PET Innovation: ISO Technology

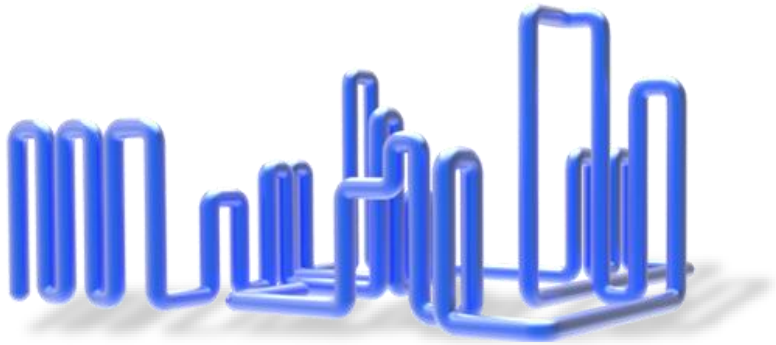
PETinar April 4, 2023

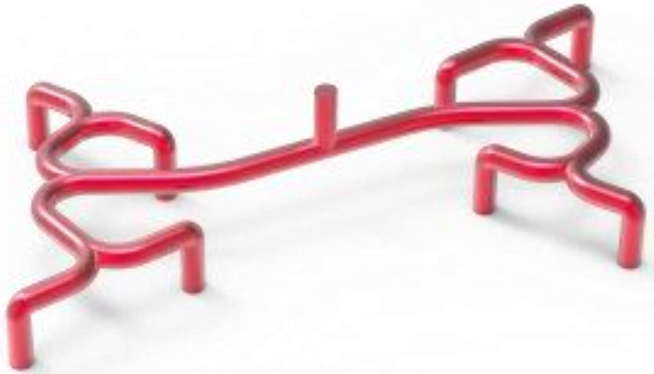
What is ISO Technology?

ISO* Technology is a unique manufacturing process that inspires freedom of design

- ✓ 3D Visualization
- ✓ Creativity
- ✓ Expertise

} Flow Optimization





** ISO is a trademark of YUDO and StackTeck preform molds are supplied exclusively with YUDO hot runners.*
Images provided courtesy of YUDO.

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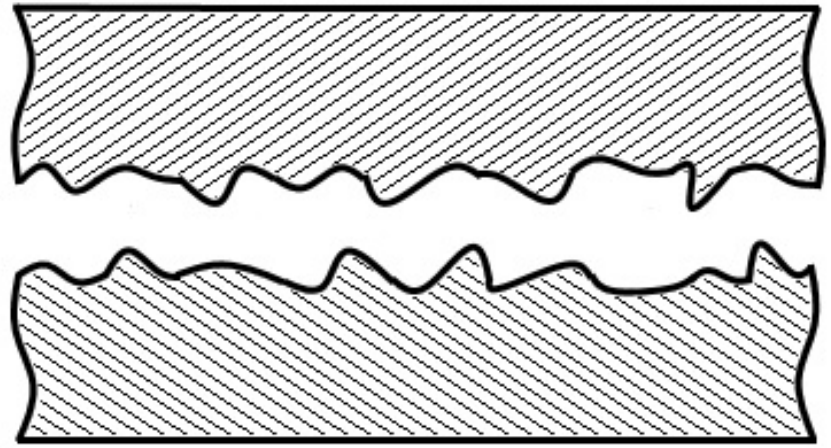
How does ISO Technology Work?

ISO Technology makes use of a state-of-the-art diffusion bonding process

Example of a hot runner manifold prepared for diffusion bonding

How does ISO Technology Work?

High heat and pressure are uniformly applied to the plates in a specialized chamber



- *During this process, a molecular exchange takes place across the adjoining plates*
- *Just as liquids and gases diffuse, solids do as well under the right conditions*
- *No brazing - No filler materials used*
- *The joint has the same mechanical and physical properties as the parent materials*

Animation of Diffusion Bonding Process Courtesy of IdRatherBeLearning (wR3TGn.gif)

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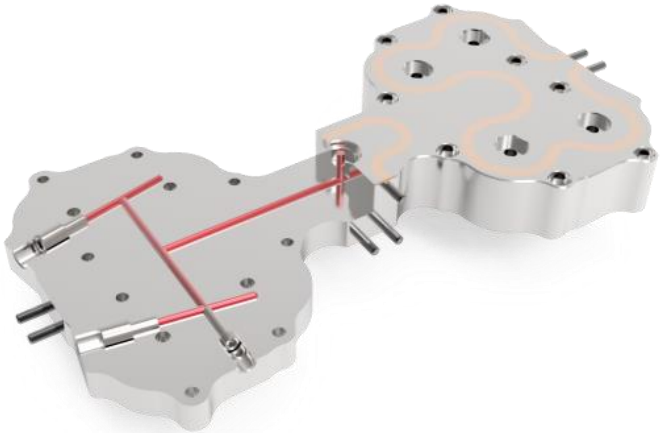
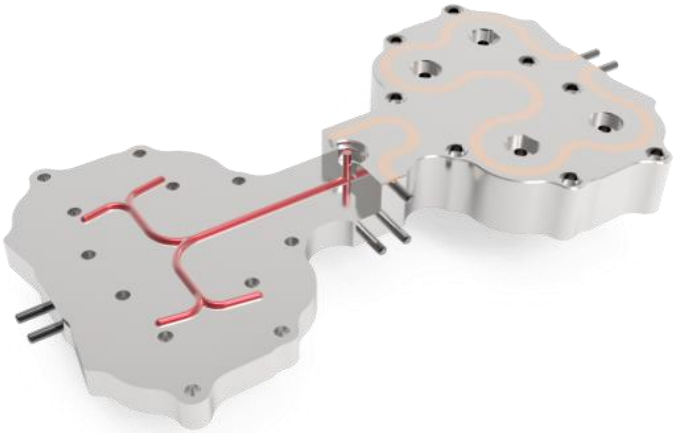
How is ISO Technology Different?

Comparison of a gun-drilled vs diffusion bonded manifold



Conventional Gun-Drilled Manifold



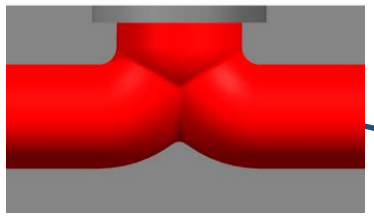
ISO Diffusion Bonded Manifold

No plugs - no leaks

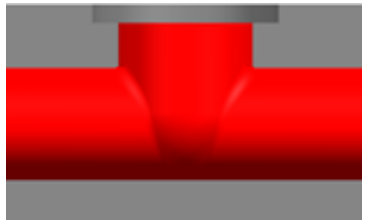
Why use ISO Technology?

Design Freedom offers Inherent Advantages

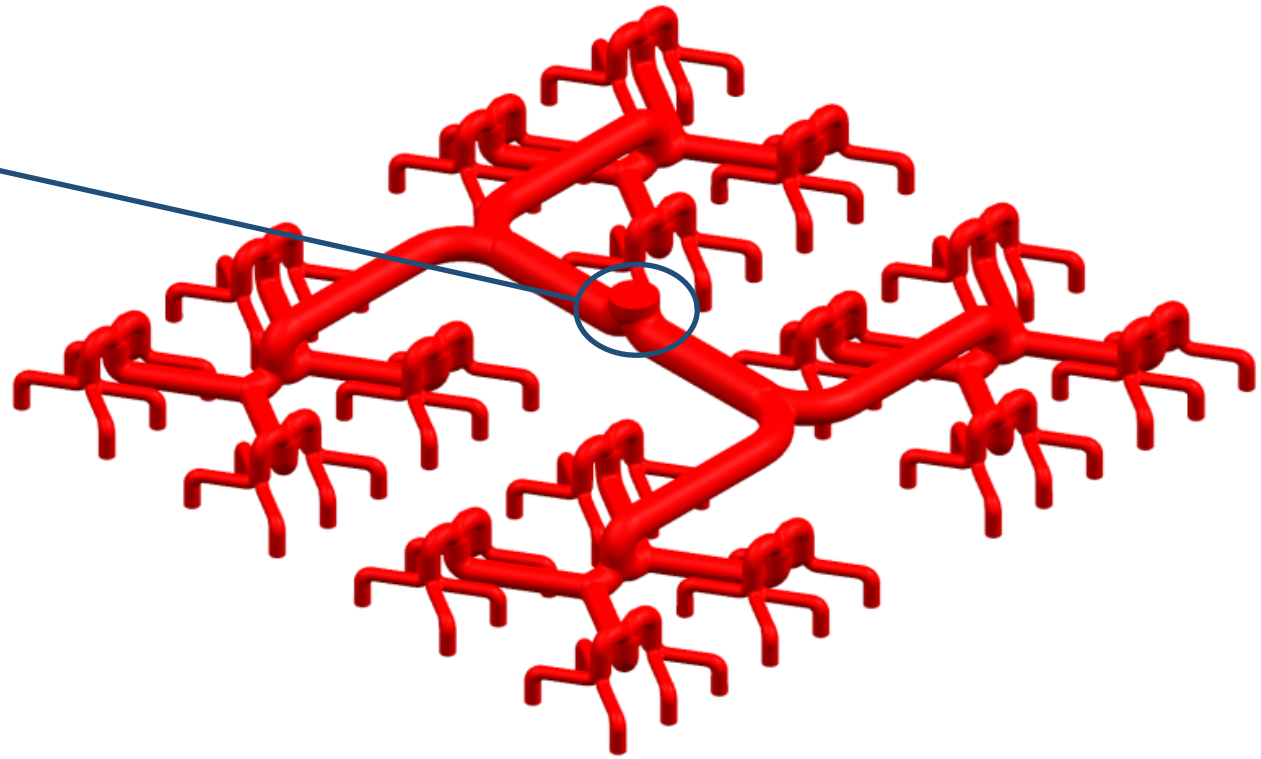
- ✓ Enables an optimized melt channel design
- ✓ Facilitates smooth level transitions
- ✓ Eliminates sharp corners and edges
- ✓ No dead spots



Smooth Radius Channel with ISO



Conventional Channel

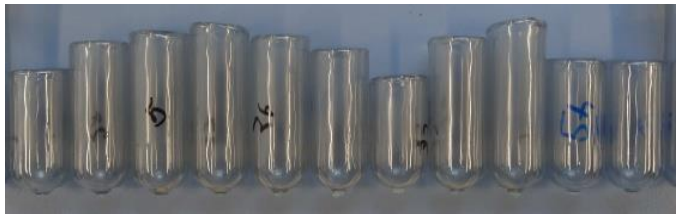


Real World Results

Effect on Balance

- Short Shot test (injected at 50% shot-weight)
- Variation reduced from 46% to 19% (percent relative range)

Conventional



ISO

Weight	Conventional	ISO
Average (g)	13.80	14.27
Min (g)	10.80	13.15
Max (g)	17.20	15.83
Range (g)	6.40	2.68
St Dev	1.43	0.57

Real World Results

Effect on Pressure Drop

- Peak injection pressure was significantly reduced
- Reduced resistance to flow - shear stress
- Opportunity to reduce cycle time

Injection	Conventional		ISO
Fill Rate (g/s/c)	10	13	16.9
Fill Time (s)	2.80	2.15	1.66
Peak Fill Pressure (b)	680	780	674

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Real World Results

Combination of these two important elements:

Good Balance

+

Low Pressure Drop

Enables demanding technologies such as Overmolding

Bolsters light-weighting programs

- Thinner walls
- Higher L/T's

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Real World Results

144 Cavity comparison with a conventional hot runner

Peak Injection pressure reduced 19%

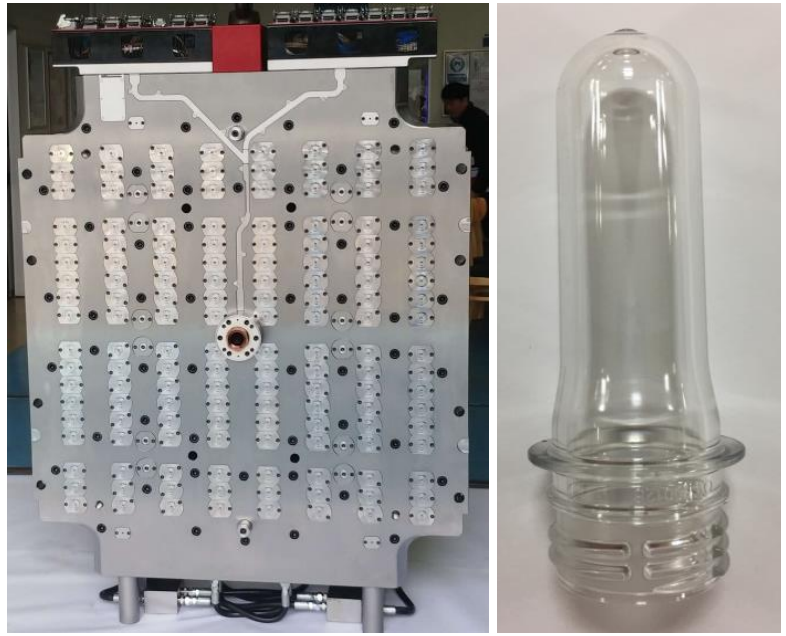
Conventional:	11,600 psi
ISO:	9,400 psi

Preform weight variation reduced 52%

Conventional:	0.29g
ISO:	0.14g

AA avg (with scavenger) reduced 24%

Conventional:	1.23 ppm
ISO:	0.93 ppm



Real World Results

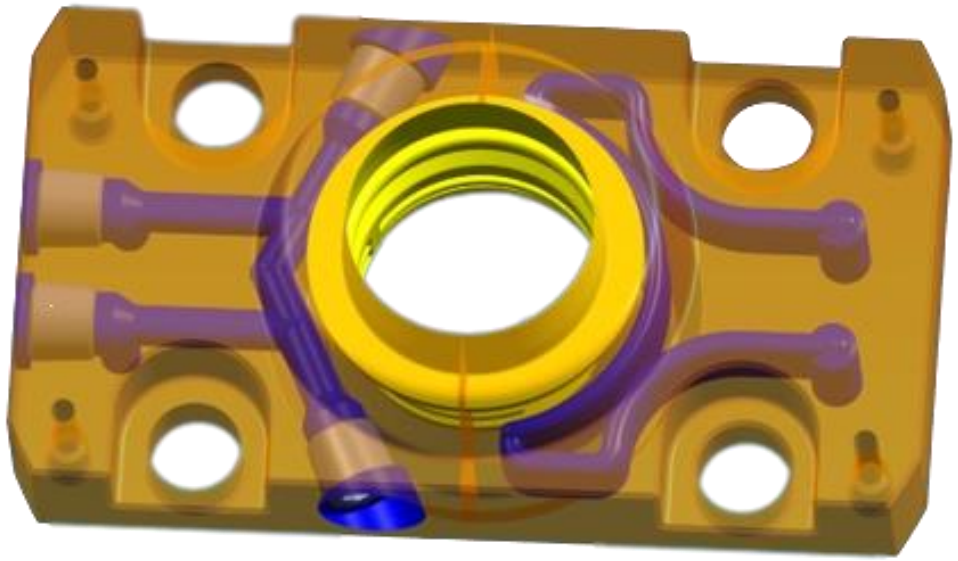
Color Change – Green to Clear

- Conventional hot runner = 220 cycles
- ISO hot runner = 30 cycles

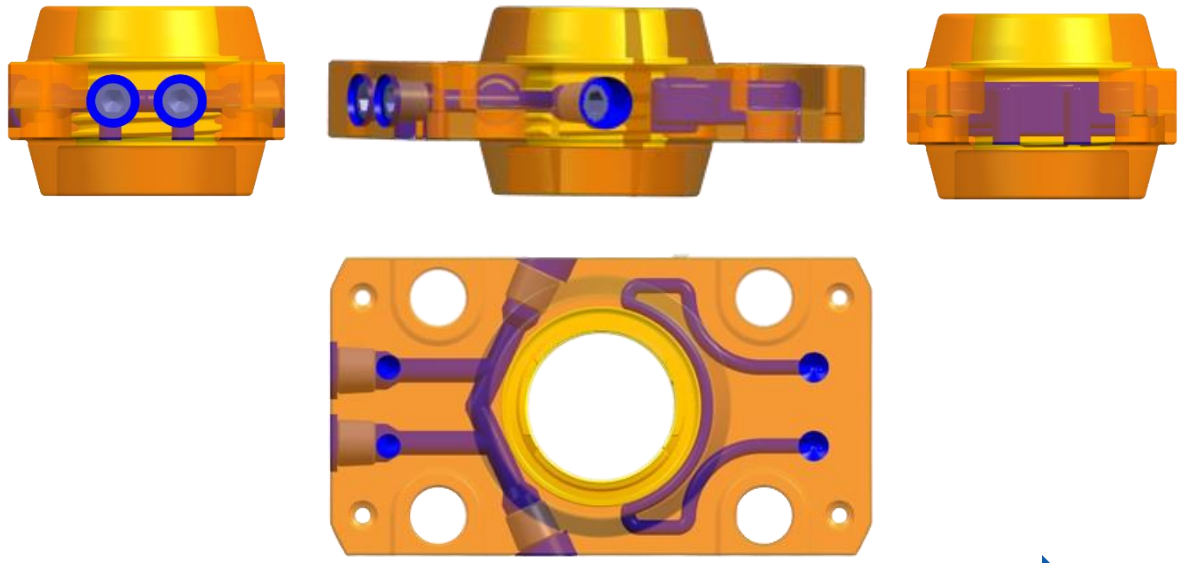
Where else is ISO Technology Used?

KoolTrack™ Diffusion Bonded Stack Components

- Optimized water circuit targets difficult to reach areas
- KoolTrack neck ring design utilizes conformal water channels



Conventional Drilling



KoolTrack

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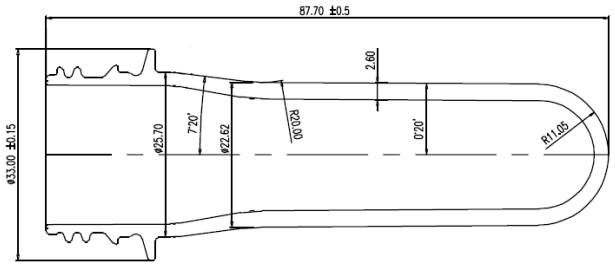
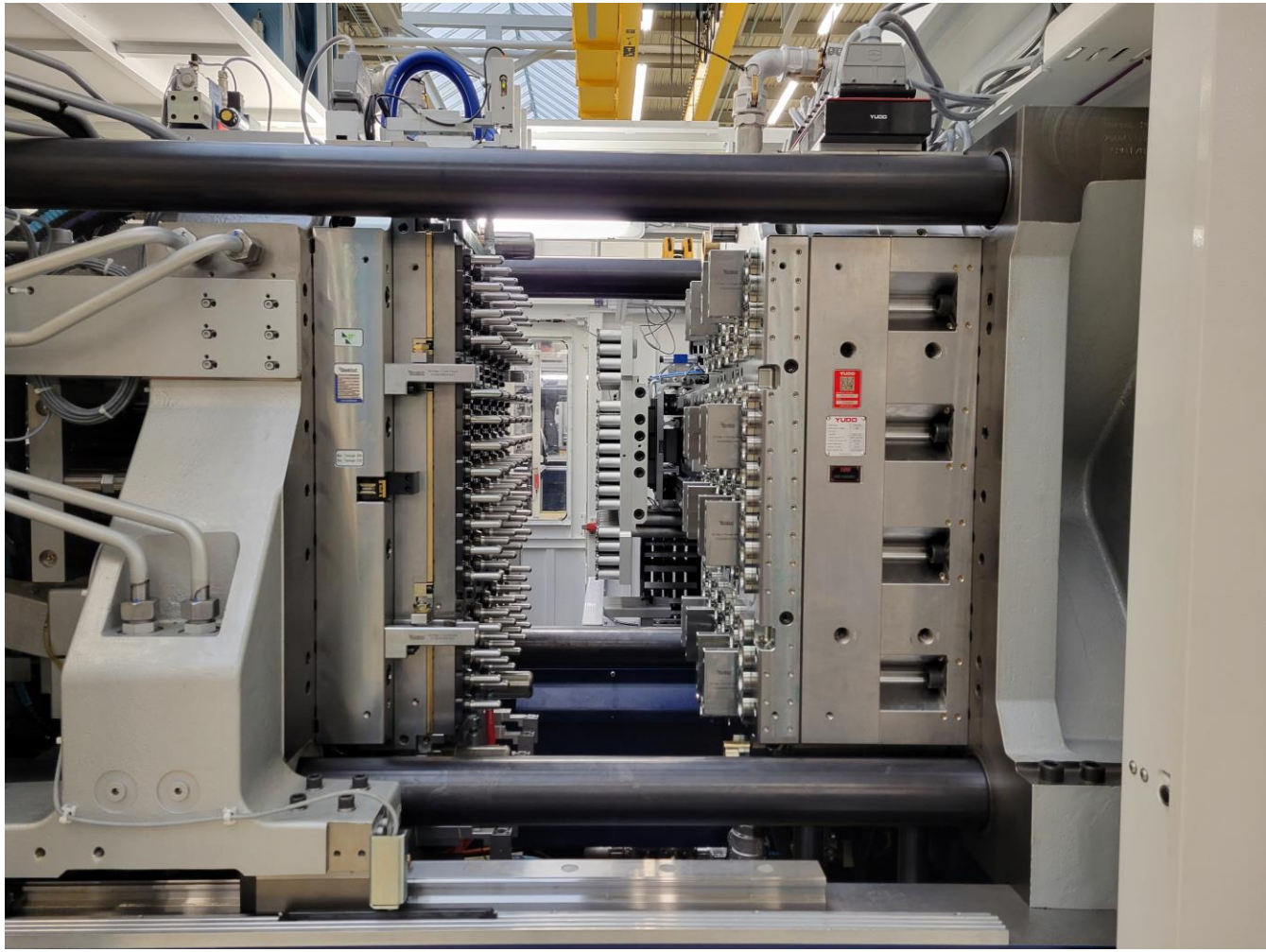
Real World Results

StackTeck Challenge

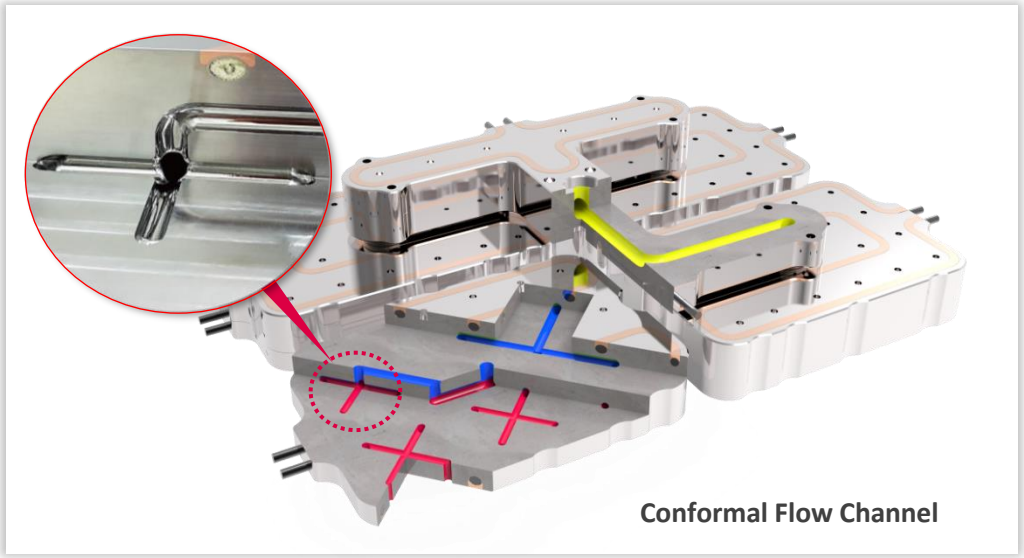
- PCO-1881 18.58g preform
- StackTeck 96-cavity mold, EOAT, & PiCOOL
- Netstal PET-LINE 4000 – side entry robot



	Conventional	**KoolTrack**
Cycle Time	7.50 s	**6.99 s**
Thread Temperature	64°C	**50°C**



Thank You



Contact:

Rick Unterlander | General Manager PET | P: 416-749-1698 ext 577 | M: 416-859-1789

Website: www.stackteck.com