



GUIDE OPTIMIZING PET PREFORM MOLDING FOR SUSTAINABILITY, PERFORMANCE, QUALITY, AND SPEED - WITHOUT COMPROMISE



TIPS TO MAXIMIZE SUSTAINABILITY, PERFORMANCE, QUALITY AND SPEED WITHOUT COMPROMISE

The production of preform-based PET packaging is evolving rapidly in response to changing market trends and with the introduction of new technologies.

What are you doing to keep up with these changes and opportunities?

Are you taking the right steps to ensure your long-term success?

Are you doing enough to set yourself apart from the competition?

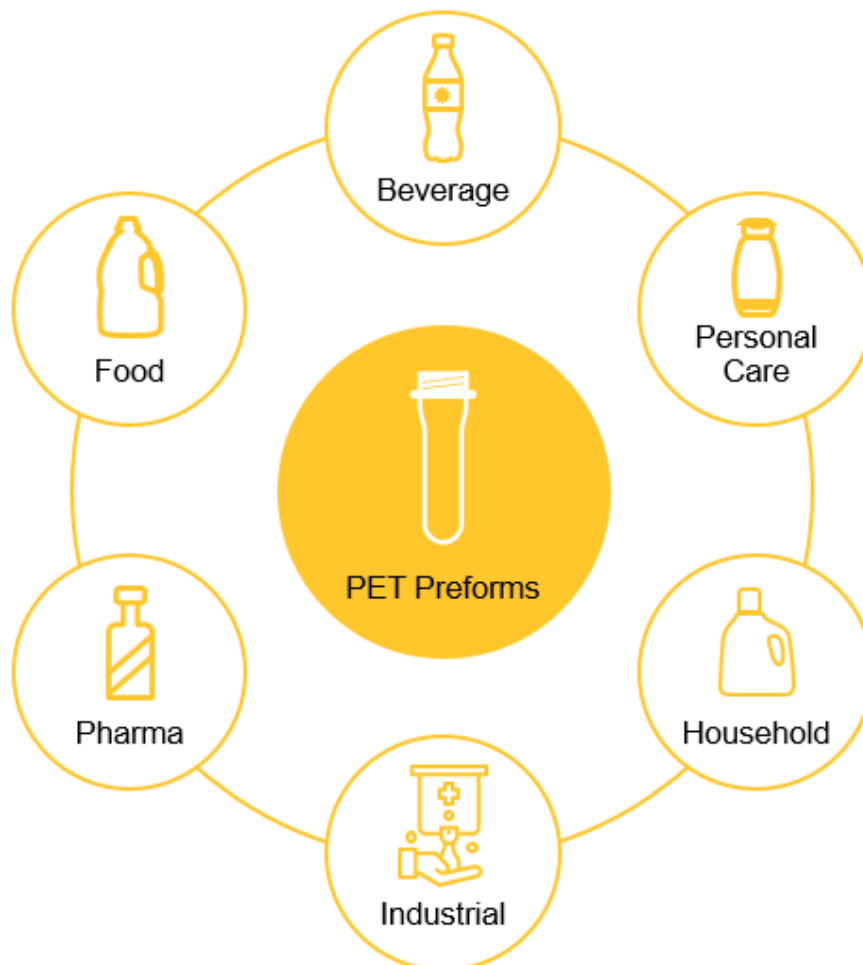
THIS GUIDE WILL WALK YOU THROUGH HOW TO BEST POSITION YOURSELF TO ACHIEVE THESE GOALS AND WILL COVER:

- The growing opportunity for preform-based applications
- How to adapt to evolving consumer preferences
- The increasing demand for sustainable packaging production and what you can do about it
- How expert system monitoring can give you a competitive advantage
- The latest ways to increase production efficiency and output
- The benefits of advanced vacuum drying and self-cleaning technology for enhanced rPET processing
- The capabilities of Husky's next-generation HyPET®6e system

THE OPPORTUNITY FOR PET PREFORM-BASED APPLICATIONS IS GROWING

The global demand for PET applications is growing for a number of reasons. Producers are switching from alternate materials to PET because it is proving to be a tremendously flexible material that can easily adapt to new designs, be more sustainable by incorporating increasingly higher percentages of recycled content and is extremely cost-effective, particularly as production is scaled.

As a result, the variety of packaging applications made with PET is expanding. While PET has historically been the material of choice for beverage packaging, it is more widely used for an expanding list of applications, including for food, personal care, household, pharmaceutical, and industrial packaging, many of which were previously only available in alternate materials like glass, aluminum, or HDPE. So, with the demand for PET based applications on the rise, how do you prepare your operation to achieve the highest levels of sustainability, performance, quality, and speed without compromise?



ADAPT TO CONSUMER PREFERENCES

New generations of consumers are demanding a greater variety of more personalized products catered to their unique needs, styles, tastes and sustainability values. This shift has forced many producers to adapt manufacturing operations to produce a wider variety of applications. From a production standpoint, this often means the need to support more SKUs, shorter production runs, and more frequent design changes. Fluctuations in market demand also influence production capacity, encouraging knowledgeable producers to look for ways to be more flexible and adaptable in their operations to accommodate these fluctuations.

Economic and market pressures have changed how consumers shop, driving demand for better value and convenience. This has shifted preferences away from mid-size packaging toward either large multi-serve formats or smaller sizes sold in multi-packs. These choices reflect both cost savings and lifestyle priorities as bulk purchases reduce shopping frequency, while multi-packs offer portion control and storage convenience. The result is increased demand for larger-format packaging greater than 1.5 liters.

OTHER APPLICATIONS THAT HAVE EXPERIENCED A SHIFT INCLUDE:

- Large format water bottles and jugs 4 liters and up
- Food applications, particularly edible oils, in larger format sizes above 1.5-2.0 liters
- Small format waters and small functional healthy drinks sold in multi-packs
- Wide mouth food applications up to 120 mm in diameter



More of these applications are converting to PET because of its durability, greater clarity, and sustainability potential with recyclability and lightweighting. To meet this need, producers require more flexible and adaptable systems that are purpose-built to effectively process higher percentages of rPET while minimizing the cost and time required to introduce tooling for alternate sizes and designs.

This can include:

- Tooling designed to incorporate technologies that increase efficiencies, reduce maintenance intervals, and can handle higher rPET levels effectively
- Features to reduce the conversion and acquisition cost of tooling required for repeated introduction of new SKUs
- The capability to have systems and auxiliaries configured to support increased levels of recycled content, various throughput requirements, different mold cavitations and pitches
- Faster mold changeovers allowing for the switchover of production in a fast, cost-effective way
- Large pitch systems specifically designed to produce large format and wide-mouth format food applications



BECOME MORE SUSTAINABLE

Growing consumer demand, adoption by leading brands and various recycled content mandates coming into effect over the next several years are all intensifying the need to deliver more sustainable packaging. To succeed in today's market, it's becoming increasingly clear that to be relevant producers must find ways to minimize the carbon footprint of their packaging – or risk falling behind on legislation and the competition.

The top sustainability issues that continue to be at the forefront of packaging include implementing the production of rPET materials, increasing the use of rPET materials, and reducing the use of PET resin through lightweighting initiatives.

But producing a more sustainable package requires careful planning, the right technology and working with an experienced provider to overcome common risks and challenges.

Making the successful move to rPET

rPET collection and manufacturing technologies result in more variability in resin properties. When not properly addressed this variability has the potential to negatively influence aspects like material color, material drying and processing conditions. If not handled properly this can impact production and part quality and usually occurs when the most common risks are not addressed and mitigated.

Because of its increased variability there are a number of factors to consider when introducing post-consumer recycled material into packaging. These factors can include resin and melt preparation, melt delivery and distribution, preform design, processing, in-mold shaping, post-mold cooling, to finally the molded part itself.

Despite these potential issues, implementing recycled content can be flawless with the proper planning and right technology. So how do you confidently make the move to rPET preform production? The key to effective risk mitigation is a multi-pronged approach where system, tooling and auxiliaries are integrated and working together seamlessly. Whether you have feedstock as palletized resin, pellets, or flake, Husky has a range of fully integrated platforms to help you produce high quality packaging with the least amount of risk.

Smart, Connected Molds Designed to Handle rPET Material

Running intelligent, connected molds with automated processes reduces material variability, which allows for more efficient processing of higher percentages of rPET. A prime example is implementing a proactive mold cleaning process during preform production.

Husky's patented Self-cleaning mold technology is an automated method for cleaning dust from neck ring vents. Simplified to the touch of a button and with virtually no production time penalty, Self-cleaning is especially beneficial for rPET since this material creates more dust and requires more frequent cleaning.

While the effectiveness of manual cleaning depends on the technician's skill, an automated method is less variable. Self-cleaning technology uses a precisely controlled flash—the intentional overflow of the tool into vents where dust collects. During a Self-cleaning cycle, the vents are filled by the overflow of PET from the preform. The overflow then sticks to the dust, and the flashed preforms, complete with the dust, are ejected, leaving clean vents behind.

Revolutionary Vacuum Drying Technology

Traditional desiccant dryers, especially those that are 10-25 years old, are struggling to meet the demands of modern rPET processing. These systems often require frequent maintenance or replacement of molecular sieves, heat exchangers, and filters leading to increased operational complexity and costly downtime. In addition, an energy intensive oil condenser is often needed to protect the dryer from condensable contaminants, which requires substantial maintenance and energy. For converters who frequently switch between materials and applications, downtime can be high during resin changeovers.

Husky's new Vacuum Dryer technology eliminates the need for desiccant and cooling water while delivering superior contamination control. By leveraging a continuous four-stage process, Vacuum Dryers precisely manage temperature and residence time, protecting rPET material from thermal degradation and ensuring optimal drying performance.

Vacuum Drying Technology enables:

- 4x faster resin changeover
- Up to 30% lower energy consumption (for rPET)
- Up to 50% reduced maintenance
- Modular design to fit in tight factory constraints
- Proactive Monitoring with Advantage+Elite™



Lightweighting to reduce resin consumption

Lightweighting is a simple concept that makes sense – every one tenth of a gram of resin you remove from a finished preform or closure reduces your production and part costs and increases your profitability. It's also a great way to achieve your sustainability goals.

There are four main lightweighting methods you can adopt. These include:

Switching to a lightweight version of your existing thread finish

1

2

Switching to a new dispensing system, which means a new lightweight thread finish and new closure design

Redesigning and optimizing the preform body to reduce weight

3

4

Redesigning the base of the bottle to use less resin



Of course, these four methods can be implemented individually, or in combination to achieve greater savings. But when considering how to lightweight your packaging, it's important to take a balanced approach. That means lightweighting to achieve the lightest packaging possible, while maintaining bottle performance, package integrity and product freshness.

When selecting your equipment provider, you will experience a higher degree of success if partnering with a company that has the packaging experience and expertise in converting to a lighter weight product, knows how to create effective design, has the tooling resources to help you modify your molds and can help you set up a seamless operation.

DRIVE GREATER EFFICIENCY AND OUTPUT

With rising demand and ongoing global challenges related to supply chains and skilled labour shortages, it's important to be prepared for and mitigate any potential disruptions. How do you do this while setting yourself up for predictable growth over the next five to 10 years?

Higher output systems are a way to reduce operating costs while boosting productivity. If implemented effectively this approach can result in massive bottom line benefits and the lowest total cost per part produced.

This is possible because running a single high output system as opposed to multiple lower output systems can yield:



Minimized labor and floor space requirements



Reduced energy and maintenance costs



Less upfront capital requirements

Whatever your production goals, Husky PET preform molding solutions can deliver outputs on a smart, intuitive, productive system where all components are engineered to work together. An added advantage is working with a provider who has connected services to proactively monitor your system and who can handle all percentages of rPET material efficiently.

PROACTIVE PERFORMANCE MONITORING

When it comes to gaining market competitiveness, achieving and maintaining the highest levels of performance can have a big impact on your bottom line. In fact, poor performance can lead to significant yearly losses. If this is something your operation is experiencing, then you should consider implementing proactive performance monitoring as a strategy.

When compared to a reactive approach, expert proactive system monitoring provides several key competitive advantages, including:

- Predicting system performance deterioration and identifying system problems before they become major issues
- Real-time monitoring to ensure and maintain the lowest total cost to produce
- Closed-loop reporting analyzing system variables to anticipate, recognize and rectify potential issues before they impact productivity or part quality
- Reducing the variability risk associated with part defects or running higher levels of post-consumer resin

Husky's Advantage+Elite™ real-time monitoring solution uses remote connected technology to detect and identify changes in part quality and cycle time by monitoring leading system variables in customer operations. By optimizing the process to manage this condition, producers are able to maintain world-class OEE standards by recognizing and rectifying potential issues before productivity or part quality is affected. These benefits are further amplified when producers adopt Advantage+Enterprise™, designed to monitor entire factories to deliver enterprise-wide operational insights.



HyPET® NX6: NEXT-GENERATION MID-VOLUME PET SYSTEM

For producers looking for a compact and cost-effective mid-volume output solution, Husky's HyPET® NX6 48-cavity preform injection molding system is built on the company's proven high-performance platform and is engineered to maximize profitability and growth.

HyPET® NX6 delivers:

- Supply chain **control and stability**
- **High production efficiency** for applications in the 19,000 to 25,000 bph range with industry-leading part quality
- **Reduced part weight** for a lower carbon footprint and higher cost savings
- Up to **100% rPET** capability to meet evolving post-consumer resin (PCR) requirements
- **Maximized uptime** with easier mold changeovers and robustness enhancements
- Reduced part cost with **a lower cost of tooling conversion**

The HyPET® NX6 system is designed to deliver an optimal balance of performance and capital investment for mid-volume output producers.



LATEST-GENERATION HyPET® 6e SYSTEM

Building on more than 50 years of PET preform molding leadership, HyPET® 6e represents Husky's latest advancement in sustainable injection molding technology, specifically engineered to take rPET processing to the next level while still achieving superior performance, part quality, and speed.

HyPET® 6e delivers:

- Industry-leading cycle times for highest output
- Up to 200 cavity molds and high-density tooling
- Up to 13% lower energy consumption compared to previous generation systems
- Enhanced system capability supporting up to 100% rPET material
- Closed-loop quality monitoring and color adjustment

HyPET® 6e enables producers to process higher levels of rPET with confidence, while maintaining consistent part quality and lowering overall part costs. By combining throughput with sustainability, the system is designed to meet today's demand for circular packaging and high performance.



Getting started

Do you want to enter into a high growth packaging market? Are you a beverage packaging producer looking to be more competitive? Do you want to reduce part costs to win new contracts?

Whatever your PET preform production goals are, the best way to achieve them is to work with a trusted provider. Taking the time to select the right partner who has the technology, expertise and services to maximize your production, efficiency, and competitiveness will help you succeed not just today, but into the future.

When integrating advanced systems like HyPET® 6e and HyPET® NX6 with game-changing technologies like vacuum drying technology, self-cleaning mold capabilities, and connected monitoring, you can achieve new levels of performance, quality, and speed while meeting the most demanding sustainability requirements.

Contact us to learn more about how Husky can help you achieve your high output molding goals.

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Husky Technologies™
husky.co

Head Office	Canada • Tel (905) 951 5000 • Fax (905) 951 5384
Asia Pacific	China • Tel (86) 21 2033 1000 • Fax (86) 21 5048 4900
Europe	Luxembourg • Tel (352) 52 11 51 • Fax (352) 52 60 10

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