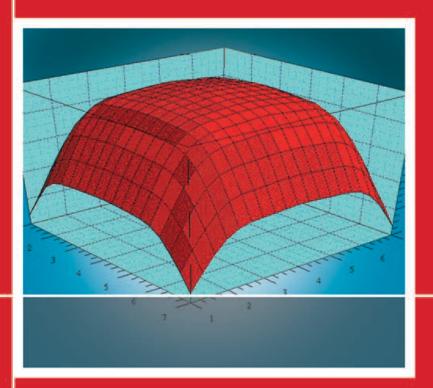
James L. Throne

Understanding Thermoforming



2nd Edition

HANSER



James L. Throne **Understanding Thermoforming**

© 2008 Carl Hanser Verlag. All rights reserved. No unauthorized disclosure or reproduction; licensed to purchaser only.



© 2008 Carl Hanser Verlag. All rights reserved. No unauthorized disclosure or reproduction; licensed to purchaser only.



James L. Throne

Understanding Thermoforming

2nd Edition

HANSER

© 2008 Carl Hanser Verlag. All rights reserved. No unauthorized disclosure or reproduction; licensed to purchaser only.



Foreword to the Second Edition

The first edition of this modest work was designed as an introduction and supplement to my larger effort, "Technology of Thermoforming", also published by Hanser. It presented a general overview of this rapidly growing field, without extensive details or equations.

Although the basic elements of thermoforming have not changed in the near-decade since the publication of the first edition, the industry is maturing and more details of the inner workings of the process are needed. Thermoforming is not just about machinery, molds, plastics, and making parts. It is also about process monitoring and control, quality assurance, safety and competitiveness with other processes. I've made an effort to broaden the work to include many of these aspects.

Two disparate areas for product development have become important recently. Thermoforming has been used in transportation for many years, primarily to produce low-volume parts. Truck and aircraft interiors and bus and train toilet interiors are examples. The development of paint film technology has spurred an interest in thermoformed paint-free exterior panels for domestic vehicles. Another developing area is bio-devices. Biotechnology is arguably the most rapidly growing science worldwide. Of course, there are many thermoforming applications already. A recent development, where 25-micron thick film is thermoformed into 350-micron hemispheres as containers for cell cultures, emphasizes microthermoforming.

The intent of the work has not changed. It remains a primer. I've rearranged the chapters to focus on the mechanics of the process first, then to consider the nature of the polymers. I've also added a short chapter on comparing thermoforming – technically and economically – with other technologies such as blow molding, rotational molding, and injection molding.

One caveat, though. In the first edition, there were no equations. In this edition, there are equations, but only simple ones, for illustration only.

Jim Throne 1797 Santa Barbara Drive Dunedin, Florida, 34698-3347, USA



DOCKET

Explore Litigation Insights



Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

Real-Time Litigation Alerts



Keep your litigation team up-to-date with **real-time** alerts and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

Advanced Docket Research



With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

Analytics At Your Fingertips



Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

LAW FIRMS

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

FINANCIAL INSTITUTIONS

Litigation and bankruptcy checks for companies and debtors.

E-DISCOVERY AND LEGAL VENDORS

Sync your system to PACER to automate legal marketing.

