UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

IBG LLC; INTERACTIVE BROKERS LLC;
TRADESTATION GROUP, INC.; TRADESTATION SECURITIES, INC.;
TRADESTATION TECHNOLOGIES, INC.;
and IBFX, INC.

Petitioners

v.

TRADING TECHNOLOGIES INTERNATIONAL, INC.,

Patent Owner

Case CBM2015-00182
U.S. Patent No. 7,772,132

DECLARATION OF CHRISTOPHER H. THOMAS

Declaration Exhibit	Corresponding TT Exhibit
A	2201
B	2202
C	2203
D	2204
E	2205
F	2206
G	2207
H	2208
I	2209
J	2165
K	2210
L	2211
M	2212
N	2213
O	2214
P	2215
Q	2216
R	2217
S	2218
T	2219
U	2171
V	2173
W	2170
X	2220
Y	2221
Z	2222
AA	2223
BB	2224
CC	2225
DD	2226
EE	2227
FF	2228
GG	2229
HH	2230
II	2231
JJ	2232
KK	2172

2

LL	2233
MM	2234
NN	2235
OO	2236
PP	2237
QQ	2238
RR	2239
SS	2240
TT	2241
UU	2242
VV	2243
WW	2244
XX	2245
YY	2246
ZZ	2247
AAA	2248
BBB	2249
CCC	2250
DDD	2251
EEE	2252
FFF	2253
GGG	2254
HHH	2255
III	2256
JJJ	2257
KKK	2258
LLL	2259
MMM	2260
NNN	2261
OOO	2262
PPP	2263
QQQ	2264
RRR	2265
SSS	2266
TTT	2267
UUU	2268
VVV	2269
WWW	2270
XXX	2271

3

YYY	2272
ZZZ	2273
AAAA	2274
BBBB	2275
CCCC	2276
DDDD	2277
EEEE	2278
FFFF	2279
GGGG	2280
HHHH	2281
IIII	2282
JJJJ	2283
KKKK	2284
LLLL	2285
MMMM	2286
NNNN	2287
OOOO	2288
PPPP	2289
QQQQ	2290
RRRR	2291
SSSS	2292
TTTT	2293
UUUU	2294
VVVV	2295
WWWW	2296
XXXX	2297
YYYY	2166

4

I. INTRODUCTION

I, Christopher H. Thomas, declare as follows:

1. I am over 18 years of age. I have personal knowledge of the facts stated in this declaration and could testify competently to them if asked to do so.

2. I have been retained on behalf of Patent Owner Trading Technologies International, Inc. ("Patent Owner") to provide expert opinions in connection with Case CBM2015-00182, regarding United States Patent No. 6,772,132 ("the '132 patent"). I have also been retained on behalf of Patent Owner to provide expert opinions in connection with other CBM proceedings and litigations involving the '132 patent and other patents owned by the Patent Owner.

3. I understand that a Petition was filed on September 11, 2015 seeking covered business method ("CBM") review of claims 1 through 56 of the '132 patent, and the petition was subsequently assigned case no. CBM2015-00182. I understand that in the Petition, Petitioner alleged that the claims are unpatentable under 35 U.S.C. § 101 and also provided various grounds under 35 U.S.C. § 103. I understand that the Petitioner did not allege any grounds of anticipation. The PTO instituted CBM review, by decision dated March 3, 2016, for all claims of the '132 patent under § 101 and the TSE and Belden-based grounds under § 103.

4. I have been asked to provide my opinion relating to an inquiry into the patentability of claims 1 through 56 of the '132 patent under 35 U.S.C. § 103. I

5

have also been asked to address the technological nature of the claims, as well as the inquiry into whether the invention solves a technical problem using a technical solution.

5.   I am being compensated for my time spent on this matter, including independent study, document review, analysis, and writing. My opinions stated herein are based on review and analysis of the materials obtained in connection with my work in his matter, together with my education and experience. The opinions stated herein are my own. My compensation is not contingent upon my opinions stated herein or the outcome of this proceeding.

6.   As will be discussed in greater detail below, it is my opinion that the invention of claims 1 through 56 of the '132 patent would not have been obvious to one of ordinary skill in the art at the time of the invention. The bases for my opinions are set forth below. One basis assumes that each of the claim elements can be found in the prior art. In addition, for purposes of this declaration, I want to make clear that I have been asked to *assume* that TSE qualifies as prior art to the '132 patent, even though I understand that there is a significant issue in this proceeding as to whether or not that assumption is valid. As also discussed in greater detail below, it is my opinion that the invention of claims 1 through 56 of the '132 patent was not obvious at the time of the invention in view of the TSE

6

and Belden-based grounds,[1] as alleged by Petitioner. The claims are not obvious because TSE and Belden, whether taken alone or in the suggested combination, fail to teach the combination of elements as claimed in the independent claims of the '132 patent.[2] My opinion is supported by overwhelming real world evidence, which I will discuss below, from both before and after the time of the Patent Owner's introduction of the commercial embodiment of the invention. This evidence supports my opinion regarding the state of mind of one of ordinary skill in the art at the relevant time. This evidence also includes substantial objective indicia (secondary considerations) of non-obviousness. Taking this body of

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[1] The TSE and Belden-based grounds are: 1) with respect to claims 1-3, 7-10, 14-16, 20-28, 30-38, 40-48, and 50-56, alleged to be unpatentable under 35 § 103 over TSE and Belden; 2) with respect to claims 4, 11 and 17, alleged to be unpatentable under 35 U.S.C § 103 over TSE, Belden and May; and 3) with respect to claims 5, 6, 12, 13, 18, 19, 29, 39, and 49, alleged to be unpatentable under 35 U.S.C § 103 over TSE, Belden, and Gutterman.

[2] In addition, certain dependent claims further distinguish from the prior art and provide further independent bases that the invention, including the features of those dependent claims, would not have been obvious to one of ordinary skill in the art. I address some of these dependent claims as well below.

evidence as a whole, including the path from the prevalent GUI tools for electronic trading before the claimed invention, to the initial skepticism of the claimed invention, to widespread acceptance and copying, as well as other factors discussed below, it is my opinion that the claimed invention of the '132 patent was not only *not* obvious to one of ordinary skill in the art at the time of the invention, but also that the claimed invention rises to the rare revolutionary and pioneering status, in the technical field of GUI tools for order entry in electronic trading.

7.   I also note that during the original examination,[3] the Examiner assumed that the prior art included a trading GUI tool with all elements of those independent claims other than "single action order entry." Thus, the "closest art"

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[3] The parent applications resulted in the '132 patent and U.S. Patent No. 6,766, 304 ("the '304 patent"). The primary reference here, TSE, was cited and considered during reexamination proceedings involving the '132 and '304 patents. Ex. B, '132 Reexam Certificate and Ex. C, '304 Reexam Certificate. In addition, during the reexamination proceedings, the Aurora brochure (Ex. 2053), which discloses an embodiment of Belden, was cited and considered. *Id*. The patent to Gutterman (Ex. 1011) was cited and considered during the original prosecution. The claims of the '132 and '304 patents are also related because they claim subject matter found in TT's MD Trader product, discussed below.

8

identified by the Examiner in that proceeding was assumed to include the other claim elements. It is also my opinion, based on my experience as one with skills higher than one of ordinary skill in the art, that the Examiner was correct in concluding that the independent claims would not have been obvious even with the above-identified assumption regarding the identified "closest art" and that the Examiner was correct in allowing the claims. I also note that the identified "closest art" is more relevant than the alleged art relied upon by the Petitioner and that the references asserted by Petitioner are further from the invention than what was already considered in examination and what has been considered in subsequent litigation.

II. QUALIFICATIONS & BACKGROUND

8. My curriculum vitae is attached to this report as Exhibit A. Briefly, my expertise lies in the field of the engineering, design, and development and construction of graphical user interface ("GUI") tools for electronic trading, such as those used in electronic trade execution systems and proprietary trading systems.

9. I have been actively trading on exchanges worldwide and managing portfolios of futures, commodities, stocks, and stock indexes since 1992. In 1996, I began developing trading decision and execution systems. At that time, my trading became completely reliant on the systems that I had developed.

9

Ultimately, this led to my career in technology as a Chief Technology Officer (CTO) for several large trading companies and Managing Director of a large Canadian bank.

10.   As CTO of Emerald Market Systems in 1997, I designed and developed an internet quote system that was used by the Chicago Mercantile Exchange to provide free quotes for certain new markets that the exchange was promoting over the internet. The system had two versions. The first version was a HTML based quote application that provided typical last price, best bid and ask price information. The second version was a JAVA based version of the HTML quote application. Both of these versions were used to facilitate trading in the open outcry trading pits. In 1998, I designed and developed for a Chicago-based Futures Commission Merchant, named LFG, the first web browser based trade order entry system for the U.S. commodity markets known as "FuturesOnline." When FuturesOnline was first released to users, there were no electronic exchanges for futures that were available to regular users who were not members of an exchange in the United States. Because of this, FuturesOnline was initially connected to the TOPS system at the Chicago Mercantile Exchange. This allowed traders connected via the internet to send orders using FuturesOnline, which would be routed to the relevant trading pit at the exchange using the TOPS system. FuturesOnline also provided quotes to its traders and also allowed them to view

10

their previous transactions, open orders, account balances, etc. Later, when

GLOBEX became available to regular customers of FCMs, FuturesOnline was

connected to GLOBEX as an electronic exchange destination. I was responsible

for designing and programming all of the graphical user interfaces ("GUIs") and

designing and implementing the database that FuturesOnline used for storing

trades, orders, account balances, etc. There was another component to

FuturesOnline which I developed and that was the broker version. This enabled

brokers at LFG to see all of the account balances and open and closed orders for all

of their clients, and it enabled the brokers to enter orders, modify existing orders,

cancel orders or close out trades for any of their customer's accounts. This was

functionality that they had never had before and it greatly increased the

productivity of the brokers and allowed them to have improved risk management

over their customers' trading activities. FuturesOnline was so successful that I

created a white-labeled version that enabled other FCMs to use the FuturesOnline

technology while it appeared to their customers that it was their own.

FuturesOnline was white labeled to three FCMs, in addition to LFG's use. In

developing LFG's FuturesOnline, I utilized Distributed Network Architecture

("DNA") technology from Microsoft Corp. FuturesOnline was later featured on

Microsoft's website as a case study for its use of DNA technology. A copy of the

case study is attached as Ex. D, (Microsoft DNA Case Study). This technology

11

was developed for electronic trading, not for mimicking or supporting open outcry trading. As will be discussed below, in the transition away from open outcry trading, some technology was developed to mimic open outcry trading, while other technology was developed to carry out electronic trading by sending trade orders to an electronic exchange for automatic anonymous matching. FuturesOnline falls into the latter category.

11. During the period from about 1992 to 2002, I was active in the trading community in a variety of roles relating to trading and/or technology for trading, as described in this declaration. By virtue of this experience, I witnessed, participated in, and am familiar with the industry's transformation from open outcry trading pits, to early trading tools for after-hours trading (such as the Chicago Board of Trade's Project A and the CME/Reuters GLOBEX system) and, eventually, to what we refer to today as electronic trading and its technology based trading tools.

12. From late 1999 until 2002, I was the CTO for Stafford Trading, a proprietary trading company in Chicago, Illinois, USA, which was one of the largest market makers on the U.S. equity option exchanges. In this capacity, I managed a staff of roughly one hundred individuals and an annual technology budget in excess of fifteen million dollars. This staff included approximately 40 software developers, 40 network and server engineers, and 20 support staff. During this time, I also designed a new desktop order entry system to replace a

12

legacy system for the traders at Stafford Trading. This system was connected to electronic exchanges and ECNs for stocks and options on stocks, and was connected to the CME GLOBEX electronic exchange for futures. I designed the GUIs for that system, which included Level II type quotes (this is functionally equivalent to Figure 2 in the TT patents). In April of 2000, while at Stafford Trading I became a founder and CTO of a technology company called Ragnarok Systems Inc., which was majority owned by the principals of Stafford Trading. Ragnarok Systems was a next generation online trading brokerage firm. Ragnarok Systems along with parts of Stafford Trading was acquired by Toronto Dominion Bank in March of 2002. Ragnarok Systems was also featured on Microsoft's website as an example of large commercial usage of Microsoft's technologies in the Financial Services industry. At Toronto Dominion Bank ("the Bank"), a large Canadian bank, after the acquisition, I served until August 2003 as a Managing Director and CTO of the new entity at the Bank that was named TD Options, LLC. I subsequently returned to trading as a Managing Director at TD Options LLC and continued to further develop trading systems that I had begun using several years earlier. In 2006, I started my own trading group at TD Options LLC, while still serving as a Managing Director, and actively traded a long-short portfolio of U.S. Equities and U.S. equity index futures, using the trading strategies and software tools that I developed. This trading was electronic trading. When I refer to

13

electronic trading, I am referring generally to a system in which traders send electronic orders to an electronic exchange, where the electronic exchange uses technology to implement an automatic matching engine (via hardware and software).

13.   I left TD Options LLC in October of 2008 and became a founder of a proprietary trading firm in Chicago, named Pembroke Trading LLC, specializing in algorithmic trading of futures markets. In this capacity, I was responsible for designing and managing the development of the user interfaces and electronic trading platforms and infrastructure for testing and executing trading strategies in live markets.

14.   In May of 2011, I started my own proprietary trading firm, Maridunum Capital, L.L.C., which specializes in automated algorithmic trading of Futures Markets. In this capacity, I was responsible for designing all trading software and algorithms for the company. Additionally, I was responsible for programming portions of the software.

15.   In May of 2016, I became a founder of a software company named Primal Quant LLC, which will provide trading strategy design and testing tools to online traders without the need for the trader to have programming experience or knowledge. At Primal Quant I am responsible for all GUI and database designs, as well as managing a team of software engineers.

14

16.   I am not a professional expert witness. My profession is the development of technology for trading and trading. My experience as an expert is limited to the subject matter of the TT patents, and I was hired more than 9 years ago in that role because of my relevant experience in the trading industry, including open outcry, electronic trading, and the development of technology for use in electronic trading. Prior to that, I had never testified as an expert witness in any matter. In sum, before getting involved as an expert, I had widespread exposure and personal knowledge as to the state of the art at time of invention, as well as before and after the time of the invention. Through my experience with the litigation, I was exposed to additional items of information. Coupled with my personal experience in the industry, I have therefore gained extensive knowledge of the art.

III.   INFORMATION CONSIDERED

17.   I am familiar with the '132 patent through my work on litigations involving the '132 patent (as well as other TT patents). I am familiar with its prosecution history, including parent/provisional applications. I am familiar with all of the CBM materials in the above-captioned matter including the Petition and supporting exhibits and declarations, the patent owner's preliminary response, and the Board's institution decision.

18.   With respect to the litigations involving the '132 patent, I am familiar

15

with proceedings before the United States District Courts and the United States Court of Appeals for the Federal Circuit involving the '132 patent and related patents (e.g., U.S. Patent Nos. 6,766,304, which shares a common specification with the '132 patent). Those proceedings involved entities that participated in a Joint Defense Group with Petitioners and joined together to conduct a worldwide hunt for prior art. Ex. E, TT0703980 at p. 16. As a result of my involvement in these court proceedings, I have been exposed to the large amount of alleged prior art that has been presented by the parties in the related litigations over the past ten years. Many, many documents relating to alleged prior art were produced by the defendants, members of the Joint Defense Group, and other third parties. In connection with the court proceedings, there were many dozens of depositions seeking information on the state of the art and the invention, including a number of depositions of third party individuals who executed declarations regarding the uniqueness and benefits to the user and the industry of the commercial embodiment of the claimed invention. In addition, there were party contentions and expert reports relating to the validity of the patents. There were summary judgment filings relating to validity and declarations in support of such filings. The defendants in the court proceedings also took depositions of third parties that entered into license agreements and/or settlements with TT and a number of third party individuals who executed declarations regarding the uniqueness and benefits

16

to the user and the industry of the commercial embodiment of the claimed invention. Prior to trial, the parties served expert reports and contentions. In the *eSpeed* case and the *CQG* case, I testified at trial, as did a number of other experts for the parties. Voluminous material relating to the validity of the patents was developed. Because of my own experience in the industry, my review of the file history, and my experience in these court proceedings, I have a thorough understanding of the state of the art at the time of the invention, and before and after the time of the invention.

19.   In the district court proceedings, I became familiar with the TSE reference that has been presented in this proceeding, as well as other TSE documents and the 2005 deposition of a TSE representative (Mr. Kawashima), who was recently deposed again. I have considered both deposition transcripts. For purposes of clarity, I will use the shorthand "TSE" to refer to the reference relied upon in this proceeding. TSE was first raised in the court proceedings more than ten years ago. In October of 2007, a jury determined that, among other things, TSE did not render the '132 patent and the related '304 patent unpatentable and that TSE did not qualify as prior art. The district court agreed, and these findings were not appealed. I am also familiar with the prosecution of the '132, and '304 patents at the PTO, including reexamination proceedings, in which the claims of the '132 and '304 patents were upheld, including over TSE, Belden's system as

17

described in the "Aurora" brochure, and Gutterman. As such, the alleged prior art asserted by Petitioners in this proceeding is either less pertinent or, at best for Petitioners, cumulative to the alleged prior art references that were considered by the PTO, either in the original prosecution or in the reexamination proceedings. In addition, as noted in the Other Publications section of the Reexamination Certificate confirming patentability of the '132 patent's claims, a number of TSE related documents (including translations) were cited references and therefore were considered during prosecution. Ex. 1001 at p. 2.

20.   In addition, I have personal experience with a wide variety of technologies for electronic trading (as referenced above in background) and, over the course of my professional involvement in trading, have seen numerous GUI tools for electronic trading. Throughout my professional trading career, I have made an effort to stay current and when possible ahead of the curve, on technologies for trading, including investigating new technology offerings, attending trade shows, and receiving sales pitches from trading technology vendors, as well as developing technology myself. I also have colleagues in the industry, some of whom would be considered one of ordinary skill in the art, and some of whom I would consider to be of significantly higher levels of skill. Because of my roles in the industry, from a time significantly before the invention until well thereafter, I was working and speaking on a regular basis with these

18

colleagues and the traders themselves about technology for trading in general, and GUI tools in particular, and their needs, desires, frustrations and challenges with the technology available at the time. These experiences further inform my opinions from the perspective of one of ordinary skill in the art.

21.   In addition to the above, I have personally traded on electronic exchanges using Trading Technologies's ("TT's") products, including MD Trader, which is the commercial embodiment of the inventions described for example in the '132 patent. In addition, I have spoken with numerous users of MD Trader and other experts in the field about MD Trader and how it functions.

IV.   PERSON OF ORDINARY SKILL IN THE ART

22.   The technology at issue in this proceeding is a graphical user interface ("GUI") tool for trading. In general, the term GUI refers to a human-machine interface that allows users to interact with the machine by utilizing graphical elements, as opposed to, for example, text-based interfaces. Text-based interfaces typically required the user to type commands on a keyboard. With a GUI tool, the user may interact with the graphical elements on a display, such as by using a keyboard, a mouse, a stylus, a finger, or other pointing device. GUI tools are constructed using a combination of software and hardware elements. In addition to desktop and laptop computers, GUI tools are used in a wide variety of handheld devices. GUIs are also sometimes referred to as MMIs (man-machine interfaces) or

19

HCIs (human-computer interfaces). These GUIs are analogous to physical devices because, like physical devices, they are designed to permit a user to interact with a machine. For example, in older airplanes, the cockpit utilizes physical buttons, levers or switches to control the operation of the airplane. In modern day aircraft, the cockpit utilizes GUIs that enable the pilot to control the operation of the airplane. As another example, old calculators have push buttons that enable the user to enter values or operations, whereas today's smartphones utilize, for example, a GUI that enables the user to enter the same values or operations.

23.   GUI tools like the invention of the '132 patent are typically developed for and used by professionals, particularly at the time of the invention. Thus, in addition to providing desirable functionality, these GUI tools must be highly stable and reliable. In my experience, GUI tools for trading are extensively tested, including testing in all kinds of simulated market conditions, well in advance of any use in a live market. As discussed below, GUI tools are mission critical for professional electronic traders. They are the primary tools of their trade, just like GUIs in a cockpit are the primary tools for pilots flying modern day aircraft.

24.   In the course of my industry experience, I have hired people to do GUI tool development for electronic trading. Backgrounds included previous experience in software development, technical degrees in computer science, engineering or other science disciplines, or equivalent work experience, etc.

20

25.   In my opinion, one of ordinary skill in the art for purposes of this proceeding is a person having (1) a bachelor's degree or equivalent experience and (2) two years of experience designing and/or programming graphical user interfaces, including experience designing and/or programming graphical user interfaces for electronic trading based on input from a person with knowledge of the needs of an electronic trader. I have a greater level of skill, but I can speak about what one of ordinary skill in the art would understand because of my background and experience.

26.   I have reviewed Mr. Roman and Mr. Rho's definition of one of ordinary skill (submitted with the Petition) and I disagree with it for at least the reason that it does not provide sufficient weight to the experience designing and/or programming GUIs for electronic trading based on input from a person with knowledge of the needs of an electronic trader. Mr. Roman and Mr. Rho's definition instead focuses primarily on GUI experience, with no access to or knowledge of the needs of an electronic trader, which is plainly deficient. They suggest that merely direct or indirect experience with trading or related systems is adequate. This is incorrect because it ignores the needs of the trader for whom the GUI is designed, and further illustrates why their opinions regarding obviousness are incorrect. In addition, I disagree with their assertion that the person of ordinary skill would need a bachelor's degree or higher in computer science or computer

21

engineering. Based on my experience in the industry for over 20 years, I believe that this requirement is too restrictive, again skewing the view of the person of ordinary skill toward a generalized GUI designer and away from the recited field.

27.   My definition of the person of ordinary skill in the art is that of a baseline worker in this industry. Many individuals in the industry, as one would expect, have a significantly higher level of skill. My level of skill in the art is significantly higher than that of the person of ordinary skill, and my level of skill was attained through my numerous relevant work experiences, including trading experience, self–taught programming proficiencies, as well as experiences in designing, developing and implementing electronic trading systems.

V.   CLAIM CONSTRUCTION

A.   "Static"

28.   The term "static" has been construed by the United States Court of Appeals for the Federal Circuit as _____. This construction comports with the broadest reasonable interpretation. Indeed, it would be unreasonable to adopt any construction that would be broader in scope than the Federal Circuit's construction, which is based on the intrinsic evidence.

B.   "order entry region"

29.   The patent describes and claims an "order entry region" that is "aligned with the static display of prices" and includes "areas for receiving commands ... each area corresponding to a price of the static display of prices."

22

This term has a broadest reasonable interpretation that is consistent with its plain and ordinary meaning: a region for entering orders, where the region includes areas for receiving commands and each area in the order entry region corresponds to a price in the static price display.

C. **"selecting a particular area in the order entry region through a single action of the user input device... to set a plurality of additional parameters for the trade order and send the trade order to the electronic exchange"**

30. In my opinion, the single action must occur in a location corresponding to a price level along the static display of prices and the single action must set two or more additional parameters *and* send the trade order message to an electronic exchange. In other words, the single action that both sets additional parameters (for example, price and type of order) and sends a trade order message must occur at a particular location in the order entry region. This element requires input from a user input device to select a particular location.

D. **"displaying working orders in alignment"/"entered orders"**

31. One of ordinary skill in the art would readily recognize that the working order indicator must indicate to the user that the user has an order at a particular price level along the static display of prices. Ex. 1001 at 7:55-8:2. One of ordinary skill in the art would likewise understand the claimed "entered orders," which are dynamically displayed in alignment with their corresponding prices along the static price display, represent the quantity (portion) of the user's trader

23

order that has been filled at the corresponding price.

E.   "Re-Centering Instruction"

32.   A "re-centering instruction" is a command by a user to re-center the static display of prices so that the inside market is in the middle of the display.

VI.   BACKGROUND OF THE INDUSTRY

33.   To understand the claimed invention and its non-obviousness, it is important to have an understanding of the nature of the industry in which it was developed and the mission critical nature of tools used for electronic trading. The electronic trading industry is made up of various participants. These participants include the exchanges, Futures Commissions Merchants ("FCMs") (the equivalent of equity brokers for futures), technology providers, such as Independent Software Vendors ("ISVs") whose primary business is to provide GUI tools, trading firms, brokers and individual traders. All of the participants identified above provide complimentary services and work together to facilitate the execution of trades. TT is an example of an ISV. Examples of more well-diversified vendors include CQG and Bloomberg. Examples of an FCM include RCG and Goldman Sachs. Examples of an exchange include the CME, Eurex and the Tokyo Stock Exchange ("TSE"). A broker is generally speaking someone who, typically for a fee, executes buy and sell orders on behalf of another. An FCM is an entity that facilitates the buying and selling of futures contracts and typically holds monetary funds as

24

margin for trading activities. An exchange is a marketplace in which things of value are traded, such as securities, options, futures etc.

34.   TradeStation Group, Inc. is the parent company of TradeStation Technologies, Inc., a trading technology company, and TradeStation Securities, Inc., an online securities and futures brokerage firm (broker and FCM). I may refer to these Petitioners collectively as "TradeStation." TradeStation Technologies was founded under the name Omega Research in 1982, which initially focused on developing and marketing tools that would allow users without a technical or computer programming background to program and test their own trading strategies. Since that time, TradeStation has been engaged in developing and marketing technology for traders, including, after the advent of electronic exchanges, technology for electronic trading. TradeStation's technology has included, and today includes, GUI tools for electronic trading. Thus, TradeStation has been significantly involved in the technology side of the trading industry for over thirty years. TradeStation is a large company that invests millions of dollars annually on technology development. TradeStation revenue is derived from a combination of a monthly fee for access to their trading platform and/or a fee per trade. IBG LLC, Interactive Brokers LLC and IBFX, Inc., (hereinafter collectively, "IB") are likewise very large technology and trading companies. IB conducts an electronic brokerage business, providing its customers what it claims

25

to be one of the most effective and efficient trading platforms in the industry. IB charges a fee for access to its data feed, as well as fees on a per share traded basis, and recently reported annual net revenue is in excess of one billion dollars.

35.   Prior to the advent of electronic trading, the trading of futures occurred in what is known as the open outcry system. Open outcry is the name of a system of financial trading, used for over one hundred years, in which traders shout their bids and offers aloud in an area of a trading floor referred to as a trading pit. In the trading pit, traders utilize shouting and hand signals to transfer information about buy and sell orders to other traders. To avoid confusion, the inside market prices were the focus, and traders could only shout and signal regarding their interest at the best bid/offer or at a price that *improves* the best bid/offer. Orders (bids or offers) at prices *away* from the inside market were not allowed. Traders executed trades by agreeing with another trader in the pit on a price and quantity. As such, there was no transparency into what interest others might have at prices away from the best bid/offer. Indeed, traders in a trading pit frequently would try to hide their interest in order to obtain the best prices for their orders. In addition, in the trading pit personality and physical presence played a role—there was no anonymity. Traders often wore distinguishing clothing, such as colorful jackets or even platform shoes, to garner attention in the pits in an attempt to gain priority for order execution. For the same reasons, certain locations in the

26

trading pit could be more desirable than others. Furthermore, each pit was limited to contracts for a particular product and thus, in the open outcry system, the trader could only trade the contracts that were available in the pit where he/she stood. Mobility between the pits was limited, by physical distance between the pits, timeliness of the opportunity, and other factors. In its early form, there was no technology in the open outcry trading pits. Nonetheless, open outcry pit trading was viewed as incredibly efficient and it was viewed favorably and supported by large numbers of industry participants.

36. As technology developed, exchanges and trading entities utilized the technology within the open outcry trading paradigm. For example, technology was added by the exchanges to assist in the processing of orders executed in the open outcry pits, which is sometimes referred to as backend processing. Similarly, brokers began to utilize technology to route customer orders to the appropriate trader in the pit. An example of this type of technology is shown in the patent to Gutterman. *See* Ex. 1011. Even though it utilized technology to facilitate the functioning of the entities involved in the trading pit, the open outcry paradigm was essentially unchanged.

37. Subsequently a different paradigm appeared, which very rapidly changed the way trading was done. Many in the industry, of course, resisted the new paradigm, especially in the United States. The new paradigm was electronic

27

trading. As opposed to the use of computers to facilitate the open outcry system, I understand "electronic trading" to refer to technologies that allow a trader to send an order to an electronic exchange, where the exchange uses technology to implement a matching engine (hardware and software). The electronic exchanges typically publish rules advising users of the manner in which the exchange will prioritize and match orders. Technologies that assist in the functioning of an open outcry trading pit, such as order routing or order management technologies, are *not* electronic trading. Initially, electronic trading was used to extend trading hours, where the electronic markets could be utilized after the open outcry pits had closed. Later, electronic trading was used as a complete replacement for the open outcry trading pits. In the new paradigm, electronic trading involves providing traders with real time data feeds and mission critical GUIs for interacting with the electronic exchange. In this paradigm, traders no longer pick who they trade with. Instead, traders send orders at any desired price and quantity as electronic messages that get queued and matched by an electronic exchange (computer hardware and software), typically on a first-in-first-out basis. In this system, the traders are anonymous to each other. The electronic exchange publishes this mass amount of data to people all over the world, so the information is known and transparent in contrast to the situation in traditional open outcry trading pits.

     38.   In the early period of applying technology to trading, there were

28

different approaches and theories driving technology development. Some entities took the approach, which now seems silly in hindsight, of trying to continue the pit paradigm by taking advantage of technology to continue pit trading. The patent to Belden is an example of this approach that attempted to continue the pit paradigm by mimicking the trading pit. *See* Ex. 1012. Under the pit-mimicking approach, the GUI tools were constructed such that the trader could see an electronic representation of the pit and an electronic representation of other traders participating within that pit. In the representation of the pit, the various representations of traders typically also displayed the trader's offers and/or bids at the inside market prices. In order to execute a trade, the trader would click on an icon representing a trader in the pit. There was no matching engine (i.e., no electronic exchange) in these types of pit-mimicking systems. One train of thought in support of this approach was that traders who had previously traded in the trading pits would like it and adapt more readily because it would be more familiar to them, in the sense that, as in open outcry pit trading, the traders were able to select the other trader with whom they wanted to trade. Also, several United States exchanges and many of their members wanted to retain the open outcry pit trading model.

39.   The other approach looked to create a new and different electronic trading paradigm. Specifically, this approach was focused on the development of

29

GUI tools for electronic trading and the development of electronic exchanges. The invention of the patent here falls into this second approach. The invention is not compatible with a pit mimicking approach, like Belden. Likewise, a pit mimicking approach, like Belden, is not compatible with an electronic exchange. The pit mimicking approach is merely a continuation of the open outcry paradigm, with an incremental utilization of technology. By the time of the invention, those of ordinary skill in the art working in the direction of the electronic trading approach had issues with the pit mimicking approach. For example, the pit mimicking approach was really just a platform for users to execute trades with each other, continuing the open outcry paradigm, whereas the electronic trading paradigm allowed for anonymous and automatic electronic matching. Eventually, electronic trading ushered in the new paradigm, and the attempts to use GUIs to replicate the trading pit experience fell by the wayside as did open outcry trading itself. There was no place for use of these types of trading tools with the new electronic trading exchanges. Anonymity, electronic matching algorithms, speed and the ability to simultaneously trade multiple contracts came to the fore with electronic trading, and pit trading's personality, physical presence, lack of transparency, and limitations on the ability to trade more than one type of contract were out.

40. One of ordinary skill in the art would understand that an electronic exchange is a matching engine in which trade orders that are sent to the electronic

exchange (in the form of electronic messages) are automatically matched in accordance with rules set by the exchange. Most electronic exchanges match orders based on a first-in-first-out priority, using time stamps to determine priority. The electronic exchange stores an order book database including bid and offer information and sends out updates in a data feed. The trade order messages are sent to the exchange electronically and typically queued for execution using a first-in-first-out matching algorithm. There are no open outcry pits in an electronic exchange. And in contrast to open outcry pits where traders are in close proximity to each other, know the identity of the other traders and actually choose who they trade with, trading on an electronic exchange is generally anonymous. Conventional GUI tools were developed to permit traders to send order messages to an electronic exchange.

41. Since at least the early 1990s, the industry participants identified above have been investing in developing and providing GUI tools for electronic trading (for order entry on electronic exchanges). These tools are developed, for example, by ISVs and more well diversified vendors. Many FCMs and brokers (such as RCG and Goldman Sachs) and exchanges (such as DTB/Eurex in the 1990s, the CME in the 1990s through the early 2000s and the Intercontinental Exchange ("ICE") today) have provided their own GUI tools for electronic trading. IB and TradeStation, Petitioners in the current proceedings, have also invested

31

substantially in creating and providing GUI tools for electronic trading. *See, e.g.*, Ex. F, Excerpts from IB 10-K Statement at 419 ("Our proprietary technology is the key to our success."); Ex. G, Excerpts from TS 10-K Statement at 5187 ("We believe that our success depends, in large part, on our ability to offer unique, Internet-based trading technologies."). Furthermore, many trading firms and individual traders have invested in their own technology creating their own GUI tools for electronic trading. All of the participants identified above compete against each other with respect to GUI tools for electronic trading and invest untold millions of dollars on an annual basis on these technologies.

42. Because of the significant monetary stakes involved, i.e., the very livelihood of the user or the user's clients, the GUI tool for order entry is mission critical. The GUI tool of the '132 patent was designed and developed for the needs of a professional trader. A professional trader is conducting trading as his/her profession. Some professional traders trade on behalf of others (e.g., clients), while others trade on behalf of themselves. Professional traders are highly trained and have very specialized skill sets. There is nothing more critical for this type of user than the ability to see the market information, to quickly react to that information with the ability to accurately enter, modify and cancel orders, and to observe the results of those actions. This type of tool is expensive to develop, and also expensive for the professional traders to use. It is indisputably the primary

32

tool of the trade, very much like a primary flight display ("PFD") in the cockpit of an airplane, which provides the pilot with the critical flight information (attitude, altitude airspeed, etc.) as well as feedback based on pilot input to the flight controls. For this reason, users typically set up the GUI tool in a very precise manner according to their personal tastes, and the location of this GUI tool coincides with their center of focus on their workspace. These professional users are typically committed to significant monthly costs to be able to use these GUI tools, particularly at the time of the invention. For example, I understand that TT's trading software costs $1,000 per month per user.

43.   The incentives to the industry for success are pure – there is a lot of money at stake. Traders (who can be brokers, speculators and/or hedgers) use technology, such as software and hardware products, to help make quick decisions and seize opportunities on behalf of themselves or clients. This technology can be obtained from any of the various industry participants described above. At the time of the invention and continuing to today, there is a strong interest in technology that provides even the slightest edge or advantage over others in the industry. As a result, there are tens of millions of dollars spent each year on research and development to create technologies that can provide a participant in the industry any edge. *See, e.g.*, Ex. G at 5188 ("In 2006, 2005, and 2004, technology development expenses were approximately $5.2 million, $4.5 million,

33

and $4.4 million"). Different participants in the industry have different motivations for success, but each participant is well-capitalized and highly motivated to provide improved GUI tools for traders. This is true today and was also the case both before and at the time of the invention. For example, success for traders is measured in terms of profitability. Brokers, FCMs and exchanges make money by charging fees for trading activity—so technology that causes traders to trade more makes them more money, and of course they want participants to be successful, otherwise they would not trade. ISVs and other software vendors charge in different ways, such as monthly site fees or based on transactions – but their success is directly related to the success of the traders.

44.   Speed and accuracy are often critical factors for success. Because opportunities may exist for only fleeting moments, the ability to spot them and seize those opportunities can often be the difference between the success and failure of a trader. Thus, even the smallest appreciation or suspicion that some new technology has a chance to provide even a slight advantage is quickly tried by the industry. This was true before the time of the invention, at the time and continues to today. Unlike the case in some other industries, there are no market factors or other reasons why participants in the industry would not try any technology that is perceived as having the slightest possibility of providing an edge. Similarly, the exchanges, brokers and FCMs make more money when more

34

volume is traded, because they typically have transaction fees as a significant part of their revenue models. As such, they are always looking to develop technology that will increase the volume traded by end users. As a result of this aligned interest among industry participants, new technology that provides a competitive edge spreads like wildfire.

45.   It is important to appreciate that, in this industry, there is a very fine line between success and failure, and differences in GUI tools, which may appear minor to a layperson or one who is *not* one of ordinary skill in the art, may actually be extremely significant to one of ordinary skill. What may seem to be a minor tweak, especially with the benefit of hindsight, to a person who is not one of ordinary skill in the art or a person outside of the field of electronic trading, could mean the difference between an incredible success and a complete failure. As a result, one of ordinary skill in this art may perceive a difference as critical, whereas someone outside the field may see the same difference as minor with the benefit of hindsight.

46.   As volume through electronic trading increased, electronic trading quickly became a large portion of the business for exchanges. The exchanges, whose revenues are typically tied to trading volume, therefore had great interest in promoting electronic trading. Eurex invested in promoting electronic trading and trading screens in particular. The Chicago Board of Trade ("CBOT") developed its

35

own screen. The Chicago Mercantile Exchange ("CME") provided Globex and Globex II, both of which included trading screens. All of these exchanges had an incentive to create an improved trading GUI that caused people to trade more and that improved trader performance, so the exchanges would make more money through increased volume.

47.   One of ordinary skill in the art, and certainly an expert in the relevant area, would have an understanding of the background of the trading industry set forth in the preceding paragraphs. These are commonly understood principles in the industry. I will explain below that, in the context of this industry, where many were investing in development of GUI tools and yet all failed to achieve the technical solution of the claimed invention, the claimed invention was revolutionary. Despite the significant investment in research and development and pure motivation for improvement throughout the industry, Petitioners are unable to allege that anyone, anywhere in the world, actually achieved the invention recited in the claims prior to the inventors of the '132 patent. To my knowledge, the inventors here were the first in the world to combine the elements as recited in the claims. Petitioners nonetheless assert that the invention is obvious. This is illogical; I strongly disagree. To illustrate how Petitioners' position is incorrect, I will provide details below, in timeline fashion, of the state of the industry leading up to the time of the invention, a description of the invention and its benefits and

36

advantages, and what happened in the industry after the invention.

VII. CONVENTIONAL GRAPHICAL USER INTERFACE TOOLS ("GUI TOOLS")

48.   In the electronic trading industry, both prior to the invention of the '132 patent and for a period thereafter, there was a widely accepted conventional wisdom regarding the design of a graphical user interface tool ("GUI tool") for order entry on electronic exchanges.

49.   For example, it was conventional to provide the ability to enter and send orders to an electronic exchange using order entry tickets. While the precise layout of an order entry ticket could vary, there was a conventional construction of these tickets. In particular, it was conventional to provide a GUI, using in the form of a window, with areas in which the trader could fill out parameters for an order, such as the price, quantity, an identification of the item being traded, buy or sell, etc. The tickets would typically also provide an area (e.g., a button), which the user could press or select (e.g., click on) to send the order to the exchange. Often times the order ticket would also provide a confirmation window or button that needs to be selected before the order message is actually sent. This method was known as being very accurate for order entry, but also widely known as being very slow. Indeed, these types of conventional order tickets are still widely used today.

50.   With respect to GUI tools that permitted users to enter and send orders by directly interfacing with displayed prices (*e.g.*, through the use of a mouse), the

37

overwhelming majority of GUI tools were constructed to provide designated locations in the GUI in which the best bid price and best ask price are displayed.

51. Figure 2 of the '132 patent (reproduced with annotations below) illustrates an example of one such common GUI tool. *See* Ex. 1001.

FIG. 2

Best Bid Price is Always Displayed Here

Best Ask Price is Always Displayed Here

		201	202	203	204	205			
	Contract	Depth	BidQty	BidPrc	AskPrc	AskQty	LastPrc	LastQty	Total
1	CDHO	●	785	7626	7627	21	7627	489	8230
2			626	7625	7629	815			
3			500	7624	7630	600			
4			500	7623	7631	2456			
5			200	7622	7632	800			

52. Figure 2 represents a screenshot of such a GUI tool at a snapshot in time for a particular item (the contract for "CDHO"). Typically the user would select what item as being traded, and then the client hardware running the GUI tool would connect to a live data feed for data relating to that item. The data feed is provided to client hardware running the GUI tool by an electronic exchange, for example as illustrated in Figure 1 of the '132 patent.

53. This GUI tool is constructed as follows: It displays a BidPrc column 203 that includes locations (e.g., cells) in which bid prices are displayed and an AskPrc column 204 adjacent to the BidPrc column that includes locations (e.g., cells) in which ask prices are displayed. The best bid price that is currently

38

available in the market (the highest price at which there is an order to buy for the item being traded at the electronic matching engine) is always displayed at the top of column 203, and other prices *at which there are other orders to buy pending* at the electronic exchange are displayed in descending price order in the BidPrc column 203, each such price being displayed in a separate location (e.g., cell). Similarly, the best ask price that is currently available in the market (the lowest price at which there is an order to sell for the item being traded at the electronic matching engine) is always displayed at the top of column 204, and prices *at which there are other orders to sell pending* at the electronic exchange are displayed in ascending price order in the AskPrc column 204, each such price being displayed in a separate location (e.g., cell). The inside market is understood by those of ordinary skill in the art as meaning the best bid price and best ask price available in the market.

54. As noted above, the BidPrc column 203 and the AskPrc column 204 display prices at which there are currently orders to buy and sell, respectively, resting at the electronic exchange, each price being displayed in a separate location (e.g., cell). The quantities associated with the orders to buy and sell resting at the electronic exchange are also displayed. The GUI tool of Figure 2 is constructed to display a BidQty column 202 that includes locations (e.g., cells) in which bid quantities are displayed. The BidQty column 202 is located adjacent to the BidPrc

39

column 203. The GUI tool also displays an AskQty column 205 that includes locations (e.g., cells) in which ask quantities are displayed, and the AskQty column 205 is located adjacent to the AskPrc column 204. Each location (e.g., cell) in the BidQty column 202 and the AskQty column 205 displays a number indicating the total quantity at the electronic exchange at the price shown in the adjacent location (e.g., cell) of the corresponding BidPrc column 203 and AskPrc column 204, respectively. All the displayed prices and quantities illustrated in Figure 2 update dynamically as such information is relayed from the electronic exchange.

55.   The GUI tool shown in Figure 2 is dynamic with respect to the display of prices because each and every time the inside market changes, based on updates from the electronic exchange, the GUI tool causes the display of price values within the cells of the top row in columns 203 and 204 to change. More particularly, the GUI tool causes the value displayed in the location of the best bid price cell (i.e., the location at the top of the column 203) to change every time an update reflecting a change to the best bid price available in the market is received, and the value in the best ask price cell (i.e., the location at the top of column 204) to change every time an update reflecting a change to the best ask price available in the market is received. The other displayed bid and ask prices, as well as the associated quantities located in columns 202 and 205, similarly change to reflect updates from the market. Therefore, the displayed prices and quantities are

40

constantly changing in response to updates from the electronic exchange. However, the locations (or cells) designated for the inside market remains in the same top row of the display of prices. In other words, though the displayed values for the prices are changing in the cells, the dynamic display maintains the inside market at the same location in those top two cells. Thus, the dynamic GUI tool of Figure 2 is constructed to fix the location of the inside market for a commodity in a predetermined portion of the display (e.g., in the top cells of columns 203 and 204).

56.   In this type of dynamic screen, there is no price axis. In other words, this GUI tool only displays, in columns 203 and 204, those prices for which orders are pending at the electronic exchange. This GUI tool does *not* display price levels that have no orders. For example, in Figure 2 above, price level 7628 is omitted, because there is no order pending at the electronic exchange at that price level.

57.   In the conventional Figure 2-style GUI tool, the user could place an order by clicking on a location (e.g., cell) in one of the price or quantity columns. For example, if a user wanted to place an order to sell a specified quantity of the contract CDHO, e.g., 50 contracts, at the price 7626, the user would position the mouse over the location (e.g., cell) having that price and click. I discussed entry of these types of orders in the conventional Figure 2-style GUI tool at the *eSpeed* trial using the following demonstrative slide:

41

58. Similarly, if the user wanted to place an order to buy a specified quantity of the contract CDHO, e.g., 20 contracts, at the price of 7627, the user would position the mouse over the location (e.g., cell) having that price and click. I discussed order entry of this type at the *eSpeed* trial using the following demonstrative slide:
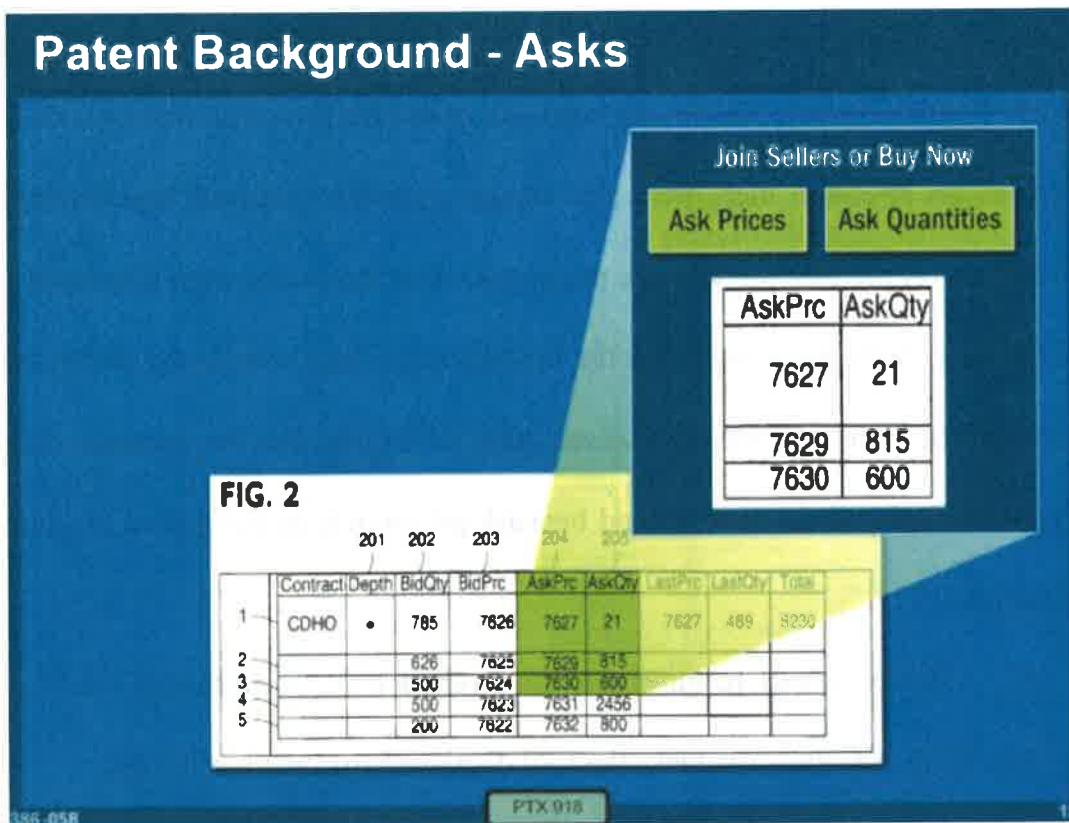
59.   As the market for CDHO updates, any of the numbers in the price and quantity columns may be changing.

60.   GUI tools like the example shown in Figure 2 were ubiquitous by the time of the invention. Typically, these GUI tools provided the user the ability to select the number of rows to be displayed. For example, if a trader desired only to see the inside market, the trader could limit the GUI tool to display only the top row.

61.   Prior to the invention, GUI tools of the sort shown in Figure 2 represented the engrained conventional wisdom and state of the art in the minds of persons of ordinary skill in the art regarding how electronic trading GUIs were best

43

designed and constructed. While most dynamic GUI tools are similar to what is shown in Figure 2 (where the best bid and ask prices are provided side-by-side), at the time of the invention there were also similar dynamic GUI tools that displayed the locations for the best bid and ask prices such that the prices were displayed vertically (*e.g.*, with the location for the best ask price being displayed above the location for the best bid price). However, such GUI tools, like the dynamic display in Figure 2, displayed the best bid and best ask prices only at designated locations on the screen.

62.   While various features may have varied from one dynamic GUI tool to another, there was one constant: the tool displayed (or provided) fixed, designated locations for displaying the best bid price and the best ask price. This made perfect sense because it emphasized focus on the primary target for the traders: the inside market. Displaying the inside market in a fixed location was perceived, by those skilled in the art at the time of the invention, as a significant advantage. First, the inside market (where an item is trading at a given moment) is the most important information for a trader. In addition, the inside market was the focus because, prior to the invention, the most common types of orders were orders made at the inside market (commonly referred to as "market orders" or "market type orders"). The same was true in the open outcry trading pits, where the inside market was the focus because, in the pits, trades were only made at the inside

44

market (orders could only be represented at the inside market prices or better). Since the location of the inside market is always known, the trader may easily spot the target, regardless of changes in the market. At any given time, the trader could look at the screen and immediately know the current state of the market. The conventional dynamic screens were valued by those skilled in the art at the time of the invention as being the fastest and most accurate way to enter orders at the inside market. It is fast because the inside market is always displayed at a fixed location where the bid and ask are in close proximity to one another, so that the trader can quickly trade by placing the mouse cursor over the best bid price or best ask price and click. It is accurate because the inside market location is fixed for the trader.

63.   At the time of the invention (and after), those of ordinary skill in the art applied specific design criteria to GUI tools for order entry in electronic trading. Specifically, one design criteria was to conserve screen real estate. In addition, it was another design criteria to provide GUI tools that enabled users to enter orders with maximum speed and accuracy.

64.   Screen "real estate" is a reference to the size of the GUI tool, or the amount or portion of the trader's screen that the GUI tool occupies. Conserving screen real estate was important because traders had numerous types of information provided on the limited space of the trading screen, including:

45

multiple markets for products to be traded, various price charts, numerous news feeds, *etc*. It was critical to minimize space so that the market for each product could be displayed, as well as to reduce the amount of mouse movement between products. The conventional dynamic GUI tools satisfied this criteria because the locations for displaying the best bid and ask prices are fixed and extremely close together (e.g, side-by-side in adjacent cells). In addition, in the higher-end dynamic screens, the number of locations for displaying bid and ask prices beyond the inside market may be adjusted to further minimize the amount of screen real estate required for a product. That is, the screen real estate for a product can be reduced to simply four locations for displaying pieces of market data that would be displayed in a single row (or column): a best bid price and quantity, and a best ask price and quantity. With the dynamic GUI tools, the other rows, such as those below the top row of Figure 2, are not necessary to see the current inside market and, therefore, do not need to be displayed. Thus, the dynamic GUI tool allowed mouse movement by the user within a product, as well as between products, to be minimized. For example, if the GUI tool was condensed to a single row displaying a best bid price and quantity, and a best ask price and quantity for one product, then the user could very quickly move the mouse between these four closely grouped locations.

65.   There were numerous examples of dynamic GUI tools in the futures

46

space prior to the patents-in-suit, including but not limited to:

SPATS screen;
GLOBEX I trading screens;
LIFFE APT trading screens;
the OSD screen of the LIFFE APT system;
MEFF dynamic screen;
TT's X_TRADER;
Project A trading screens;
eSpeed trading screens;
Patsystems trading screens;
Globex II trading screens;
DTB/Eurex trading screens;
Ecco trading screens;
RTS trading screens; and
EasyScreen trading screen

66.   Examples of screenshots of these dynamic GUI tools are collected in

Exhibit H, (Excerpts from the Expert Report of David Silverman and LIFFE

Directory of Software Solutions October 1998). To say that the Figure 2 style

dynamic GUI tool was prevalent prior to, and at the time of, the invention is a huge

understatement. These types of GUI tools were being used throughout the industry

for order entry in that time frame. Mr. Roman acknowledged this. Indeed, these

type of dynamic GUI tools remained in very strong use after the invention and are

still widely used today.

67.   In terms of the conventional GUI tool, I want to be clear that I am

referring to tools for professional traders. By the time of the invention, non-

professionals, to the extent that such individuals had access to submit orders

electronically, would typically use a basic order entry ticket, as described above. Using this method, the user may not even desire or have the need to view live market data. An example of such an order ticket is attached as Exhibit I, (Globex 1 Order Ticket). On the other hand, the professional tools described above combined presenting real time market data and order entry in same tool. As described above, for professional traders, these GUI tools are mission critical tools of the trade.

68. Indeed, in 2001, I designed an order entry interface for Stafford Trading, and later used by TD Bank, which used a dynamic GUI tool similar to that of Figure 2. There also were hundreds of these types of dynamic GUI tools used in other asset classes, including bonds and equities (*e.g.*, NASDAQ level 2 type dynamic trading screens). Still today, this style of dynamic GUI tool is a common type of order entry screen in all asset classes other than futures.

69. Thus, it comes as no surprise that the only professional GUI tools that Mr. Roman specifically recalled from approximately 1999 (at best several months after the invention) were dynamic GUI tools similar to that of Figure 2. In particular, Mr. Roman testified at deposition in this proceeding that he served as an expert witness in 1999 for Tradescape, which was a proprietary trading group. Ex. J, 5/3/2016 Roman Dep. Tr. at 26:11-27:7. Tradescape, like many others in the industry, invested heavily in technology. It employed 10 in-house developers and, as Mr. Roman testified at deposition, Tradescape's GUI was a "Level II interface."

48

Id. at 27:15-22. The "Level II interface" referred to by Mr. Roman, also referred to as a NASDAQ Level II interface at the deposition, was a dynamic GUI tool, similar to that of Figure 2, in which the GUI tool displayed the best bid and ask in fixed locations side-by-side. Tradescape's developers were adding additional features to this conventional GUI tool. The NASDAQ Level II GUI tool was known for its use in equities trading, but the functionality was in all aspects relevant to this proceeding the same as Figure 2. One of ordinary skill in the art would readily understand reference to a "Level II" or "NASDAQ Level II" GUI tool as functionally equivalent to the conventional GUI tool described herein.

70. I have personal knowledge of the state of the electronic trading industry prior to the invention. For professional traders who were concerned with speed, the overwhelming conventional wisdom at the time called for a dynamic display with the inside market being displayed at a fixed location on the GUI tool. For professional traders that were concerned with accuracy, the conventional wisdom at the time called for an order ticket. In addition, information utilized by the trader, such as fills, working orders, market depth etc., if provided at all, was commonly displayed in separate windows. The conventional dynamic GUI tool described above was not only widely adopted and used, but also accepted by those in the industry as the engrained conventional wisdom.

49

VIII. THE UTILITY AND ADVANTAGES OF THE PATENTED INVENTION

71.   Through my experiences, I have seen a lot of patents in the field of electronic trading, and many relate to incremental improvements to existing technologies. It is my understanding that not all inventions need to be pioneering or revolutionary to be non-obvious. In fact, very few rise to that level, as illustrated by many of the patents in this field. In my opinion, for an invention to be pioneering or revolutionary in nature, the invention must cause the path of development to diverge from the conventional path, opening the door for new developments improving upon the revolutionary idea. Also, the invention should be contrary to conventional wisdom and create a significant improvement that affects many people. In other words, if an invention changes the course of development in the field, spawning a substantial new arena of innovation, I would consider that invention to be revolutionary.

72.   In my opinion the present invention is not only not obvious, but one of those few inventions that rises to the level of revolutionary. The invention changed the industry and spawned a whole new arena of innovation in the design of GUI tools for electronic trading. The invention radically diverged from the conventional GUI tools of the time and provided significant advantages over the prior art by combining a dynamic display of bid and ask indicators and a static display of prices with single action order entry that occurs by selecting a location

50

corresponding to a price level along the price axis to both set a price and send the order.

73.   In contrast to dynamic GUI tools, where the display is constructed so that the location of the inside market remains fixed and the values displayed at those locations change with each and every inside market update, the GUI tool of the invention is constructed so that the display of the inside market moves relative to the price axis when the inside market changes. The claimed invention would, as a matter of first impression, be perceived by those of ordinary skill in the art as unacceptable, particularly given the engrained conventional GUIs. For example, a dynamic display of bid and ask indicators and a static display of prices would have been viewed by one of ordinary skill as using too much space on the screen, i.e., too much screen real estate, in terms of the size of the field of the dynamic display of bid and ask indicators and a static display of prices for each product on the screen. In addition, in terms of the distance that the trader would have to move the pointing device, e.g., a mouse, within a single product and between products when trading multiple products, a dynamic display of bid and ask indicators and a static display of prices would have been viewed as much too slow (requiring too much mouse movement). Another apparent disadvantage of a dynamic display of bid and ask indicators that move relative to a static display of prices is that it would permit the inside market-viewed as the target—to move up and down on the screen

51

and, as a result, a user interested in placing an order at the best bid or ask would have to "chase" the market. Thus such a screen would be slower and less accurate with respect to market type orders. Furthermore, unlike the conventional GUI where the inside market is displayed in a fixed location, with a dynamic display of bid and ask indicators and a static display of prices, the user is not able to look at only a small portion of the GUI to at all time see the inside market, the area of focus in the conventional GUI.

74.   Nonetheless, the invention provided significant benefits to users even though it had significant drawbacks that would initially turn off potential users. The claimed combination provided benefits of the prior art GUIs in terms of improved speed without the need to sacrifice accuracy when trading at specific prices and improved usability in terms of providing a better visualization of the market. It turns out that these benefits dramatically improved profitability of traders and also dramatically increased the trading volume of traders using tools embodying the claimed combination.

75.   I have seen evidence that confirms the non-obvious nature of the invention and shows how it revolutionized GUI tools in the industry. For example, in 2004, Mr. Durkin, who was then Director of Merrill Lynch Futures, wrote to the inventor, Mr. Brumfield, regarding his initial reaction to seeing an embodiment of the invention. Remarkably, even though he was given the opportunity to see the

52

invention in person, Mr. Durkin initially could not comprehend what he was seeing. He stated "[a]t first, I couldn't even understand what I was looking at." Ex. K, Email from Durkin to Brumfield, May 28, 2004. It was only after seeing the inventor enter a few orders that Mr. Durkin "figured out the layout." *Id.* After Mr. Durkin realized how the inventive GUI tool operated, he "was immediately struck by the novel way the market prices were displayed and how easy it was to enter orders." *Id.* If someone like Mr. Durkin could not even understand the inventive GUI tool when he initially saw it, this shows that it is simply not possible for anyone to reasonably conclude that the invention would have been obvious to one of ordinary skill in the art.

76. The display of price levels along a static display of prices is described in the specification of the '132 patent, for example with reference to Figures 3 and 4, reproduced below with annotations:
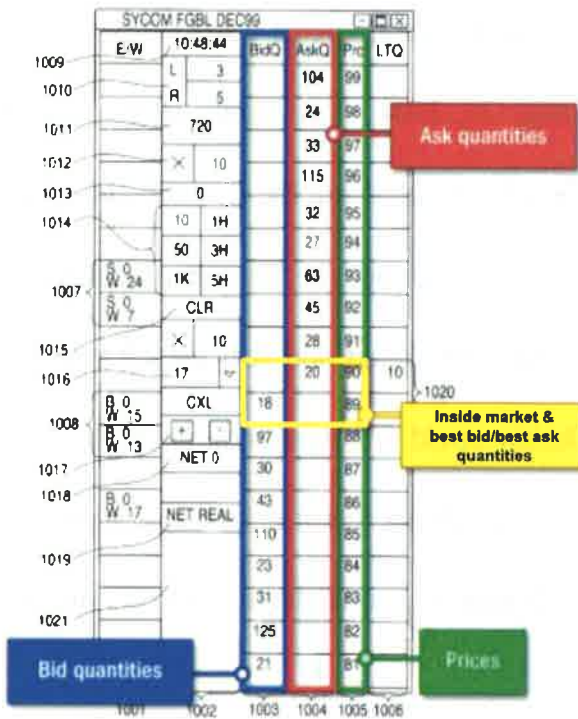
FIG. 3 / **FIG. 4**
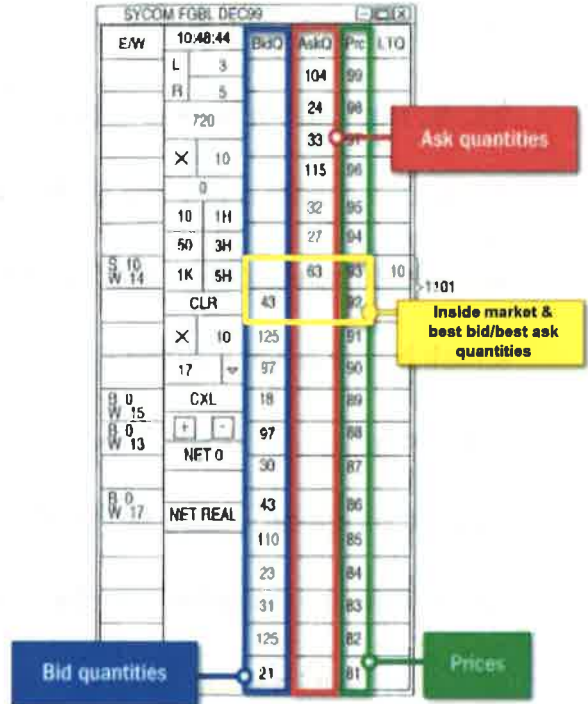
77. Figures 3 and 4 show an embodiment of a GUI tool according to the invention. The GUI tool displays the name of the product, in this example "FGBL DEC99," at the top of the window. Figure 3 shows the market for the product at one time and Figure 4 shows the market for the same product at a later time. This GUI tool is constructed as follows: it displays a price axis ("Prc") that includes locations (e.g., cells) in which each of a range of price levels is displayed. It displays bid indicators in a bid display region (e.g., column labeled "BidQ"), and ask indicators in an ask display region (e.g., column labeled "AskQ"). These regions likewise include graphical locations (e.g., cells), where each graphical

54

location corresponds to a different price level along the price axis, and the GUI tool displays the bid/ask indicators at graphical locations corresponding to their respective price levels. The GUI tool obtains the underlying market information for the bid/ask indicators from a data feed that is provided by an electronic exchange. As shown in Figure 3, the best (i.e. highest) bid indicator is located at the price level of 89 and the best (i.e. lowest) ask indicator is located at the price level of 90. The indicators in this embodiment are numerical and show quantity at the corresponding price level. At the best bid (price level 89), the indicator shows a quantity of 18, and at the best ask (price level 90), the indicator shows a quantity of 20. By displaying additional bid/ask indicators at price levels other than 89 and 90, as shown in the embodiment of Figure 3, the GUI tool displays additional market depth for the product at the time.

78. At the time shown in Figure 4, the GUI tool clearly illustrates how the market information for the product has changed upon receipt of new market information. Relative movement of the bid and ask indicators results from the invention's juxtaposition of a static display of prices and a dynamic display of bid and ask indicators. Specifically, the locations of a number of bid/ask indicators moved relative to the static display of prices because the inside market and portions of the market depth have changed. In particular, the location of the indicator for the best (i.e. highest) bid has moved relative to the static display of

55

prices to a different graphical location, now corresponding to the price level of 92 (an increase of three price levels), and the location of the indicator for the best (i.e., lowest) ask has moved relative to the static display of prices by a like amount, now corresponding to the price level of 93. The GUI tool has also updated, for example, the indicators at the best bid and ask to show quantities of 43 and 63, respectively.

79.   A comparison of the GUI tool in Figures 3 and 4 shows that the price levels in the static display of prices did not change positions (i.e., re-locate from one cell to another) in response to this change in the inside market. In other words, while the bid/ask indicators in the GUI tool moved in response to new market information from the electronic exchange, the price levels in the static display of prices did not change positions. Each value in the static display of prices remained in the same location/cell, and the indicators for the inside market moved locations/cells relative to the static display of prices. Thus, in contrast to the dynamic screens (e.g., Figure 2 style), the GUI tool of Figures 3 and 4 displays movement of the inside market relative to price levels of a static display of prices. This movement, which provides users with an intuitive feel for the behavior of the market for the product, is not present in the conventional dynamic screens.

80.   I captured a video clip showing the operation of a dynamic screen available at the time of the invention in a side-by-side comparison with a screen

56

showing a static display of prices/relative movement in accordance with the invention. The captured video clip may be viewed at http://107.134.85.251. In the video, both the dynamic screen and the screen showing a static display of prices are operating with data for the same market. As shown in the dynamic screen (lower portion of the video), the location of the inside market is fixed; i.e., the top row of cells, where the best bid price and best ask price are always located in the cells immediately below the column headings BidPrc and AskPrc, respectively. As market updates are displayed, one can readily see that the numbers representing the best bid price and the best ask price are constantly changing. Turning to the screen showing relative movement in the upper portion of the video, the static display of prices does not change, while the indicators for the inside market (best bid and ask price) move relative to that static display of prices.

81. The claimed invention displays an order entry region comprising a plurality of areas for receiving single action commands to set a price value for a trade order message and to send the trade order message, where each area corresponds to a different price level along the static display of prices. Using the claimed invention, an order message can be sent by selecting a particular area in the order entry region through a single action (e.g., a single click or a double click of a mouse button) of the user input device in the particular area. The single action sets a price value for the trade order message (the value of the price axis

57

corresponding to the order entry area selected) and sends the trade order message having a default quantity to the electronic exchange. For shorthand, I sometimes refer to the elements of the order entry region with areas corresponding to price levels along the price axis that can be selected by a single action of a user input device to both set a price parameter and send a trade or message, as "single action order entry."

82.   By combining a dynamic display of bid and ask indicators and a static display of prices, with single action order entry that occurs by selecting a location corresponding to a price level along the price axis to both set a price parameter and send the order message, the inventors went against the prevailing and overwhelming conventional wisdom at the time. For example, instead of having the inside market in a fixed location with the prices changing in that fixed location, the inventors provided a GUI tool that is constructed to allow the inside market to move locations relative to the price levels along the static display of prices. The price levels along the static display of prices do not normally change positions, as with the dynamic GUI tool of Figure 2, so that the trader will likely not miss his or her intended price when the order is sent if that intended price was a particular price (as opposed to the inside market). Thus, the combination of the invention has the advantage of improving the accuracy of orders in which the user intends to submit an order at a particular price without the need to sacrifice speed. In

58

addition, as described in the patent, the invention promotes quick and efficient trading by replacing the mental mathematics of the conventional screen with a display that fluctuates logically up or down as the market prices change. Ex. 1001 at 3:5-10. Thus, the trader receives a visual indication of the market movements and the direction and speed of that movement. One of ordinary skill in the art would readily appreciate that, in this case, the claims are directed to the GUI tool itself, and are not directed any GUI that simply generically allows access to an underlying invention. For example, a claim directed to a program for tracking foods that one consumes, which could be implemented using a wide variety of different GUIs, is not analogous to the present invention. Nor are the claims directed to a method of data processing.

83.   In conceiving the main idea behind the claimed invention, Mr. Brumfield (the primary inventor) was primarily concerned with addressing a problem he experienced with conventional dynamic screens whereby he would miss his intended price as a result of the price changing from under the his cursor before an order is sent. *See, e.g.*, Ex. L, Brumfield Trial Tr., at 682:1-684:3. I have attached an animation demonstrating the problem of a trader missing his/her intended price. Exhibit M. As shown in the animation, the prices and quantities in the conventional dynamic GUI tool are constantly changing within the displayed cells. In the animation, the trader wishes to place an order to buy the contract at

the price of 111175. However, as the trader moves the cursor to the location corresponding to the best ask price of 111175 and attempts to select that price with the mouse, the price changes to 111180 just prior to the trader clicking the mouse, such that when the mouse is clicked to set and send the order, it is sent at the wrong price, 111180. This example results in a loss of $1562.50. This is also illustrated in the demonstrative below:

84.   As shown above, at time 1, the trader is moving the cursor toward the intended price of 111175. At time 2, the price has changed to 111180 just as the trader is clicking the mouse in the desired cell, resulting in the loss of $1562.50.

60

This problem, recognized by Mr. Brumfield, is caused by the functioning of the conventional dynamic GUI. It is caused by the technology. Such a problem of accuracy of data entry is a classic technical problem. That the problem may affect a business issue—the inaccuracy leads to an incorrect order—does not change the technical nature of the problem. Mr. Brumfield was uniquely positioned to be confronted with this problem because he was trading huge volume (approximately 20% of the volume of German Bund Futures) and was more focused on particular prices than market prices as many other traders were. For Mr. Brumfield, a small error could be disastrous.

85. Mr. Brumfield conceived of a solution that combined a dynamic display of bid and ask indicators and a static display of prices with single action order entry that occurs by selecting a location corresponding to a price level along the static display of prices to both set a price and send the order. Exhibit N, (Brumfield Sketch) depicts a sketch of Mr. Brumfield's idea that he prepared in 1998. Even with this combination of features in mind, however, he did not know for certain whether the resulting GUI tool would in fact prove advantageous in comparison to the conventional screens. Shortly thereafter, Mr. Brumfield hired TT under a consulting contract to build a prototype. It took a number of months to get a prototype that was sufficiently working and bug free for Mr. Brumfield to truly test the prototype—to take for a live spin with live bullets using his normal

61

approaches to trading. Only by doing that could he ultimately tell if the new GUI tool would be advantageous.

86.   Once he was really able to use the prototype for trading in his usual manner, he saw that the invention was a big deal. First, the invention addressed the speed/accuracy problem—it solved the missing price problem illustrated above with respect to conventional Fig 2 style screens. Second, it had the unexpected benefit of providing a more intuitive visualization of the market that allowed him to have better feel for and quicker reaction to the market. The overall combination had a dramatic impact on his trading—causing his profitability (already huge) to skyrocket.

87.   The combination of a dynamic display of bid and ask indicators and a static display of prices with single action order entry that occurs by selecting a location corresponding to a price level along the price axis to both set a price and send the order provided the unexpected benefits of: 1) increasing the likelihood that the user would get his/her desired price for non-market type orders because the price levels do not change positions as the bid/ask indicators move relative to the static display of prices; and 2) providing faster order entry at specified prices because the user has more confidence in obtaining the desired price, even if the inside market is changing. Also, the movement of the indicators along the price axis allowed the trader to intuitively sense market movements, rather than

62

requiring constant mental mathematical steps as in the dynamic screens where the prices and quantities are constantly flipping, thereby enhancing the user's ability to identify and quickly act upon opportunities. *Compare* GUI tools shown at video clip at http://107.134.85.251. The speed increase was unexpected because one of ordinary skill in the art would have expected the invention to be slower because the inside market is not at a fixed location. The increased confidence of obtaining the desired price, the visualization of the market, the identification of gaps resulting from the use of a price axis, combined to increase volume—a significant benefit to the industry (not only in terms of more revenue to FCMs and exchanges, but the market obtained the benefit of greater liquidity).

88.   The invention solved the conventional GUI tool's problem of missing the intended price. I have attached an animation illustrating the invention's solution to the problem of a trader missing his/her price. Exhibit O. As shown in the animation, a conventional GUI tool is shown on the left and an embodiment of the invention is shown on the right. In the animation, both GUI tools are receiving the same market updates. In the conventional GUI tool, the inside market is fixed to the location highlighted by the yellow box. In the embodiment of the invention, on the other hand, the inside market, also highlighted by a yellow box, moves relative to the static display of prices. As shown, the trader wishes to enter an order to buy at the price of 90. In the conventional GUI tool, as the trader moves

63

the mouse into the appropriate location on the GUI tool, the price changes to 91 just prior to the trader clicking on the cell, resulting in the trader entering an order at the wrong price, 91. Again, this problem is specifically caused by the GUI tool and is a problem of inefficient data entry. In the embodiment of the invention, on the other hand, the trader moves the mouse to the 90 price level and clicks to send the buy order at 90 thereby obtaining the intended price, even though the inside market changed. This change is a result of the specific construction and features of the improved GUI tool. A screen capture from the animation is shown below:

89.   In MD Trader, the inside market moves up and down relative to the static display of prices as the market updates are received thereby providing the

unexpected benefit of improved market visualization. As a result of the above

described benefits, the GUI tool of the invention provided tremendous benefits to

the trader, including most importantly, financial benefits. This new GUI tool was

literally a money making machine. For example, Exhibit P, (Brumfield Trading

Results) is a graph showing Mr. Brumfield's cumulative trading results during the

time that he was testing the prototype software embodying the invention. Mr.

Brumfield credits the invention for the significant success illustrated by the graph,

even though the prototype still had some significant bugs. Ex. L, Brumfield Trial

Tr.at 712:13-713:11; *see also*, Ex. Q, Declaration of D. Martin, discussed below in

paragraph 107(discussing an extended period of uninterrupted success). Mr.

Brumfield's trading strategy during this time frame did not change. What changed

was the GUI tool technology he was using.

90.   The invention arose out of a series of very unusual and unique

circumstances. Mr Brumfield was widely known for his tremendous success in the

open outcry trading pits, where he was one of the largest traders at the Chicago

Board of Trade. Yet in the midst of that success, he quit the trading pits "cold

turkey" in the late 1990s, because he had the vision to see open outcry trading as a

dinosaur, in the last stages of life. Ex. L at 672:3-673:8. Mr. Brumfield

recognized, that electronic trading would render the open outcry pits, which were

thriving at the time, obsolete. As we know today, Mr. Brumfield proved to be

right. After leaving the open outcry pits in Chicago, Mr. Brumfield turned his attention to electronic trading.

91.   Around the time of the invention, Mr. Brumfield, the primary inventor, was one of largest electronic traders in world. He was using conventional GUI tools, as described above including the market grid and order entry tickets. For a period of time, he *alone* accounted for 20% of daily volume of a particular futures contract (a German bond) that was traded on an electronic exchange. *Id.* at 674:22-675:20. Because of his trading proficiency, Mr. Brumfield had the resources and, more importantly the willingness, to hire developers to build trading tools for him, even when it was very unclear whether the tools would provide benefits over his existing tools. For example, prior to the invention, I understand that Mr. Brumfield hired TT to develop another idea that he had for an improvement. *Id.* at 690:8-19. After spending the time and money to develop the prototype, Mr. Brumfield discarded that idea, because it proved not to be useful. *Id.* at 691:3-19.

92.   Later, he conceived of the present invention and again engaged TT to develop the prototype. It took over six months just to get the prototype up and running, at least to a degree sufficient for him to test the prototype and see if it made a difference. Mr. Brumfield testified that the prototype was still buggy and crashing. *Id.* at 711:2-16. In my view, Mr. Brumfield's actions were very unusual

66

and extremely risky—Mr. Brumfield was willing to give the prototype a full try, i.e, trading 20% of the volume in a contract, even while it was still in development. This is analogous to Howard Hughes taking the Spruce Goose up in the air without knowing that it was airworthy. Mr. Brumfield put aside the conventional order entry GUI tools with which he was having great financial success, to try something that was radically different. In my experience, it was unheard of for a successful trader to switch tools under these circumstances. When Mr. Brumfield switched to the new GUI tool, the results were shocking in terms of the positive impact that it had on his already successful trading. Based on the evidence that I have seen, the invention was a money making machine for Mr. Brumfield. He came to appreciate the significant value of the invention, and its potential to change the industry. I have reviewed a number of articles about Mr. Brumfield and have had discussions with Mr. Brumfield about his open outcry pit trading and his transition into electronic trading. Ex. R, (Brumfield Articles). I conclude from all of this that Mr. Brumfield has a very "outside the box" personality, and his creative thinking has been shown to have been visionary. I believe that invention would not have come into being without Mr. Brumfield's approach, which was outside the limits of conventional thinking. I have reviewed sworn declarations from industry leaders who came to this same conclusion. *See, e.g.*, Ex. S, Declaration of Zellinger; Ex. T Declaration of Cahnman. Only Mr. Brumfield's visionary and

67

persistent attitude could have led to this invention—it ultimately showed its benefits despite significant apparent drawbacks that would have caused it to be a non-starter to any person of ordinary skill in the art at the time.

93.   As illustrated by Mr. Brumfield's experience, even if one of ordinary skill in the art had knowledge of *all* elements of the invention separately, he or she would not have recognized the advantages of combining those elements, as in the invention, over the conventional screen. The conventional wisdom regarding the primary goals of designing order entry GUI tools for electronic trading— conserving screen real estate and providing for fast and accurate order entry— strongly taught against using a price axis with relative movement (e.g., a dynamic display of bid and ask indicators and a static display of prices) and single action order entry. Those of ordinary skill in the art would immediately recognize the apparent drawbacks and disadvantages of such a combination (e.g., excessive use of screen real estate, chasing the market, allowing the inside market to move beyond the user's small window of focus), which one of ordinary skill in the art at the time of the invention would find unacceptable, a complete non-starter. It is only with hindsight using the patent's disclosure of benefits and advantages, or experience with the invention, like Mr. Brumfield's use of the prototype in live markets, that would lead one of ordinary skill in the art to even consider such a drastic deviation from the engrained conventional screen.

68

94.   Mr. Brumfield believed in the significant benefits of the invention and felt that it could help TT, which was at the time struggling.   Although already an investor in TT, Mr. Brumfield decided to assign the invention to TT and increase his investment, provided that TT agreed to develop the prototype into a commercial product and, importantly, pursue protection of the invention with patents.   He felt that the invention could turn the company around, but the invention had to be protected by patents because it was a GUI that could be seen and easily copied once people realized its impact.   Once again, Mr. Brumfield's vision proved accurate.

95.   Following Mr. Brumfield's realization of the benefits, he and TT worked to convert the prototype software into a commercial product, which was introduced in the late summer of 2000 under the trade name MD Trader.[4] MD Trader is the commercial embodiment of the invention claimed in the patent. Attached as Exhibit LL is a claim chart illustrating how each element of the claimed invention is present in MD Trader. Even though it was launched *about two years after* Mr. Brumfield first conceived of the invention, MD Trader was the

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[4] In parallel with this development effort, TT also undertook steps to secure patent protection, filing the priority application to the '132, '056, and '411 patents in March of 2000.

first product available in the industry that combined a dynamic display of bid and ask indicators and static display of prices with single action order entry that occurs by selecting a location corresponding to a price level along the price axis to both set a price and send the order, as set forth in the claims. MD Trader was also the first to display entered order indicators at locations corresponding to price levels along a price axis and the first order entry GUI tool with a manual recentering command to recenter the price axis. This significant period of time, from late summer of 1998 to late summer of 2000, during which the industry was constantly investing in and developing improved GUI tools, but failed to achieve the claimed invention, in itself suggests that the invention was not obvious.

96.   I have reviewed the Declarations of Mr. Geannopulos and Mr. McDonnell, which provide details about TT's recovery and success after the launch of the commercial embodiment of the invention. *See* Exhibits U (Geannopulos Dec.) and Ex. V (McDonnell Dec.). I am also familiar with the effect that the commercial embodiment had on TT through my participation in the litigations, where there was testimony at the eSpeed trial and the CQG trial about TT's success and the direct connection between the commercial embodiment and TT's success. I have also reviewed the Exhibits to those declarations, which confirm TT's growth in sales. All of this evidence provides compelling real world evidence that Mr. Brumfield's belief in the potential of the invention was justified.

70

Within just a few years following the introduction of the commercial embodiment of the invention TT's sales (in terms of both revenue and total product) ramped up dramatically, increasing almost 10-fold. Ex. U at ¶ 43; Ex. V at ¶ 21-23. This is an unusual success story in a very difficult ISV industry.

97.   Once the GUI tool of the invention was introduced to the public in 2000, as TT's MD Trader, and overcame initial widespread skepticism, it became a fixture in futures trading. Indeed, many technology developers in the industry copied TT's GUI tool as described elsewhere in this Declaration. *See, e.g., infra* at paragraphs 110-111, 126-28, 133, 136. In addition to becoming a fixture in futures trading, TT's GUI tool is still growing in other asset classes, including equities, options and even event betting exchanges, more than 15 years after its initial launch. Many patented inventions have a much shorter useful life, as the technology rapidly advances. The continued strength of this invention in the industry, after so many years of investment and development in GUI tools for electronic trading, speaks to pioneering nature of this invention. Mr. Brumfield could have kept the invention to himself, as I believe most would have under the circumstances. But, Mr. Brumfield had a very different mindset than others. At the time, he was an investor in TT, which was struggling. He thought that commercializing the invention would help TT's business and save the jobs of TT employees. Mr. Brumfield also thought that commercializing the invention would

71

benefit the industry, helping traders be more successful and helping exchanges grow volume. So, with the understanding that TT would protect the invention with patents (which was essential, because the commercial product could not be maintained as a trade secret), Mr. Brumfield agreed to assign the invention to TT. He then convinced TT, against internal resistance, to turn the invention into a commercial product and bring it to market. TT undertook efforts to convert the prototype into a commercial product to appease its essential investor, Mr. Brumfield. At the time, there was skepticism at TT about the commercial viability of the invention. Indeed, no one at TT thought the invention would be a significant addition to TT's product offering. There was so much skepticism, even at TT, that Mr. Brumfield insisted that TT create a new position dedicated to educating TT employees and its customers about the benefits of the invention in an attempt to overcome this skepticism. Ex. L at 715:19-716:18. Ultimately, as described further below, Mr. Brumfield's belief in the invention was proven correct—once it gained some traction in the marketplace, it was a huge success and it turned TT around. Within a few years of TT introducing the commercial embodiment of the invention, TT's sales and revenues increased dramatically. Ex. V at ¶ 21-23.

98.   From my own experience, I am familiar with TT's position in the ISV market, both before and after the introduction of the commercial embodiment of the invention. Before, TT was a niche player in the GUI tool space. After the

72

introduction of the commercial embodiment of the invention, and as a result thereof, TT became a major force in the GUI tool space. I have personal knowledge of the industry's reaction to the launch of MD Trader. Initially, because the new GUI tool was contrary to the conventional wisdom at the time, MD Trader was met with a heavy dose of skepticism. However, once the benefits of the invention became apparent, MD Trader became the GUI tool of choice among professional futures traders, and later expanded into other asset classes. In addition, as discussed further below, I believe that MD Trader drove volume increases at the electronic exchanges.

99.   Mr. Brumfield's discovery of this invention was unique under the circumstances. In this industry, there were many savvy, motivated and well-funded companies and individuals trying to innovate at all times to gain a competitive edge. At the time of the invention, the person of ordinary skill in the art was aware of all of the individual elements of the invention. For example, one of ordinary skill was aware of conventional technology, such as conventional order entry GUI tools as described above constructed to display bids, asks and the inside market, charts showing historical price information in relation to an axis, single click order entry, etc. And yet, none of these savvy companies and individuals put the elements together to arrive at the claimed invention. Notably, Petitioners, Interactive Brokers and TradeStation were among these many savvy industry

73

participants that were working to create GUI tools, and they failed to make the claimed combination until years after the commercial embodiment was in the marketplace and available for all to see. Rather, it took Mr. Brumfield's creativity and TT's experience to make this invention. Under these real world circumstances, it is simply not credible to say that the invention would have been obvious to one of ordinary skill in the art. It is only with improper hindsight, armed with knowledge from the patent itself, that one can could arrive at the invention by picking and choosing elements from the conventional technology.

100.   I understand that there was a massive worldwide hunt for prior art to the invention, in connection with the district court proceedings, where multiple defendants subpoenaed over 30 companies looking for prior art, and doubtless sought informal discovery from many more. The subpoenaed companies included some of the largest organizations in the financial arena, including Goldman Sachs, Citigroup, Reuters, and Credit Suisse etc. Yet, despite this massive hunt, the defendants and members of the joint defense group never found prior art that combines the elements of the invention as claimed. Indeed, the most relevant prior art was of record and properly considered in the original prosecution. Discovery confirmed that conventional thinking at the time of the invention was to provide the conventional dynamic Fig. 2 style GUIs. As detailed below, much of the discovery actually shows that the claimed combination was not obvious.

74

101.   Further confirmation that the invention was not obvious to one of ordinary skill in the art followed from events after TT's launch of MD Trader. At the outset, MD Trader was not an immediate success and was met with a significant amount of initial skepticism. TT sales personnel met resistance from traders, who were hesitant to switch to the new technology. Ex. W, Burns Decl., at ¶ 21; Ex. U, at ¶ 39.Indeed, the initial skepticism was so significant that TT took the unusual step of creating a new role within TT and hiring an employee, Mike Burns, to help TT overcome the skepticism—both from users and from employees within TT. Ex. W, at ¶ 21; Ex. U, at ¶ 39. Many of the Declarations (referenced further below) from traders and prominent leaders in the futures industry also demonstrate the presence of initial skepticism. In addition, Mr. Feltes and Mr. McElveen both confirmed the initial skepticism. For example, Mr. Feltes testified in the *eSpeed* case as follows:

Ex. X, *eSpeed* Trial Tr. (Feltes) at 3035:17-25.

102. Similarly, Mr. McElveen stated that he was "aware that many traders who were used to using older style screens that existed prior to the release of MD Trader were initially skeptical of the MD Trader screen and reluctant to use it." Ex. Y, McElveen Decl., at ¶ 6.

103. After a period of initial skepticism, the invention broke through to become the prominent trading tool in the futures trading space. *E.g.*, Ex. Z, *eSpeed* Trial Tr. (Geannopulos) at 346:8-13; Ex. Y, at ¶ 7. This was confirmed by Mr. Feltes, CEO of Marquette Partners, a proprietary trading firm, who testified that, after initial skepticism, MD Trader became very successful and introduced "a new

76

paradigm." Specifically, Mr. Feltes testified as follows:

TT Has Been Praised by the Industry

But gradually, over the course of the next six months to a year, more and more traders moved. Because it took one trader experimenting, finding very good success and then, once success is proven, other traders will move over. So there was a fairly quick take-up on the new MD Trader – after initial skepticism.

[MD Trader] seemed to be a new paradigm ... it seemed different than previous systems that we had seen.

David Feltes
CEO, Marquette Partners

PTX 1365

Ex. X, at 3036:7-14; 3030:15-17.

104.   The invention received widespread praise. For example, over 30 prominent traders and leaders in the futures industry signed declarations under the penalty of perjury attesting to the importance of the patented invention to electronic trading, declaring, for example:

"Mr. Brumfield had a unique vision and [MD Trader] was ingenious" (Glickman, Decl., ¶ 6)

"significantly reduces the mental calculations required by the preexisting systems" (*Id*. at ¶ 5)

"much faster than any order entry system I had used before" (Thomas Burns

77

Decl., ¶ 7)

"created a paradigm change in the way that active traders traded" (Feltes Decl., ¶ 5)

"fast and accurate order entry and management" (Johnson Decl., ¶ 7)

"more intuitive and easy to use than other systems" (Ryan Decl., ¶ 4)

"changed the way electronic trading was done" (Anthony Decl., ¶ 6)

"made it much easier to see how the market was moving" (Oryhon Decl., ¶ 4)

"allowed traders to . . . react quicker" (*Id.* at ¶ 5)

"radically different than the types of trading tools that were available at that time" (Monieson Decl., ¶ 7)

"far superior" (Clark Decl., ¶¶ 4-5)

"allowed a trader to recognize opportunities much quicker" (Cahnman Decl., ¶ 8)

"a world of difference" (Thomas Burns Decl., ¶ 5)

"[traders] saw the great advantages of using MD Trader and now could not switch back" (Moore Decl., 4)

"far superior for the active trader because it was fast" (Zellinger Decl.,¶ 5)

"a very significant departure from the . . . [systems available]" (Grisafi Decl., ¶ 6)

"allow for a trader to be more aggressive and more confident" (Anthony Decl., ¶ 6)

"a revolutionary product providing great benefits to electronic traders" (Oryhon Decl., ¶ 6)

"revolutionary . . .not just an incremental improvement." (Kidd Decl., ¶ 8)

The differences between MD Trader and previous systems resulted "in MD Trader being an invaluable tool to traders." (Grisafi Decl., ¶ 5)

"a stroke of genius and I had not seen anything like it before" (Martin Decl., ¶ 8)

"different . . . from anything I had ever seen before" (Leone Decl., ¶ 3)

"a major improvement . . . so significant that I cannot put a price on its value" (Parker Decl., ¶ 4)

"displayed the ebbs and flows of a market in a way that I could easily see" (Thomas Burns Decl., ¶ 6)

Prior to TT's launch of MD Trader "no one suggested anything remotely like MD Trader" (Feltes Decl., ¶ 8)

"whoever came up with . . . MD Trader was truly 'thinking outside of the box'" (Oryhon Decl., ¶ 6)

"MD Trader provided a significant change to the order entry screens that were prevalent at the time of its release. Prior to the release of MD Trader, traders did not even perceive a problem with the old tools they were using. Only after seeing the benefits of MD Trader did people like myself realize the shortcomings of the preexisting systems." (Schuman Decl., ¶ 12)

MD Trader was a "superior tool to the other systems available at the time." (Zellinger Decl., ¶ 4)

"MD Trader was the first application designed to be used as a true trading tool by the trader to enhance trading." (Zellinger Decl., ¶ 5)

"MD Trader proved to be a significant advance in performance." (Marlovics Decl., ¶ 8)

MD Trader was "great." (Gancer Decl., ¶ 4)

MD Trader is "invaluable." (Jahno Decl., ¶ 5)

79

"substantially increases the speed in which traders can react to opportunities and enter orders." (Mendelson Decl., ¶ 6)

"revolutionary." (Moricz Decl., ¶ 4)

"radically different . . . far superior." (Monieson Decl., ¶ 7)

"a world of difference for the trader." (Melgarejo Decl., ¶ 4)

"provided dramatic benefits to traders." (Ryan Decl., ¶ 5)

Ex. AA, (Collection of Trader Declarations).

105.   Another example is provided by the author of the book, "Steidlmayer on Markets," which states "from a pure speed perspective, TT's X_TRADER® front end with the MD_Trader™ display provides what you are looking for, the fastest access to the market." Ex. DD, at 206 (excerpts). The author goes on to state, "[w]ith speed being our basis of comparison, TT has the others beat hands-down. The process is faster and more reliable." *Id.* at 207.

106.   In addition, by keeping the price levels still and having the inside market move relative to the static display of prices, the invention unexpectedly better represented the market and changes in the market than prior art style screens. *E.g.*, Ex. L, at 705-706. This required less mental processing demands on the trader, and also more precisely identified the current market. *E.g.*, Ex. AA, Anthony, Decl., ¶ 5, Cahnman Decl., ¶¶ 8-9, Glickman, Decl., ¶ 5; Grisafi, Decl., ¶¶ 4-5, McElveen, Dec., ¶¶ 4-5, Feltes, Decl., ¶¶ 4-5, Northway, Decl., ¶ 4,

Zellinger, Decl., ¶ 5. Thus, order entry at desired prices was improved. *E.g.*, Ex. L, at 703-706; Anthony, Decl., ¶ 5, Glickman, Decl., ¶¶ 4-5, Grisafi, Decl., ¶¶ 4-5, Clark Decl., ¶ 5; Cahnman Decl., ¶ 8, Feltes, Dec., ¶¶ 4-5, McElveen, Dec., ¶¶ 4-5, Northway, Decl., ¶ 4. The combination of this unexpected benefit with the fast/accurate order entry made this invention very valuable to many traders. For example, allowing the market to move up and down on the screen provided the ability for the trader to enter orders more quickly and accurately at desired prices relative to the market.

107.   It turned out that, by combining the features in the manner of the patent, the invention was extremely valuable. For example, one of the inventors, Harris Brumfield, changed from using the conventional prior art style interface to the invention claimed in the patents-in-suit and as a result quickly experienced an exponential increase in his gains. Ex. L, at 707-713; Ex. P. One early adopter, David Martin, changed from using a prior art style Globex terminal to the invention claimed in the patents-in-suit and soon thereafter had approximately 90 consecutively profitable trading days using the invention. Ex. Q, ¶ 8; Ex. BB, Martin Dep. Tr., at 118-120. According to Mr. Martin, the invention "was far superior to preexisting systems" and his success was "directly attributable" to TT's patented invention. Ex. Q at ¶ 8. Yet another user of the invention, Charles McElveen III, founder and owner of Kingstree Trading, L.L.C., licensed and used

81

the invention soon after it launched and quickly saw the "significant advance over the trading screens existing at the time." Ex. Y at ¶ 4. Using the invention, Mr. McElveen commented that the invention "allows for traders to react much more quickly to fast-changing market conditions than the preexisting systems." *Id.* at ¶ 5. Mr. McElveen also testified that the patented invention was so important that his company may not have even been able to survive without it. Ex. CC, McElveen Dep., Tr., at 107-109. Mr. McElveen stated, "the competitive advantage that we gained by trading with the MD Trader screen has been a determining factor in our success." Ex. Y at ¶ 5. Many electronic futures traders recognized the benefits of the invention and started using it. Ex. Y at ¶ 6. The patented invention has also received accolades and been widely copied. *E.g.*, Ex. DD, Steidlmayer on Markets, pp. 205-207.

108. I also understand that there is evidence that the invention of the patent provided a significant added benefit to exchanges and FCMs. Specifically, the evidence shows that the invention caused traders to increase the volume of their trades. For example, the former Managing Director and Chief Information Officer of the CME, Scott Johnston, testified that a major contributor to the CME's dramatic volume growth from 2000 to 2002 was MD Trader (TT's commercial embodiment of the invention). Ex. EE, Johnston Decl., at ¶ 3; Ex. FF, Johnston Dep. Tr. at 69-71. Mr. Johnston testified that he had observed that the electronic

82

trading volume at the CME coming from Kingstree Trading (headed by Mr. McElveen and referenced in the preceding paragraph of this Declaration) "had exploded" after the fall of 2000. Ex. EE at ¶4. Mr. Johnston and other CME employees visited Kingstree and observed firsthand that "Kingstree's traders were all frenetically trading on a front-end that looked different from what I had seen before. That front-end was TT's MD Trader." *Id.* Mr. Johnston had previously witnessed traders using the CME-provided Globex front-end (which was developed by GL Trade and utilized a conventional screen for order entry), and noted that traders using MD Trader entered orders at a quicker rate than with Globex. *Id.* Around the time that MD Trader became "the order entry of choice for most high-end active professional futures traders," the CME asked GL Trade to put a tool similar to MD Trader into its front-end because the exchange "viewed the MD Trader type front-end as causing traders to trade more volume." *Id.* at ¶ 5. In addition to Messrs. McElveen and Johnston, others in the industry also provided declarations stating that the commercial embodiment of the invention caused increased trading volume. *See, e.g.,* Ex. GG, Grisafi Decl., at ¶ 5; Ex. S, Zellinger Decl., at ¶ 10.

109. I have also reviewed articles giving accolades to TT for its invention. Ex. DD at 205-07; Ex. HH, (Front-End Article) at 7. I have also reviewed the deposition and *eSpeed* trial testimony of Mr. Feltes, the head of Marquette Trading,

83

who testified that TT's invention represented "a new paradigm or a change that we hadn't requested." Ex. X, at 3030:15-17. The reasons for the accolades were because of the new and innovative combination of a price axis with relative movement (i.e., a static display of prices and a dynamic display of bids and asks) and single action order entry, and how this combination provided for faster and more accurate order entry. Many also praised features from the dependent claims, such as displaying working order indicators relative to the static display of prices, the ability to cancel such orders by selecting the indicators, and the ability to manually recenter the static display of prices after the inside market indicators moved away from the center of the displayed field of prices.

110. After the initial skepticism was overcome, there was widespread commercial success of the invention. For example, Mr. Geannopulos, at the time TT's Executive Vice President of Business Development, testified that the invention was a huge commercial success such that TT had gone from a little known, unprofitable company to having a substantial presence within the space with sales increased around 700%, after the introduction of the invention. Ex. U at ¶ 43; Ex. II, (TT Global Revenue); see also Ex. V at ¶ 21-22. Mr. Geannopulos also testified that MD Trader is "the reason why people come and talk to us and— and why we're on the map...." Id. at ¶ 44. He also stated that MD Trader was responsible for such explosive growth, and the GUI tool customers identified with

TT. *Id.*; *see also* Ex. JJ, Lapan Dep. Tr. at 145:18-21. As pointed out below, the invention has also been a selling point for other companies who directly or indirectly copied the invention. Commercial success is further evidenced by the amount of revenue that TT has received from TT products that embody the invention. Ex. V at ¶ 21-22. It is also evident from the revenue TT has received as a result of worldwide licensing of the patents and settlements/damages from the district court proceedings. Ex. KK, Knobloch Decl., at ¶ 11.

111. I am also aware of widespread copying of the invention throughout the industry and that many of those copies were commercially successful for others. For example, I am aware of copying by companies such as Patsystems, Refco, Ninja, FastFill, NYFIX, Orc, RealTime Systems Group, and Strategy Runner. Images of the products that copied the invention were presented during the eSpeed trial using the following demonstrative exhibits:

85

MD Trader Was Widely Copied By Other Software Vendors
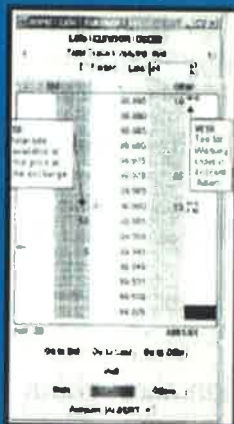
Patsystems Trading Screen - PTX762
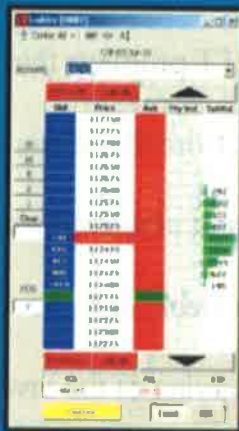
RefcoPro Ladder Ticket - PTX773

Ninja - PTX385

Fastfill - PTX387

PTX 1773

MD Trader Was Widely Copied By Other Software Vendors
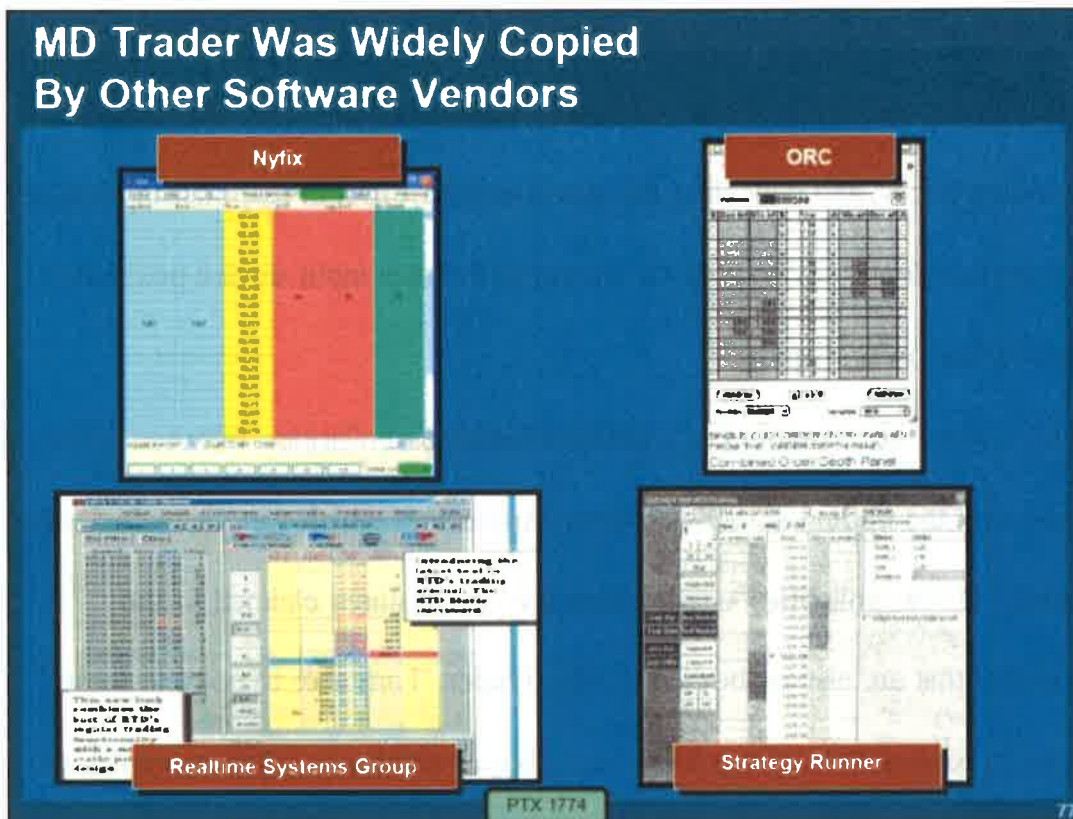
112. As noted below in ¶ 148, each of these companies is subject to a consent judgment, acknowledging infringement and validity. Each of these products was introduced in the years following TT's launch of MD Trader. Just like MD Trader, TT's commercial embodiment of the invention, each of these products is constructed to include all elements of the invention. For example, as claimed in the '132 patent, these products were constructed to include a static display of prices and a dynamic display of a plurality of bids and asks. In addition, each is constructed to include single action order entry that occurs by selecting a location corresponding to a price level along the static display of prices to both set additional trade order parameters and send the order. Other dependent claim

87

elements that are found in these products include a re-centering command to center the inside market, display of a user's working orders in alignment with their corresponding prices, and canceling the user's entered order in response to a single action of the user input device with the cursor of the user input device positioned over the working order display.

113.   There are a number of additional striking similarities between TT's MD Trader and the trading screens of these competitors which were launched after MD Trader. These similarities encompass all of the features claimed in the patents-in-suit that are also embodied in MD Trader. I am able to point to these similarities in each of the screens illustrated above, which can act as examples of all of the competitor screens that copied TT's MD Trader.

114.   For example, MD Trader displays an inside market with a highest bid price and lowest ask price. Likewise, each of the eight exemplary products illustrated above displays an inside market with a highest bid price and a lowest ask price. In MD Trader, the inside market is displayed along a vertical display of prices along a price axis. The same vertical display of prices along a price axis was implemented into each of the eight exemplary products.

115.   MD Trader also displays market depth through a plurality of bid and ask indicators. Likewise, each of the eight exemplary products illustrated above displays market depth through a plurality of bid and ask indicators. For both MD

88

Trader and the eight exemplary products, the bid and ask indicators are displayed in alignment with the price levels along the vertical display of prices.

116. In MD Trader, the vertical display of prices along the price axis does not move at times when the inside market changes. Instead, when the inside market changes, the bids and ask indicators displayed in MD Trader move up and down relative to the static display of prices. This functionality was directly copied by others in the industry, including the eight exemplary products.

117. MD Trader also offers the ability for a user to enter an order with a single click of a mouse in an order entry region at a location that corresponds with a price level aligned the price axis. This "single action order entry" is similarly available in each of the eight exemplary trading screens.

118. MD Trader then displays a working order indicator that is in alignment with the price at which the user entered its order. These working order indicators are similarly displayed in the eight exemplary products. These products also offer the ability for a user to cancel its trade by single clicking on the working order indicator, just as MD Trader does. Other features such as the use of default quantity, the display of volume history per price level, and the color of the columns were directly copied.

119. Both the Matrix window offered by TradeStation and the BookTrader window offered by Interactive Brokers are susceptible to the same striking

89

similarities, as further described below. Detailed explanations of the similarities between MD Trader and Matrix/BookTrader windows with respect to the claims at issue are set forth in Exhibit LL.

120. With just a cursory glance, it is evident that TradeStation also copied TT's MD Trader when developing its Matrix window.

121. An image of TT's website from April 16, 2003 is depicted below. This image alone shows that MD Trader included, at a minimum, volume by price along a vertical display of prices that included visible market gaps. MD Trader also displayed the daily high/low and offered the ability to enter and cancel orders via a single click of a mouse. Visually, MD Trader also displayed a plurality of bids in the blue column and a plurality of asks in the red column.

90

FIGURE 1

Market Depth Trader Window

volume by price

market gaps visible

single-click trading

daily high / low

single-click deleting

MD_TRADER's vertical display allows for unprecedented market feel, an intuitive sense of where the market is headed. The vertical grid format dynamically displays the market depth for a given instrument, enabling the trader to enter orders by clicking once in the buy or sell column.

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Legal Information

Ex. MM (X_Trader Product Tour).

122. In comparison, an image of TradeStation's website from June 6, 2004 is depicted below. Similarly, the Matrix window included volume by price along a vertical display of prices that included visible market gaps. Matrix also displayed the daily high/low and offered the ability to enter and cancel orders via a single click of a mouse. Visually, Matrix also displayed a plurality of bids in the blue column and a plurality of asks in the red column.

91

TradeStation's MATRIX Window–Next Generation Manual Order Entry

View MATRIX Window Demo

TradeStation's new MATRIX window combines the benefits of the market depth window, a highly-advanced order entry tool, and an order tracking system, all in one window.

The MATRIX window supports the full functionality of TradeStation's order execution capabilities. With just a single click on any row in the Bid or Ask column, you're able to immediately place an order. Your order then appears in the Order column. To cancel an order, simply click on that order in the Order column. To cancel/replace an order, simply drag and drop it to a different price. Once your order is filled, you're able to view your open position profit/loss in the P&L column and place an order to close the position at the desired level with just a click of your mouse.

Ex. NN, (Advanced Futures Orders).

123.   Further, even the language of TradeStation's marketing materials closely follows that of TT. For example, in 2003, TT referred to MD Trader as allowing for "unprecedented market feel." *See supra* ¶ 121, Figure 1. Similarly,

92

even today, TradeStation continues to market its Matrix window as allowing for "unprecedented market feel."

Ex. OO, (About the Matrix Window).

124.   As yet another example, TT proclaimed that MD Trader "dynamically displays the market depth." *See supra* at ¶ 121, Figure 1. Likewise, in its announcement of the release of Tradestation in 2003, stated that the new Matrix window "dynamically displays the market depth." Coincidentally, this language is also used in the patents-in-suit.

```
New Matrix Window Offers State-of-the-Art Order Entry for Equities and
Futures
    TradeStation's new Matrix window dynamically displays the market depth of
a stock or futures contract.   Traders can place orders by single-clicking on
the appropriate bid or ask level in the display.   The Matrix window also
provides a graphical representation of the trader's open positions and open
orders, and enables the trader to drag-and-drop an open order to automatically
cancel and replace it at a different price.   The company believes its Matrix
window will offer a new level of flexibility for manual order placement for
both equities and futures.
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Ex. PP, (TradeStation Launch Article).

125.   These similarities provide concrete evidence that TradeStation copied

TT's MD Trader when developing and marketing its Matrix window. TradeStation

also has continuously marketed its Matrix window as being "innovative," "new,"

"state-of-the-art," and an "innovative order entry management tool."

```
    PLANTATION, Fla., Nov. 24 /PRNewswire-FirstCall/ -- TradeStation Group,
Inc. (Nasdaq:    TRAD) today announced the launch of TradeStation 7.2, the third
update to the company's next-generation TradeStation trading platform made
this year.  The new features in TradeStation 7.2 include enhancements that
have been widely requested by the company's clients.  Most notably,
TradeStation 7.2 now offers unique forex analytics and execution capabilities,
state-of-the-art order entry through its new Matrix window, and direct
exchange market data connectivity for Nasdaq, NYSE, AMEX and OPRA.
```

Id.

About the Matrix Window

The Matrix window provides users with an exciting new view of the market including an innovative graphical display of market depth and trade activity for a given instrument along with lightning fast order execution with its one-click trading capability. This combination allows for unprecedented market feel and efficiency for the frequent trader.

▸ To create a Matrix window, click the **Matrix** icon in the **TradingApps** window. A new Matrix window is displayed.

Ex. OO, (About the Matrix Window).

Ex. QQ, (TradeStation Securities MATRIX).

126. In addition to these examples, I am aware of others in the industry that copied MD Trader. For example, Mr. McElveen, who was the founder and owner

95

of Kingstree Trading, acknowledged that "many competitors of TT have come out with similar screens to MD Trader utilizing the static price concept, the improved order entry and the re-centering features." Ex. Y at ¶ 7. In fact, Mr. McElveen stated that he was "not aware of any competitors of Kingstree…that are not using an MD Trader type screen." *Id.* As another example, Mr. Durkin from Merrill Lynch stated:

> Since that time [when I first saw an embodiment of the invention in the Spring of 2000] there have been many imitations presented to me as "just as good as TT", (I think YESTRADER was the first one to show me a knock-off MD-Trader). GL, Pats, Easy Screen and Cantor [eSpeed] all demonstrated their versions of a "vertical" or "ladder" market display. They all seem to be unable to put all of the pieces together, probably a result of programmers being told to "copy TT" without understanding the functionality that it delivers to the trader. Re-centering is the most obvious example of a feature often omitted from the various knock-off attempts. More recently my Bloomberg rep came by to show me their most recent attempt at a futures order entry screen. As he was demonstrating it to me he conceded that it was not that good yet, but he assured me that Bloomberg had "200 developers working to make a screen just like TT".

Ex. K. Still more examples are provided in the declarations of independent traders and leaders in the industry, collected at Exhibit AA, which state that competitors copied MD Trader. *See, e.g.,* Ex. T at ¶ 10. Clearly, there was widespread copying of the invention throughout the industry.

127. In the *eSpeed* district court proceedings, witnesses testified about widespread copying. *See, e.g.,* Ex. CC at 88-89, 98-99; Ex. Y at ¶ 7; Ex. RR, Marlovics Declaration, ¶ 10. Indeed, many of the above-referenced declarants

96

attest to copying. I have also reviewed the deposition testimony of Messrs. Deux, Lapan and Geannopulos, and the declarations of Messrs. Burns (Ex. W), McDonnell (Ex. V), and Geannopulos (Ex. U) which indicate that the invention was widely copied throughout the industry. Also, Charles McElveen, founder of Kingstree, testified ████████████████████████████████ Ex. CC at 88-89, 98-99. Other documents evidence eSpeed's copying as well. *See* Exs. SS (PTX 38); Ex. TT, (PTX 78); Ex. UU, (PTX 123); Ex. VV, (PTX 279); Ex. WW, (PTX 281); Ex. XX, (PTX 286); Ex. YY, (PTX 294).

128. Mr. Deux, referenced in the preceding paragraph, also ██████████

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████████████████████Ex. ZZ, Deux Dep. Tr. at 210:8-212:25. Mr. Deux is the founder and CEO of NinjaTrader Group LLC, which offers technology for electronic trading and is a competitor to TT. ████████████████████████

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████████████████████████████████████ *Id.* at 29:7-32:22. In my opinion, ████████████████████████████

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129. As another specific example of copying, I have seen GL Trade documents showing copying. In one document, dated the year following TT's launch of MD Trader, GL stated that it developed its Quicktrade product in order

97

to compete with the "innovative competition, *providing an alternative way* of

trading." (emphasis added)

Ex. AAA, (GL Quicktrade).

130.   The Internal Product News document, which is dated March of 2001, identifies TT as the "innovative competition" and suggests that Quicktrade was being developed to "replace Trading Technologies [sic] screens." *Id.* GL's Quicktrade product was constructed to provide a dynamic display of bid and ask indicators and a static display of prices. In addition, the product included single action order entry that occurs by selecting a location corresponding to a price level along the price axis to both set a price and send the order. In 2002, to further replicate TT's MD Trader, GL added a display of a user's working orders aligned with price levels on the price axis, and canceling the user's trade order in response to a single action of the user input device with the cursor of the user input device positioned over the entered order indicator. Ex. BBB, (GL Product Information). GL later entered into a settlement agreement with TT and took a license under TT's patents.

131.   Prior to GL's launch of Quicktrade, Elliot Lapan, who supervised traders at Transmarket Group LLC and was a principal at Transmarket until 2006, suggested to GL that it look at TT's MD Trader (which he referred to as "Market Depth Trader"). Ex. JJ at 144:24-145:7. Mr. Lapan testified that he "actually told them they should go out and get a TT license and play with the product [MD Trader] and look at it." *Id.* at 145:3-5. He further testified that, "I specifically

99

recommended that they have something that resembled TT's vertical price display. This was something that my traders were very excited by." *Id.* at 145:18-21. Mr. Lapan told GL, "[i]f they really want to go in the right direction, here is the way to go." *Id.* at 151:15-16. Thus, Mr. Lapan suggested that GL copy TT's MD Trader and even that his traders were very excited by MD Trader. Subsequently, GL launched Quicktrade and, as referenced in the preceding paragraph entered into a settlement agreement with TT and took a license. In addition, Transmarket Group LLC developed a copy of MD Trader and, as referenced in Paragraph 148 below, became subject to a Consent Judgment as a result.

132. Another illustrative example from the district court proceedings is the case of eSpeed. In the early 2000s, eSpeed offered a cash market and provided traders on that market with a conventional dynamic screen for electronic trading. After the launch of TT's MD Trader, eSpeed decided to enter the electronic futures trading space and attempted to copy the invention based on customer demand. eSpeed had access to TT's commercial embodiment of the invention (MD Trader). Nonetheless, in the process of attempting to copy the invention, eSpeed at first got it wrong, and did not even implement a dynamic display of bid and ask indicators and a static display of prices. Ex. CCC, PTX 438. Tellingly, *years after* the invention, in its attempts to copy, eSpeed initially followed the engrained conventional wisdom, which still existed years after the release of the commercial

100

embodiment of the invention, and provided a dynamic GUI tool in which the inside market was continuously displayed in the center of a vertically-oriented column of prices. *Id.* eSpeed employees (with skill levels above one of ordinary skill in the art) had access to TT's invention, attempted to copy the invention, and yet still failed to appreciate the invention and got it wrong. *Id.* Thus, the claimed combination was not obvious to the eSpeed developers (again of a higher skill level than that of one of ordinary skill in the art), even with the benefit of hindsight. This real world evidence confirms that it would have been impossible for the invention to have been considered obvious at the time of the invention. eSpeed's own actions and documentation demonstrate the non-obviousness of the invention.

133. Later, after eSpeed realized its error, it implemented a GUI tool with a dynamic display of bid and ask indicators and a static display of prices. *See* Ex. 2030, *eSpeed* jury verdict; *see also Trading Technologies Int'l, Inc. v. eSpeed, Inc.,* 595 F.3d 1340, 1348 (Fed. Cir. 2010) (noting "eSpeed concedes that Futures View satisfies all claim limitations"). As shown below, the eSpeed products (which eSpeed called "Futures View" and Ecco "T-Ware Ladder View") were a knockoff of TT's commercial embodiment of the claimed invention. eSpeed documents showed that they copied the claimed invention. *See infra* at ¶ 136. Also, witnesses who worked at the time at eSpeed testified to copying. *See, e.g.,* Ex. DDD, *eSpeed*

Trial Tr. (Lewis) at 440; Ex. EEE, PDX 215.

134.   As demonstrated at the eSpeed trial, these products infringed the

asserted patents; an example claim chart for claim 1 of US Patent No. 6,766,304

("the '304 patent") and eSpeed's Futures View tool, which was presented at the

trial and demonstrates infringement, is shown below:

eSpeed Infringes on Each Element of Claim 1

'304 Patent

1. A method for displaying market information relating to and facilitating trading of a commodity being traded in an electronic exchange having an **inside market with a highest bid price and a lowest ask price** on a graphical user interface, the method comprising:

eSpeed Infringes on Each Element of Claim 1

'304 Patent

dynamically displaying a **first indicator** in one of a plurality of locations in a **bid display region**,

eSpeed Infringes on Each Element of Claim 1

'304 Patent

each location in the bid display region corresponding to a price level along a **common static price axis,**

Common Static Price Axis

PTX 1320

eSpeed Infringes on Each Element of Claim 1

'304 Patent

the **first indicator** representing quantity associated with at least one order to buy the commodity at the **highest bid price** currently available in the market:

First Indicator

Highest Bid Price

PTX 1321

104

eSpeed Infringes on Each Element of Claim 1

'304 Patent

dynamically displaying a **second indicator** in one of a plurality of locations in an **ask display region,**

Second Indicator

Ask Display Region

eSpeed Infringes on Each Element of Claim 1

'304 Patent

each location in the ask display region **corresponding to a price level** along the common static price axis,

Location Corresponding to a Price

eSpeed Infringes on Each Element of Claim 1

'304 Patent

the second indicator representing quantity associated with at least one order to sell the commodity at the lowest ask price currently available in the market;

eSpeed Infringes on Each Element of Claim 1

'304 Patent

displaying the bid and ask display regions in relation to fixed price levels positioned along the common static price axis such that when the inside market changes, the price levels along the common static price axis do not move and at least one of the first and second indicators moves in the bid or ask display regions relative to the common static price axis;

eSpeed Infringes on Each Element of Claim 1

'304 Patent

in response to a selection of a particular location of the order entry region by a single action of a user input device, setting a plurality of parameters for a trade order relating to the commodity and sending the trade order to the electronic exchange.

135. The '304 patent shares a common specification with the '132 patent. Each of these products is constructed to provide a dynamic display of bid and ask indicators and a static display of prices. In addition, each is constructed to include single action order entry that occurs by selecting a location corresponding to a price level along the price axis to both set a price and send the order. Other claimed elements that are found in these products include a re-centering command to center the inside market, display of a user's working orders aligned with price levels on the static display of prices (as shown above), and canceling the user's trade order in response to a single action of the user input device.

136. eSpeed's documents make clear that its products were designed to copy the salient features of TT's invention. For example, internal eSpeed

108

documents suggest that eSpeed "copy TT," (Ex. FFF, PTX 1366; Ex. GGG, PTX 80; Ex. HHH, PTX1367; Ex. III, PTX 81), and "duplicate TT," make a product that is "visual [sic] and electronically similar to TT," (Ex. JJJ, PTX 1356; Ex. KKK, PTX 110), "make our futures screen look like TT…color codes the bid and offer columns separately (might as well use TT's blue/red scheme) and have as close a look and feel as possible to TT." Ex. LLL, PTX 1360; Ex. MMM, PTX 448. As another example, an internal eSpeed document makes clear that eSpeed was copying the functionality of TT's price axis. The document, authored by eSpeed's Bill Gill, states, "the reason I populated all price levels up and down from the best at the default increment, is that's how Trading Technologies appears to do it, if you look at their website." Ex. NNN, PTX 1357; Ex. OOO, PTX 79. As a further example, eSpeed copied the "relative movement" feature in which "a dynamic display of bid and ask indicators moves up and down in relation to a static display of prices *See* Ex. PPP, PTX 1358; Ex. CCC, PTX 438; Ex. HHH, PTX 1367; Ex. III, PTX 81. This in turn led to eSpeed copying the re-centering feature. Ex. HHH, PTX 1367; Ex. III, PTX 81 (stating "move line dividing buy/sell, rather than move prices; add button to realign to center"); Ex. QQQ, PTX 1359; Ex. MMM, PTX 448 ("Re-center the bid/offer stacks with single click of mouse button [Steger, Lon] TT and other futures app's [sic] do this"). As yet another example, the documents show that eSpeed copied the working order feature and the feature

109

of canceling the working order through a single action of a user input device. Ex. RRR, (PTX 1361); SSS, (PTX 1362); TTT, (PTX 1363); UUU, (PTX 1364); VVV, (PTX 1365; Ex. WWW, PTX 36; Ex. XXX, PTX 440; Ex. YYY, PTX 441.

137. A motive for copying TT is that traders came to demand the features of the invention. For example, Amanda Lewis, a former eSpeed employee, testified that when she would visit clients, "they would ask for whatever TT had." *See, e.g.,* Ex. DDD at 440; Ex. EEE. This sentiment was confirmed by Mr. Cowan, founder of Ecco (later acquired by eSpeed) and Mr. Feltes. *See* Ex. ZZZ, PTX 1371; Ex. AAAA PTX 1369; Ex. BBBB, 1/24/07 Feltes Dep. Tr., at 54:8-56:16; Ex. CCCC, PTX 1370.

138. Another example is CQG. CQG is a diversified vendor of analytics and GUI tools for trading. As is common in the industry, CQG solicits feedback from traders/users about desirable functionality. *See* Ex. DDDD, PTX 600. This CQG document shows that CQG was asking its users, i.e. traders, "what they like/dislike about TT and what their requirements are to use CQG." *Id.* In response, "traders said they absolutely need… [a] fixed ladder like TT." *Id.* I understand that TT's MD Trader screen is sometimes informally referred to in the industry as "TT." CQG was comparatively late into the market, with its knockoff (called the CQG DOMTrader) of TT's MD Trader being introduced around 2004. A side-by-side comparison of TT's MD Trader and CQG's DOMTrader is shown

110

below:

139. DOMTrader is constructed to provide a dynamic display of bid and ask indicators and a static display of prices. In addition, it is constructed to include single action order entry that occurs by selecting a location corresponding to a price level along the price axis to both set a price and send the order. Other dependent claim elements that are found in DOMTrader include a re-centering command to center the inside market, display of a user's working orders aligned with price levels on the price axis (as shown above), and canceling the user's trade order in response to a single action of the user input device with the cursor of the

111

user input device positioned over the entered order indicator.

140. As demonstrated at the CQG trial, the DOMTrader tool infringed the asserted patents; an example claim chart for claim 1 of US Patent No. 6,766,304 ("the '304 patent") and another layout of the DOMTrader tool, which was presented at the trial and demonstrates infringement on an element-by-element basis, is shown below:

DOMTrader Infringes – Browse Prices Mode

141.   In the court proceedings, CQG's DOMTrader tool was found to infringe TT's '132 and '304 patents. Ex. EEEE, CQG Verdict. Moreover, at trial, despite awareness of all of the alleged prior art that was collected in the worldwide hunt, including TSE and the other art in this proceeding, CQG did not even challenge the asserted patents on anticipation or obviousness grounds. *See id.* CQG vigorously pursued numerous other defenses at trial.

142.   I am also aware that there were court proceedings involving Rosenthal Collins Group ("RCG"). These proceedings further demonstrate the non-obvious nature of the invention.   In the RCG case, the court entered a default judgment against the defendant because there was an attempt to *modify* the functionality on an alleged prior art system. RCG, an FCM (a futures commission merchant) that

117

employs developers to create its own technology, traces its history in trading back nearly 100 years, was very experienced in electronic trading tools and, around the time of the court proceedings, certainly employed numerous individuals who were well beyond the level of skill of those having ordinary skill in the art. RCG's top officials have served as chairmen of Chicago's major futures exchanges: Les Rosenthal at the Chicago Board of Trade, Bob Collins at the MidAmerica Commodity Exchange, and RCG Chairman/CEO Scott Gordon at the Chicago Mercantile Exchange. *See* rosenthalcollinsgroup.com/about-us/who-we-are/. In my view, RCG's depth of knowledge and experience in the field rises to the level of an expert, and not merely one of ordinary skill. In addition to employing its own developers, RCG also purchases technology from vendors. RCG, as a member of the joint defense group, had full knowledge of all the prior art being asserted in these proceedings, and its counsel even attended the TSE deposition. Rather than relying in any way on the TSE reference in the litigation, the centerpiece of RCG's validity argument was the underlying material to U.S. Patent No. 6,408,282. Ex. 1030.

143. As an initial matter, the Buist patent, which was brought to the Examiner's attention by TT, was not only considered during the original prosecution (which included the PTO's "second set of eyes" review) of the application leading to the '132 patent, but also was discussed in the notice of

118

allowance of that application as one of the closest items of prior art. I have been advised that the Examiner treated the Buist patent as prior art. *Trading Techs. Int'l, Inc. v. eSpeed, Inc.*, 370 F. Supp. 2d 691, 694 (N.D. Ill. 2005). In addition, the examiner treated the reference as showing, among other things, static. With that assumption, the only element(s) lacking from the Buist patent are the "single action order entry" elements: order entry locations for receiving single action commands to set parameters and directly send the order message. As described in the Buist patent, there is a separate conventional order entry ticket and the user needs to take multiple steps to send an order.

144. The Buist patent was considered, as noted above, in the original examination of the parent application and again by the court in litigation, including by the district court judge in a preliminary injunction hearing in the *eSpeed* case. It is my understanding that, in a preliminary injunction setting the patent owner needs to show a likelihood of success. In *eSpeed*, the judge found that TT showed a strong likelihood of success in view of this art and other art, which was more relevant than what is being asserted here. In fact, the likelihood of success was so strong that the Court presumed irreparable harm.[5] *TT v. eSpeed*, 370 F. Supp. 2d at

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[5] The Court ultimately denied TT's request for a preliminary injunction, although not because of the alleged prior art.

119

704.

145. RCG, as experts in the field, and not merely those of ordinary skill, realized that the claimed invention was not obvious in light of the Buist patent or the other art being asserted. In other words, RCG did not believe that the Buist patent, along with all of the other alleged prior art that was located during the worldwide search for prior art, was sufficient to render the TT patents obvious. So, they hired Mr. Buist as a consultant. Mr. Buist found zip drives in his barn with the code for the implementation of the system shown in the Buist patent. Although the code on the zip drives was initially inoperable, Mr. Buist was able to get the screen back up and running. The screen had a static price axis and the ability to enter orders much quicker (although still not by a single action) than in the Buist patent. Based on Mr. Buist's work, RCG moved for summary judgment of invalidity. After a significant investment in time and money, including engaging code experts to analyze the evidence, TT uncovered that Mr. Buist, working with RCG counsel, modified the zip drives he found to add in code for faster order entry functionality than shown in the patent. Later, TT also uncovered that Mr. Buist and/or RCG's counsel actually modified the dates in the metadata to hide that these changes were made. TT only discovered this by a stroke of luck. The summary judgment motion did not identify any of these changes. Ultimately, the district court entered a default judgment in TT's favor. *Rosenthal Collins Grp., LLC v.*

Trading Techs. Int'l, Inc., No. 05-cv-4088, 2011 WL 722467 (N.D. Ill. Feb. 23, 2011).

146.   RCG's actions show two things: (1) experts in the field recognized that the mountain of alleged prior art (including TSE) was not sufficient to render the invention obvious and (2) experts in the field recognized that, in this field, unless there is a single reference with all of the elements of the claims, there can be no viable obviousness argument.

147.   I have also reviewed the progression of competitor's GUI tools set forth in the LIFFE ISV directories. Ex. FFFF (LIFFE Directory October 1998); Ex. GGGG (LIFFE Directory February 1999); Ex. HHHH (LIFFE Directory June 1999); Ex. IIII (LIFFE Directory May 2001). LIFFE is a London-based exchange, which was in the process in 1999 of switching certain contracts from floor-based open outcry trading pits, to electronic trading. LIFFE provided an API, which was an interface that allowed qualified ISVs to provide GUI tools to LIFFE traders for electronic trading. The series of directories provided by LIFFE makes clear that the invention in TT's patent was widely copied throughout the industry. For example, in the LIFFE directories prior to the launch of TT's commercial embodiment of the invention, MD Trader, trading interfaces are shown that only have the inside market fixed on the screen. *See* Ex. FFFF; Ex. GGGG; Ex. HHHH. Shortly after TT's roll-out of MD Trader, the May 2001 LIFFE directory shows the

121

unique MD Trader GUI tool. Ex. IIII at 33. Around that time, copies of MD Trader began to appear in the market.

148. I am aware of the industry's widespread use of the invention from numerous consent judgments entered by the Judges in the district court proceedings. Specifically the district court has entered consent judgments in favor of TT and against the following entities:

1. Goldenberg Hehmeyer & Co.
2. Kingstree Trading, LLC
3. Ninja Trader, LLC
4. Man Group, PLC
5. Patsystems PLC
6. NYFIX, Inc.
7. Peregrine Financial Group, Inc.
8. RTS Realtime Systems AG
9. Rolfe & Nolan Systems Inc.
10. Strategy Runner. LTD
11. FFastFill PLC
12. TransMarket Group LLC
13. Orc Software AB
14. Refco
15. Cunningham Trading Systems, LLC, Cunningham Commodities, LLC
16. TradeHelm, Inc.
17. Rosenthal Collins Group, LLC (2005)
18. Rosenthal Collins Group, LLC (2010)
19. Stellar Trading Systems, Ltd., Stellar Trading Systems, Inc.
20. BGC Capital Markets, LP, eSpeed Markets, LP and Eccoware Ltd

(Collectively attached at Exhibit JJJJ).

149. I understand that virtually all of the defendants listed above admitted

122

in papers filed with the court that the TT patents were valid and infringed and have

agreed to either a worldwide workaround to avoid infringement or to take a

license. *See* Ex. KK at ¶¶4-9, 14. I understand that TT has entered into

settlements and/or license agreements, which include the '132 patent, with the

following entities:

1. Goldenberg Hehmeyer & Co.
2. Kingstree Trading, LLC
3. NinjaTrader, LLC
4. Man Group, PLC
5. Patsystems PLC
6. NYFIX, Inc.
7. Peregrine Financial Group, Inc.
8. TradeMaven Group, LLC
9. RTS Realtime Systems AG
10. Rolfe & Nolan Systems Inc
11. Strategy Runner, Ltd.
12. FfastFill Pic
13. TransMarket Group LLC
14. Orc Software AB
15. Advantage Futures LLC
16. REFCO Group LLC
17. Marex Trading Services Ltd.
18. Cunningham Commodities
19. Tradehelm, Inc.
20. RCG
21. Stellar
22. BGC
23. OEC
24. GL Trade & Sungard
25. TD
26. FUTUREPATH
27. CQG
28. TradeExchange Network Ltd
29. Direct Trading Institutional, L.P.
30. tradeMONSTER

123

Aside from demonstrating widespread unauthorized use of the invention, as well as subsequent authorized uses, the consent judgments and settlements/license agreements indicate that the invention is valuable to the industry. In addition, it is my opinion that the consent judgments and settlements/license agreements demonstrate a widespread industry acquiescence to the patented invention.

150.   I have also read articles that evidence copying of the invention, such as, "What Is Behind Your Front-End?" Ex. HH, and "We Can Do That Too." *Id.* at sidebar p. 7. In this sidebar, the author points out that, while TT's GUI tool was initially considered "unique," "now many front-ends offer similar features." *Id.* The article goes on to discuss "commonality" among GUI tools and providing "the same level of service from a front-end trading perspective." *Id.* These statements merely reflect the fact, already known to those in the industry, that many were copying TT's commercial embodiment of the invention. Another example is the book, "Steidlmayer on Markets," which states that the invention had a "superior form—and we know it is superior because all the competitors are attempting to copy it".

Ex. DD.

151. My opinion that those of ordinary skill in the art would not have found the invention obvious is proven by actual events that occurred. One of the companies mentioned above, Patsystems, was both subject to a consent judgment and entered into a settlement agreement with TT. Patsystems, a long-time competitor of TT and TT's primary archrival in the early to mid 2000s, provided real world evidence that a skilled person did not combine and would not have combined the features as in the invention. Around the time TT's MD Trader was launched, Patsystems (a public UK company) had been a leader in the electronic trading industry for years and employed numerous individuals who I would

125

consider to be above the level of ordinary skill in the field. As early as 1998, Patsystems reportedly had an interface with a static display of prices and another separate interface with single click order entry. Ex. KKKK, (Patsystems) and Ex. LLLL, (Patsystems Canned Demo). However, Patsystems indisputably failed to combine the two features. While they reportedly had the components of the invention separately, Patsystems' own witness, Nicholas Garrow (head of products), candidly testified that it was "not obvious" to combine static with single action. Ex. MMMM, Garrow Dep. Tr. at 125:16-126:9 (stating "I don't believe that the patents in dispute in this case [the '132 and '304 patents] were an obvious—how can I phrase this—an obvious continuation, if you like, from—from what Pats had."). In fact, Patsystems never combined the features as in the invention until after TT launched the commercial embodiment of the invention in the late summer of 2000.

152.   This is further confirmed by the testimony of Mr. McCausland, who developed a dynamic front-end trading interface for an early electronic exchange, Intex. The Intex interface was always centered on the last traded price, but the screen included brief unpredictable moments when the price levels would not change positions. Ex. NNNN, McCausland Dep. Tr. at 61:13-17. Mr. McCausland further testified that this was a shortcoming of the programming implementation, but that, because the display was only used "occasionally" and the traders worked

126

off a different, conventional page (showing the best bid and offer), they had other priorities ahead of fixing the shortcoming. McCausland at 173:20-175:9. In Intex, order entry was a multi-step process using a keyboard to fill in a conventional order entry ticket. *Id.* at 78-81. When asked in 2005 whether there was a way in the Intex interface to keep the display of prices static, Mr. McCausland testified, "it is illogical that you would want to do that." *Id.* at 61:5-17. Mr. McCausland was likely someone who was significantly beyond the level of skill of one of ordinary skill, and to him one of the primary aspects of the invention seemed "illogical." Mr. McCausland's reaction reflects the same conclusions as would be shared by those of ordinary skill in the art. For the same reason, under Mr. McCausland's view and the view of one of ordinary skill in the art, to the extent that TSE even qualifies as prior art, one of ordinary skill would have elected to use the TSE compressed Board mode, in which, like Intex, the market information is always centered. Specifically, Mr. McCausland testified in 2005 that it was desirable to only show a price where there was actually an order, because a trader "wants to know where the orders are. He doesn't want to look at a page full of empty prices." *Id.* at 154:10-14. In addition, one of ordinary skill in the art viewing the uncompressed mode of TSE, in which the market information is alleged to re-center when the best bid/ask move a preset distance away from the center, would consider such functionality to be illogical and would reject its use in the manner

127

proposed by the combination (i.e. TSE with Belden).

153. In the district court proceedings, there was additional evidence of industry participants trying to develop improved GUI tools around the time of the invention and failing to do so. For example, David Feltes, at the time head of Marquette Trading (an international proprietary trading firm), testified that around the time of the invention, he polled approximately 40 staff to see if they had any ideas for an improved trading tool that would justify Marquette investing in developing its own software as opposed to purchasing software from vendors. Ex. AA at Feltes, ¶ 8; Ex. X at 33-34. None of the staff suggested any idea remotely like the invention. *Id.* As another example, Mike Burns testified that he worked with an experienced software developer to try to come up with an inventive trading interface to solve the same problem ultimately solved by the invention, and that he failed. Ex. OOOO, Burns Dep. Tr. at 294-95. Similarly, Mr. Lapan testified at his deposition about requesting improvements to GL's GUI tools, and offering to work with GL on improved tools. Ex. JJ at 220-224.

154. Despite years of discovery into alleged prior art, including formal and informal searches coordinated by numerous defendants and industry participants, everything unearthed is at best cumulative to references considered by the Examiner in the original prosecution. During the original prosecution, TT withdrew a parent application from allowance in order to have additional prior art

128

considered. Ex. PPPP, (11/12/2002 Petition to Withdraw). The additional prior art included Wit Capital (which became the Buist '282 patent) and Friesen. *Id.* The Examiner assumed that this cited art included not only a price axis, but also a static display of prices, with dynamic bid and ask indicators that move relative to the static display of prices. *See* Ex. QQQQ, (Notice of Allowance). The Examiner also recognized that other elements, including single action order entry, could be found separately in other prior art references. I am familiar with the art cited by the Examiner in the original prosecution, and I am familiar with the references cited by Petitioners in this CBM proceeding, and the art cited by the Examiner is more relevant to the claims than the references cited by Petitioners. Nonetheless, the Examiner correctly concluded that the claimed combination was not obvious, even in the face of the more relevant art. *See id.* At the time, the art unit to which TT's application was assigned had implemented a "second set of eyes" quality review, under which all allowed applications were reviewed, prior to issuance, by a second qualified Examiner who again considered patentability. *TT v. eSpeed*, 370 F. Supp. at 694 ("[t]he patents were reviewed . . . once through the usual procedures and once through a special quality review procedure."); *see also* Ex. RRRR, (PTX0624). After the quality review, the original Examiner's conclusion of non-obviousness was confirmed and the patents issued. As a result of the worldwide hunt for prior art initiated during the *eSpeed* case, an anonymous

request for reexamination of the '132 and '304 patents was filed. *See, e.g.*, Ex. 2043. The request relied on TSE. The reexamination branch confirmed the non-obviousness of the claimed invention, ultimately issuing reexamination certificates confirming the patentability of the claims without amendment. A second reexamination request on the same patents was filed by some of the defendants. Ex. 2045. The second request was based on references that had already been considered, either during initial prosecution or in the first reexamination. The PTO denied the second request for reexamination. Ex. 2038. The repeated review of the patentability of the invention, in view of this extraordinary scope of the search for prior art, in both the district court and the PTO, further demonstrates not only the non-obvious nature of the invention, but also that it was revolutionary.

155.   All of these entities knew of single click order entry, knew of dynamically displaying quantity on screens, and knew of price axes—almost every trader used a chart. These elements were known separately, and were widely known to many, many people all investing heavily and looking for any edge. Many of those with knowledge of these elements were people far above the level of skill possessed by the person of ordinary skill. The fact that none of these people put together the claimed combination, which proved to be a money making machine and was even resisted at first, speaks for itself. It was clearly not obvious to try the claimed combination.

IX. THE CLAIMED INVENTION IS NOT OBVIOUS

156. Against this backdrop, it is my opinion that the claimed invention is very clearly *not* obvious. Beyond the fact that the cited references fail to even suggest the claimed combination, we have the benefit of a mountain of real world evidence that confirms the non-obviousness of the invention. The industry was well-funded, motivated to gain any edge, and focused on improving GUI tools. Industry participants developed GUI tools utilizing the talents of employees whose skill sets often significantly exceeded the level of ordinary skill in the art. Yet, no one else made the combination until long after Mr. Brumfield had made the invention, TT had launched its MD Trader product, convinced some open-minded yet influential traders/companies to try it, and then started to achieve some traction in displacing the entrenched conventional screens. The evidence also shows the following factors supporting non-obviousness are present in this instance: 1) commercial success; 2) initial skepticism followed by acceptance; 3) widespread copying; 4) failure of others; 5) praise and accolades; 6) licensing and settlements; 7) failure to recognize the problems with the conventional GUI; and 8) unexpected results. In light of the characteristics of the industry, the conventional GUIs and accepted design criteria, and all of the evidence referenced above, it is clear that in the absence of an anticipatory reference, the present invention cannot be deemed obvious.

157.   Even in view of the drawbacks of the prior art dynamic screens, which I note are apparent only now with the benefit of hindsight (e.g., the drawbacks of the prior art dynamic screens are first pointed out, to my knowledge, in the specification of the patent under review), in my opinion the design considerations and the advantages of the prior art dynamic screens at the time of the invention taught heavily away from even considering a dynamic display of bid and ask indicators and a static display of prices (e.g., Figs. 3 and 4 of the '132) in combination with single action order entry, as included in the claims. In particular, the invention included a number of drawbacks that would have rendered it a non-starter to one of ordinary skill in the art at the time of the invention. This is because of at least the following reasons:

> i.)   A dynamic display of bid and ask indicators with a static display of prices would have been viewed by one of ordinary skill as using too much space on the screen, i.e., too much screen real estate, in terms of the size of the field of the dynamic display of bid and ask indicators that move relative to a static display of prices for each product on the screen;

> ii.)   In terms of the distance that the trader would have to move the pointing device, e.g., a mouse, within a single product and between products when trading multiple products, a dynamic

132

display of bid and ask indicators with a static display of prices would have been viewed as much too slow;

iii.) A dynamic display of bid and ask indicators with a static display of prices would permit the inside market-viewed as the target— to move on the screen and, as a result, a user interested in placing an order at the best bid or ask would have to "chase" the market and thus such a screen would be slower and less accurate with respect to market type orders.

158. Therefore, at the time of the invention, a dynamic display of bid and ask indicators and a static display of prices was unsatisfactory to one of ordinary skill in the art because it would be perceived as failing on all important design criteria—conserving screen real estate and providing for fast and accurate order entry. In regard to each of these design criteria, the invention ran counter to the conventional thinking at the time. The invention is perceived to waste screen real estate, particularly in comparison to the conventional GUI tools at the time of the invention. In addition, the invention, while increasing accuracy with respect to orders intended for a specific price in comparison with the dynamic screens where prices routinely flip, is not as accurate as prior art screens that have an order entry ticket. With an order entry ticket, like the TSE, the trader typically fills in the required parameters and then clicks a "send" button. The invention is not as

133

accurate as an order entry ticket system because in the invention, a market type order would require the user to chase the moving inside market and, for all order types, the order can be sent at the wrong price if the trader happens to click at the wrong price level. Thus, it is noteworthy that the invention of the '132 patent with a dynamic display of bid and ask indicators with a static display of prices can be seen to have disadvantages. The disadvantages caused traders, initially, to not want to use the invention, and thus, also caused those of ordinary skill in the art at that time to reject and not even consider using a dynamic display of bid and ask indicators and a static display of prices in conjunction with an order entry GUI tool. Nevertheless, the ability to obtain the intended price (not as fast as market type orders in dynamic screens having a fixed inside market) with a single action order entry (not as accurate as an order ticket window) resulted in an improved and unobvious GUI tool. The claimed combination is not routine and conventional. Instead, the claims are directed to novel combination of elements that provide significant benefits as described above.

159.   For my analysis, I am relying on Petitioners' translation of TSE.[6] As

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[6] I further understand that there may be an issue about the accuracy of Petitioners' translation. Nonetheless, for purposes of this declaration only, I have been asked to *assume* that the translation is accurate.

an initial matter, I note that TSE is deficient in the clarity of its description of screen functionality. Specifically, I was asked to review the function and operation of the displays of market information and windows for order entry in TSE, including the non-compressed board mode, based on the description in Petitioners' translation of TSE. One of ordinary skill in the art would only take from TSE as much as such a person could adequately comprehend. Thus, as an initial matter, the statements made in the Petition cannot be completely verified from the TSE document. For example, TSE describes that the non-compressed board mode includes a "floating display" region, but fails to describe with any level of clarity how this "floating display" works. The "floating display" region plainly implicates the manner in which the prices are displayed. Nor does TSE explain why the non-compressed board mode includes this "floating display" region, or even the purpose for including both a compressed board mode[7] and a non-compressed board mode. The limited testimony of Mr. Kawashima is not helpful on this point either.

160. As for the TSE, even assuming that the TSE reference qualifies as prior art (which I understand is disputed) and that TSE operated as purported by Petitioners (also disputed), Petitioners best case scenario, for the sake of argument,

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[7] Petitioners do not suggest that the compressed board mode included a price axis, and I agree that it does not.

would be that TSE shows a price axis (uncompressed Board mode),[8] but not the claimed single action order entry (or the recited order entry region). In fact, in my opinion, because of its regular automatic recentering, the TSE relates to a system that is more akin to a dynamic screen. One of ordinary skill in the art would have rejected TSE as a starting point, given the important design criteria applied by those of ordinary skill in the art at the time of the invention—conserving screen real estate and providing for fast and accurate order entry. TSE (uncompressed Board mode) is a compromise without benefits. It takes up significant screen real estate, without benefits to speed and accuracy. Indeed, it is significantly less accurate because the regular automatic recentering may cause an even greater magnitude error in the price that it conveys to the order entry ticket. This would appear to actually increase the time that it would take to enter an order using TSE's already slow order entry ticket.

161. In any event, it is undisputed that TSE does not disclose single action order entry. Even as of late 2005, TSE had not combined a static display of prices and single action order entry, as called for in the claims. Thus, even if one were to assume for the sake of argument that TSE includes all elements other than a single

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[8] There is no price axis in the compressed Board mode, because prices are omitted if there is no order at that price.

action to "set a price for the trade order and send the trade order having a default quantity to the electronic exchange," and given the strong interest in the industry for technology that provides even the slightest edge or advantage over others, it is telling that no one in the industry, including Petitioners and the TSE, ever combined a static display of prices and single action for *years* after Mr. Brumfield conceived of this invention. It is also clear, from TSE's use of regular, if not frequent, automatic recentering, that TSE had no appreciation whatsoever of the potential benefits of a price axis with relative movement or a static display of prices, as described herein. Nor would one of skill in the art perceive the benefits of static display of prices, as described herein, from a review of TSE. As such, the person of ordinary skill in the art would certainly not have been motivated to use TSE as a starting point, and if he/she in fact did so, would not have found the invention remotely obvious (even with the additional disclosures of Belden and Gutterman or May). In particular, a person of ordinary skill in the art would have been strongly led away from implementing single action order entry into TSE by the TSE's frequent automatic recentering, which would have led to completely unacceptable levels of accuracy for the TSE user. In addition, TSE clearly suggests to one of ordinary skill in the art that order entry accuracy is paramount, even when this degree of accuracy results in a significantly slower system. One of ordinary skill would understand this not only from TSE's use of the new order

137

entry window as the sole means of new order entry, but also from TSE's requirement that the user type in a quantity for each order. Cite Kawashima. Thus, TSE suggests to one of ordinary skill in the art that single action order entry would be very undesirable. TSE did not appreciate the benefits of the invention stemming from a static display of prices, as evidenced by their regular automatic re-centering in the uncompressed mode (when best bid or offer moves a set distance away from center).

162. In my opinion, for all the reasons given above, it would not have been obvious to one of ordinary skill in the art at the time of the invention to combine a static display of prices with single action order entry, as claimed. While the invention was widely copied and is prevalent in futures trading today (and making inroads in other asset classes), it was a radical departure from conventional thinking at the time. It still is a radical departure from conventional thinking even today in many asset classes.

163. Even if one were to combine TSE and Belden, and even if TSE constitutes prior art, in my opinion the claimed invention cannot be considered obvious because the references, whether taken alone or in combination, fail to disclose an order entry region, as claimed. The patent describes and claims an "order entry region" that is "aligned with the static display of prices" and includes "areas for receiving commands ... each area corresponding to a price of the static

138

display of prices." Thus the claims include a region for entering orders, where the region includes areas for receiving commands and each area in the order entry region corresponds to a price in the static price display. In TSE you cannot send an order from an area that corresponds to a price along the static price display. TSE is not static as construed by the Federal Circuit and certainly does not suggest an order entry region that is "aligned with the static display of prices" and includes "areas for receiving commands ... each area corresponding to a price of the static display of prices," as claimed. In TSE, orders are entered using the "New Order Entry Window," and there is no suggestion to send orders from the Board screen. Nor does Belden, Gutterman or May suggest such an order entry region as, at a minimum, both are completely lacking any showing of a static display of prices. Thus, even if combined as suggested, Petitioner's combination fails to suggest the invention, as claimed.

164.   Moreover, as I stated above, in TSE, when the order entry window opens in response to the user initiating an order on the Board screen, the user must always enter a quantity in the order entry window. This procedure where the user has to provide additional information prior to sending the order using the separate order entry window is intended to slow the order entry process to increase accuracy, which is a desired feature in broker systems like the TSE. In particular, the user must use a keyboard to enter a quantity for the order, (Ex. 1017 at

139

TSE0000000783-785), then, it would appear, move the mouse (or perhaps use the keyboard to move a cursor) to the "send" or "submit" area of the order entry window to actually send the order. *Id*. In my opinion, therefore, combining a single action to "set" and "send" a trade order with the TSE system would negate the desired accuracy of the TSE's deliberate, slow order entry process, rendering the separate order entry window superfluous. Thus, the TSE order entry process, which utilizes a separate order entry window and requires that the user fill out at least a portion of the order entry window using a keyboard, teaches against using anything like a single action to "set" and "send" a trade order. Indeed, single action order entry is incompatible with the TSE process of requiring the user to enter information in a separate order entry window. In addition, in TSE, the system refreshes at a slow 3-second rate (i.e. updates are displayed after 3 seconds). In my opinion, this is a very slowly responding refresh rate. As a result, in my opinion, single action order entry would not be needed or desired in such a slow system, and one of ordinary skill in the art would have understood that the accuracy of the order entry process in TSE is more important than speed in a system that refreshes at such a slow rate. For this additional reason, it would not be obvious to combine single action with TSE.

165.   Moreover, one skilled in the art would not look to Belden because it is a pit mimicking reference that has nothing to do with sending an order to an

140

electronic exchange, as the difference is described above. Also, Petitioners rely on Belden for teaching a single action. But Belden doesn't show a single action to both set a price and send an order from an area that corresponds to a price level along a static display of prices. Similarly, Gutterman does not relate to electronic trading. Instead, Gutterman is technology for assisting a broker with trading in an open outcry trading pit.

166. It is my understanding that if the independent claim is not rendered obvious, then each of the dependent claims is likewise not obvious. In addition, a number of Petitioners' arguments regarding the dependent claims gloss over and ignore the actual language of the claims. Specific instances are set forth in the following paragraphs.

167. I also note that TSE does not disclose any display of an indication of the last traded quantity. Dependent claim 29, 39 and 49 of the '132 patent recites displaying a last traded quantity in alignment with the corresponding price from the static display of prices. As mentioned above, when the TSE system updates the Board information at 3-second intervals, the resulting display shows any remaining total quantity amount and not the amount that was last traded or actually traded during the previous interval. Any modification of the total quantity amount should reflect all orders (newly added and recently filled or cancelled) since the last update, but would not reflect the last traded quantity. In other words, TSE merely

141

displays the net change in quantity since the last update. Thus, a change in the total quantity displayed does not reflect the last traded quantity, but rather some combination of newly added and recently filled and canceled quantities, where the user cannot distinguish either the amount newly added, the amount recently filled, the quantity recently canceled (or the prices at which those activities occurred for matches occurring between the 3-second update interval). Neither TSE, Gutterman, nor Belden show or suggest a static price display as claimed, so they certainly cannot display a last traded quantity in alignment with a price in the static display of prices. Petitioners rely on Gutterman Col 12 and Mr. Rho's interpretation of this portion of Gutterman, to satisfy this claim. I disagree. At best, Petitioner's reliance on Gutterman's disclosure of the "market bar" is misplaced. Gutterman plainly describes to one of ordinary skill, and Fig 2A of Gutterman clearly shows, that the market bar merely indicates the "current trade *price*." Gutterman, Col. 12:7-12. On the other hand, Gutterman's market bar plainly does not indicate a last traded *quantity*. Aside from lacking the last traded quantity indicator, none of Petitioner's references suggest displaying a last traded quantity "in alignment with the price corresponding thereto," as in the claim. The proposed combination is simply deficient in this regard.

168. In addition, neither TSE nor Belden shows the elements of dependent claims 2, 9 and 15. Claims 2, 9 and 15 additionally recite that the order entry

142

region comprises a "bid order entry region" and an "ask order entry region." From the corresponding independent claims we know that the order entry region is "aligned with the static display of prices" and includes "areas for receiving commands *to send trade orders* … each area corresponding to a price of the static display of prices." Therefore claims 2, 9 and 15 add that this order entry region includes separate regions for bids and asks. Neither TSE nor Belden shows anything like the recited order entry region aligned with the static display of prices, much less specific regions to send trade orders for bids and asks. For TSE, buys and sells are entered through a separate window, the new order entry window. Ex. 1017 at TSE0000000783-785. The TSE new order entry window is not "aligned with [a] static display of prices." In addition, one of ordinary sill in the art would recognize that TSE does not provide the ability "to send trade orders" from the Board screen. Petitioners argue that TSE suggests setting, in the new order entry window, whether the new order is a buy or sell based "on the place that is double clicked." Pet. at 72. This vague suggestion is plainly not a sufficient to describe the specifics of the claim language and is a good example of Petitioners glossing over the claim language and the alleged teachings of the cited reference. TSE is ambiguous about where the user would need to click to launch the new order entry window for the desired order type. Ex. 1017 at TSE0000000783-785. Even if one could click on the TSE Board screen to set whether a desired order is a buy or sell,

143

that is *not* an "order entry region" as claimed, for at least the reason that the Board screen indisputably does not include "areas for receiving commands *to send trade orders*." Belden does not cure these deficiencies of TSE, and the Petition does not suggest otherwise. Pet. at 72. Belden likewise lacks a "bid order entry region" and an "ask order entry region" that are "aligned with the static display of prices" and includes "areas for receiving commands *to send trade orders* ... each area corresponding to a price of the static display of prices." These features of claims 2, 9 and 15 are entirely lacking from the cited references.

169. Furthermore, neither TSE nor Belden suggests entering an order through a single action, where "the trade order is for a predetermined fixed quantity, and for a price corresponding to the position of the pointer" as recited in claims 3, 10 and 16. I understand that Petitioners rely on Belden for this element of the claims, because Petitioners allege that the Belden user can click on a trader icon in the trading arena to set a price and quantity. But Belden does not show this element of the claims. The price and quantity are not "pre-determined" in Belden because they are not set until the user clicks. In addition, Belden works like a trading pit, where traders can agree to trade with each other. The trader icons themselves are likewise not fixed; other traders may take a portion of what one trader if offering, or the trader associated with the icon may withdraw his/her interest (before the user performs the action of clicking). In addition, a trader

144

could come into the pit with a new offer, better than the existing offer price, and all the existing offer trader icons (at the worse price) would disappear in Belden. Nor is the trade order price "corresponding to the position of the pointer" in Belden. In Belden, all of the trader icons that are offers are at the same price (the best offer price). In executing a trade with one of the trader icons representing, e.g., an offer, the price for the trade is therefore independent of location. Nor is there any suggestion (in either Belden or TSE) of how Belden's acceptance of a single user's bid/offer *could be* combined with TSE, which displays only aggregated quantities of bids/asks (as opposed to individual bids/offers) and, as described above, provides for deliberate, slow order entry using the new order entry window and requiring the user to fill in a quantity each time. The systems of TSE and Belden, at the very least in regard to order entry, are incompatible.

170. Claims 24, 34, and 44 recite re-centering the display "upon receipt of a re-centering instruction." Petitioners contend that claims 24, 34 and 44 are unpatentable under 35 § 103 over TSE and Belden. Neither TSE nor Belden suggests a command by a user to re-center the static display of prices so that the inside market is in the middle of the display. Petitioners' only support for this claim element in the prior art is to argue that, "in TSE, selecting the home button '[H]' *while in the Scroll Screen* centers [sic] "with the board display center price at the center." Pet at 74 (emphasis added). One of ordinary skill in the art would not

145

understand this as the claimed "re-centering instruction." It is clear from TSE that use of the "H" button in the manner described is nothing more than mode switching (sometimes referred to by those of skill in the art as a modal shift); that is, the "H" button causes the TSE system to change modes, specifically, from the "scroll mode" to the "board mode." This is true regardless of the initial state (e.g., centered or not centered) of the mode that one is switching into (in this case the board mode). TSE fails to suggest that, while in the Board mode, one could select the "H" button to recenter the board mode display, and as a consequence fails to suggest the claimed "re-centering instruction." The compressed Board mode is always centered, like the conventional GUI tool described above, and person of ordinary skill in the art (who is engrained with knowledge of this conventional tool) would not even consider a re-centering command. I further note that neither of TSE's board screens (compressed and uncompressed) includes a "static display of prices" as recited in the independent claims, and as such TSE fails to in any way suggest a "re-centering instruction" for re-centering a "static display of prices." Thus, the subject matter of claims 24, 34 and 44 is not obvious.

171. Claims 25, 35 and 45 recite "displaying working orders in alignment with the prices corresponding thereto." Petitioners contend that claims 25, 35 and 45 are unpatentable under 35 § 103 over TSE and Belden. As an initial matter, these claims depend from independent claims that recite a "static display of

146

prices," such that one of skill in the art would understand that claims 25, 35 and

45's "working orders" are aligned with the price *from the static display of prices*

that corresponds to the working order. One of ordinary skill in the art would

understand that a "working order" in this context represents the user's own order.

At the time of the invention, it was known to display the user's own orders, i.e.,

working orders, in a separate window. By putting such orders in a separate

window in the known manner, the designers of those displays were complying with

the strong design criteria of conserving screen real estate (in other words the

primary window (which displays market information and/or allows order entry)

was minimized by only displaying market information without wasted space).

Neither TSE nor Belden shows displaying a working order in alignment with a

corresponding price from a static display of prices. Petitioners suggest that Belden

suggests displaying "working orders [associated] with the prices corresponding

thereto." Pet at 75. But that is not what is claimed and is no different that the

known method of displaying working orders in a separate window. The claim

requires a display "in *alignment* with" the price, and Belden fails to suggest a

working order in alignment with a price. Petitioners do not even argue that TSE

shows this element. TSE does not show a user's own orders aligned with a price in

the board screen. Nor does TSE's aggregate quantities, displayed in the board

screen, suggest a "working order." It is clear from claims 25, 35 and 45 that the

147

claimed display of a "working order in alignment" is *in addition to* the market depth display recited in the independent claims (reciting "displaying market depth …through a dynamic display of a plurality of bids and a plurality of asks in the market"). TSE's aggregate quantities may relate to the market depth display, but TSE lacks the claimed "working order in alignment."

168. Claims 26, 36, and 46 recite "dynamically displaying entered orders in alignment with the prices corresponding thereto, wherein said entered orders indicate a quantity…for which a trader's orders have been filled." Petitioners rely on Belden's summary box of Figure 3 and suggest that one skilled in the art would have been motivated to combine this disclosure with TSE so the trader could easily recognize and track his/her orders at various price levels. But Belden's summary box does not show a quantity filled *aligned* with a static display of prices, as in the claim, and there is nothing in TSE of Belden to suggest the desirability of displaying filled order quantities in this manner. In addition, Belden conforms with the conventional wisdom, around the time of the invention, of displaying such information in a separate window. Use of a separate window was thought desirable because it allowed the user to keep track of all filled orders, regardless of contract traded, in a single general location. In TSE's board screen, every available column in the screen is occupied by some other information, including, for example, prices, bid quantities, and ask quantities, and there is no room to

148

display filled orders aligned with a price level. Nor does the TSE board screen include a static display of prices. Nor would one skilled in the art understand, from TSE or Belden, that it would be desirable to display entered orders in alignment with a static display of prices. Petitioners have not cited any other evidence to suggest this either. As such, even if TSE and Belden were combined, one still does not arrive at the invention in claims 26, 36, and 46, because the combination would place the entered order in a separate window, as shown in Belden, to conserve screen real estate in the primary market display. Claims 26, 36, and 46 are thus nonobvious.

X.   THE CLAIMED INVENTION IS TECHNICAL

172.   In my opinion, the claimed invention is a very specialized GUI tool. As noted above, at the time of the invention there were a number of conventional ways to trade electronically, including the ubiquitous Figure 2 style GUI tool and order entry tickets. The patent in this proceeding does not prevent others from using these conventional GUI tools. Nor is the patent directed to any particular type of trading strategy. Indeed, CQG's expert, in the case referenced above, admitted that the invention does not stop someone from practicing any particular trading strategy and does not preclude all ways of trading electronically. Ex. SSSS, Van Dusen Dep. Tr., at 107:3-109:24.

173.   The invention is a technological improvement over prior art GUI

149

tools. Based on my own experience, GUI tools are technical in nature, and indeed the entire electronic trading industry considers GUI tools as being technology. The invention is a far cry from business methods, or methods that implement trading strategies. Instead, the GUI tools act as the platform for the user/trader to interact with the electronic exchange. In the litigations involving TT's patents, numerous experts for different defendants all agreed that the patents are directed to GUIs and that GUIs are in a technical field. For example, Mr. Silverman, an expert for eSpeed, testified that the patents[9] are directed to "a field of technology" in which "skilled software engineers" develop "real time processing" and "graphical user interfaces." Ex. TTTT, 8/24/07 Silverman Dep. Tr., at 131:17-132:2. In another example, Mr. Mellor, a technical expert for CQG, testified that the "underlying technology [in this case] is the graphical user interface." Ex. UUUU, 1/16/15 Mellor Dep. Tr., at 45:8-46:2. Other experts in the field testified in a similar manner. Ex. SSSS at 110:3-111:4; Ex. VVVV, 8/9/07 Ferraro Tr., at 329:10-11; 336:13-15; 443:2-4; Ex. TTTT at 131:17-132:2; Ex. WWWW, 8/17/07 Dezmelyk Tr., at 8:15-18. In fact, I am not aware of a single expert in any of the cases taking

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[9] In the *eSpeed* case, Mr. Silverman reviewed the '132 and '304 patents, which resulted from the same parent applications as, and share a common detailed description with, the '411 patent.

the position that the invention is not technological, until that argument was advanced by Mr. Roman in this proceeding. As noted above, the invention provides a technical solution to a number of technical problems in the prior art. In the *eSpeed* case, defendants' expert, Mr. Dezmelyk, acknowledged that the goal of the invention addressed the technical problems of efficiency and accuracy. Ex. WWWW at 8:15-18. As an additional example, the Federal Circuit stated, "[t]he claimed invention facilitates more accurate and efficient orders in this trading environment."[10] *Trading Technologies Int'l, Inc. v. eSpeed, Inc.,* 595 F.3d 1340, 1345 (Fed. Cir. 2010). Likewise, Mr. Van Dusen, CQG's expert, noted how the invention was an improvement in the field, when answering questions at deposition:

> Q: Is it fair to say –and I believe you testified about this earlier—that MD Trader was an improvement over prior systems?
>
> A: That's my understanding, that's accurate.
>
> ...
>
> Q: Why is it that MD Trader was an improvement over prior systems?
>
> ...

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[10] Again, the Federal Circuit was specifically addressing the claimed subject matter of the '132 and '304 patents, but the statement also applies to the '411 patent, which shares a common detailed description with the '132 and '304.

A: Yeah. It seems to me that the reason was, is it facilitated more precision in execution. Because the prices weren't moving, that axis was static, it allowed traders better precision in terms of their execution.

Ex. SSSS at 174:9-174:14; 175:7-175:8; 175:12-15.

174. I am aware that the field of human-computer interaction (also sometimes referred to as the man-machine interface), which includes GUI tool design, is a technical field. For example, many highly regarded educational institutions award technical degrees in the field of human-computer interaction. There are also technical texts on GUI tool design.

175. In connection with my work in the CQG case, I am familiar with NASA's treatment of GUI tools as specialized technology. For example, the Human-Computer Interaction Group of the Ames Research Center at NASA applies human-computer interaction methods to the development of GUI tools, focusing on the functionality as well as the interface. Ex. XXXX, (NASA HCI Group).

176. In analyzing the GUI tool of the invention, Mr. Roman makes the critical error of looking at the interface as merely an arrangement of GUI elements, without analyzing the underlying functionality. The invention specifically claims functionality of the structural elements and make-up of the interface. For example, the claims recite, among other things, a dynamic display of bid and ask indicators with a static display of prices and single action order entry that occurs by selecting

a location corresponding to a price level along the price axis to both set additional order parameters and send the order. These claim elements are directed to solving a technical problem. Although suggesting that the invention was directed to merely arranging GUI elements for aesthetic purposes, Mr. Roman nonetheless had to admit that the invention solves the accuracy problem, a technical problem addressed above in this declaration. Ex. YYYY, 05/05/2016 Roman Dep. Tr. at 66-69, 177:6-182:3. Mr. Roman's argument fails because it is analogous to arguing that a physical tool is merely an arrangement of materials, like metal, in a specific configuration. This is a nonsensical argument that divorces functionality and structure of basic tools.

177. Mr. Roman argues that a GUI tool needs to be revolutionary to be considered technology. In other words, for GUI tools that are not revolutionary, Mr. Roman believes that none of them qualify as technology. This is incorrect for a number of reasons. For starters, as noted above, the invention is revolutionary. In addition, even GUI tools that are not revolutionary are still technology—as recognized at the Ames Research Center. There is no basis for injecting the concept of how important the technology is (i.e. must be revolutionary) into categorizing whether something constitutes technology. The fallacy of Mr. Roman's argument is illustrated by his limitation of this "revolutionary" requirement to the analysis of GUI tools; Mr. Roman acknowledged that other

153

elements of the trading system, including software like the API, gateways and other components of the electronic trading system are technology, regardless of whether they are revolutionary. There is no principled reason to single out the GUI tools for different treatment in the trading system and it is incorrect to do so. GUI tools like the invention are clearly technology.

178. One of ordinary skill in the art would understand that the claimed GUI tool is mission critical. This is contrary to Mr. Roman's views on this subject. According to Mr. Roman, the layout of GUI tools is driven by aesthetics only, and that the difference between conventional order entry GUI tools and the inventive GUI tool is merely the rearrangement of known graphic display elements on a screen. This is not correct. Professional traders are not concerned about aesthetics, just like a pilot is not concerned about aesthetics in GUI tools in the cockpit, because these tools are mission critical. Electronic traders care about having the best tools available to improve their speed, accuracy, and efficiency, just like pilots want the best tools available in the cockpit so that the plane can be flown safely and efficiently. As with GUI tools in the cockpit, GUI tools for electronic trading are not like consumer products in which aesthetics are important. They are tools through which users can see, touch, feel and interact with the market. Changes to the mission critical order entry software are not made for aesthetic reasons, and traders will especially resist changes to a tool with which

154

they are having success. Changes to mission critical GUI tools for electronic trading and cockpits are significant—they are not like tweaks to a consumer product. The differences between conventional GUI tools and the inventive GUI tool are not aesthetic, but rather are structural and functional differences that provide numerous benefits as described below. Mr. Roman is also wrong when he states that the inventive GUI tool is merely rearranging known graphic display elements. Instead, the inventive GUI tool includes combining graphic display elements in a novel and nonobvious manner to create a GUI tool that revolutionized the industry.

179. Just like an improved cockpit display, the inventive GUI tool solves technical problems in a technical manner. For example, the inventive GUI tool solves the problem in conventional GUI tools of a trader missing his or her intended price. One technical problem with the conventional GUI tools is that they display data that are constantly changing as the market updates are received from the electronic exchange. At the same time, the trader is trying to interact with the GUI tool based on the displayed data. There are competing interests in keeping the GUI tool display up to date with the latest market information, while at the same time allowing a user to interact with the GUI tool in a fast and accurate manner. The inventive GUI tool solves this problem by providing a fixed range of price levels along a static display of prices and thereby allowing the dynamic bid and ask

155

information to move relative to the static display of prices. This is a technical solution to a technical problem, not a business method. Remarkably, Mr. Roman says that this is not technology, nor is it a technical problem. But at his deposition, he admitted that the inventive GUI tool did in fact solve the problem of a trader missing his or her intended price. Ex. YYYY, Roman Tr. at 180:13-182:3.

180.   Another technical problem with the conventional GUI tools is that, because they display numbers that are constantly changing as the market updates are received from the electronic exchange, the conventional GUI tool does not provide a measure of how much or how fast the market information is changing. The inventive GUI tool solves this problem by, again, providing a display in which the market indicators move up and down relative to the prices (which is a result of the claimed juxtaposing of the dynamic indicators and the static display of prices). This results in improved visualization of market movements because the display shows the amount and direction of the change, as well as how fast the market is changing. In other words, the interaction of the price axis and the dynamic indicator elements of the inventive tool better represented the market and changes in the market than prior art style GUI tools. The problem with the prior art style GUI tools in terms of lacking market visualization is a technical problem, and not a business method. This is a classic technical problem of usability.

181.   Yet another technical problem relates to the efficiency of displaying

information. In conventional GUI tools, the trader had to access and utilize a separate screen for market information and order entry (e.g., the conventional market grid in Figure 2 of the patent), a separate screen for working orders, and a separate screen for setting a default quantity. The inventive GUI tool provides for a condensed display that combined these separate screen into a single trading tool which improved the speed, accuracy and efficiency over conventional GUI tools.

182. Finally, in my experience, the design and development of GUI tools in this industry is clearly technical in nature as evidenced by the fact that GUI tools are designed and developed by technology groups within the various industry participants. As a former chief technology officer at a number of places in the industry, my technology group was responsible for GUI tool design and development. The employees in these technology groups typically have a technical background, such as computer science, programming skills and/or engineering. To say that the field of GUI tools for electronic trading is not technology, as Mr. Roman asserts, is simply not credible. Indeed, TradeStation's and IB's own public filings reveal that both companies invest significant expenditures and manpower towards developing GUI technology for electronic trading. *See supra,* at ¶¶ 40, 42.

157

XII. CONCLUDING STATEMENTS

183. In signing this declaration, I understand that the declaration will be filed as evidence in a contested case before the Patent Trial and Appeal Board of the United States Patent and Trademark Office. I acknowledge that I may be subject to cross-examination in this case and that cross-examination will take place within the United States. If cross-examination is required of me, I will appear for cross-examination within the United States during the time allotted for cross-examination.

184. I declare that all statements made herein of my knowledge are true, and that all statements made on information and belief are believed to be true, and that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

Executed on June 24, 2016