Thermoforming Systems LLC
A Davis-Standard Company



SHEET & THERMOFORMING TECHNOLOGY



Thermoforming Systems LLC
A Davis-Standard Company

Thermoforming Systems ("TSL") designs, manufactures and markets leading-edge thermoforming equipment to the food packaging industry.

TSL's thermoformers are largely used in food and beverage end markets throughout North America, with millions of cups, plates, lids, and trays produced on TSL's technology every year.



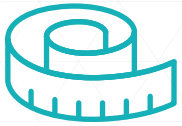


Union Gap, Washington

TSL Offers



Experience



Tailored Design



Total Solutions



24/7 Customer Service



Technology



Global Support

Let us tell you how...





Experience

Having extrusion and thermoforming expertise under one umbrella is unique, delivering reliability, high output, processing efficiency and value. The combined technology of Davis-Standard and TSL offer a pellet-to-product solution for high throughput and inline production of items such as cups, lids, clamshell containers as well as other food service and food packaging products.

- Industry-leading roll stands
- Chill roll technology
- Feedscrew designs
- Coextrusion of Foam
- Flexible and rigid applications
- High-tonnage machines
- Horizontal or vertical trim presses
- Trim-in-place systems
- Options for in-mold labeling
- Pre-punch stations and more



TSL MARKETS BY MACHINE TYPE

MARKETS BY RESIN TYPE

- PP 40%
- PET 40%
- HIPS 16%
- EPS 3%
- PLA 1%

Former & Trim Press 86%

Form Trim-in-Place 4%

Rotary 10%





MARKET PRODUCT TRENDS

- Specialty Beverages
- Green movement, conversion of materials
- PP Drink Lids
- Conversion from PS & Paper
- Product visibility & protection
- Rolled rimmed tray for over wrap
- reclosable containers
- Tamper evident
- EPP - Expanded polypropylene
- XPET - Expanded PET





TSL APPLICATIONS

Extruder/In-line 80%

Roll fed 20%

Third Motion 99%

MARKETS BY PRODUCTS



33% Drink Cups



34% Clams/Trays/Containers



9% Portion/Dairy



24% Lids



Total Solutions

Davis-Standard's acquisition of TSL brings together substantial engineering and manufacturing resources within a global facilities footprint. These resources are focused on growing our business by providing innovative technology to our customers around the world. The combined business will expand our market reach, achieve greater scale, expand resources, leverage sourcing, and realize partnership opportunities. Both brands will continue to represent their market leading technologies and innovative product solutions to the sheet and thermoforming market, further complimented by the vast extrusion technologies of Davis-Standard.

We continue to be committed to providing innovative technical solutions to meet your individual needs. This collaborative partnership through an expanded product portfolio and leveraging unique R&D resources for new product development in:

- Sheets systems for in-line or off-line thermoforming form 1000-10,000 pounds per hour
- Complete line of smooth, grooved, direct drive and high speed extruders
- Dynamic hands-free roll gap system
- XP Express® series roll stand with customized roll geometry to meet application requirements
- DS Activ-Check predictive maintenance system
- Low Flex® X Former, higher rigidity and less deflection than LF5.0
- Linear Rail 6 Trim Press for PP cups
- Linear Rail 3 Trim Presses in operation in the US and Europe
- Prototyping and demonstration capabilities on LF3.0/LR3 Trim Press
- TSL Rotary Formers/LR5 Trim Press in-line with Davis-Standard extruders
- Tamper evident containers made on TSL Linear Rail Pre-Punch presses are a growing volume product in the market

Your Pellet-to-Product Solution

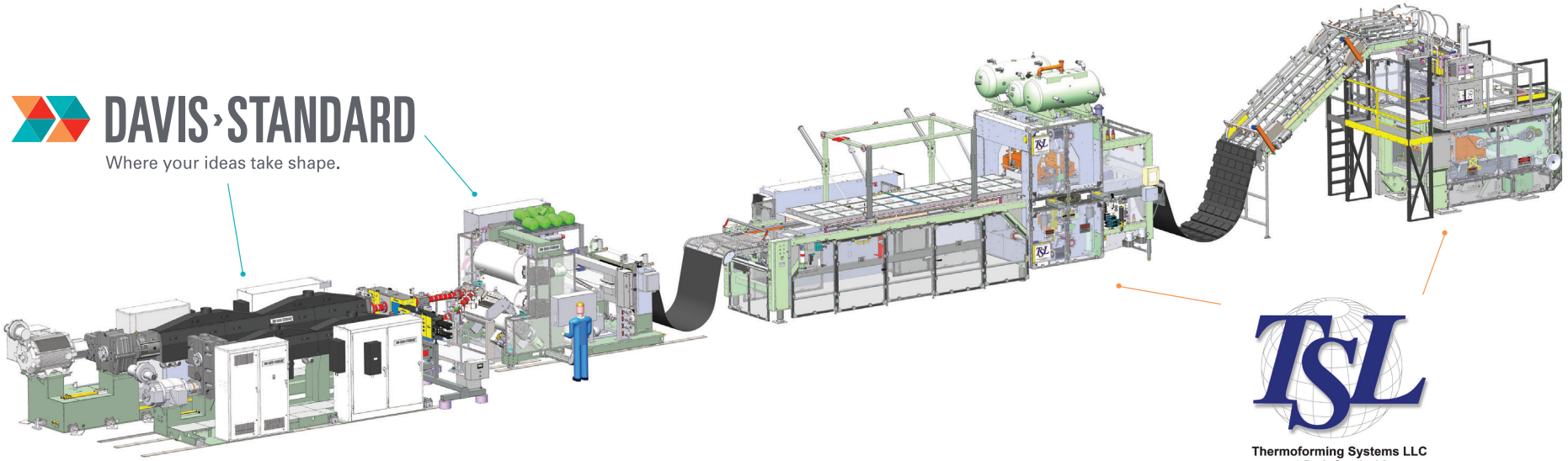


Berry baskets, consumer-safe fresh food containers



Tampered evident clamshells

DAVIS-STANDARD
Where your ideas take shape.



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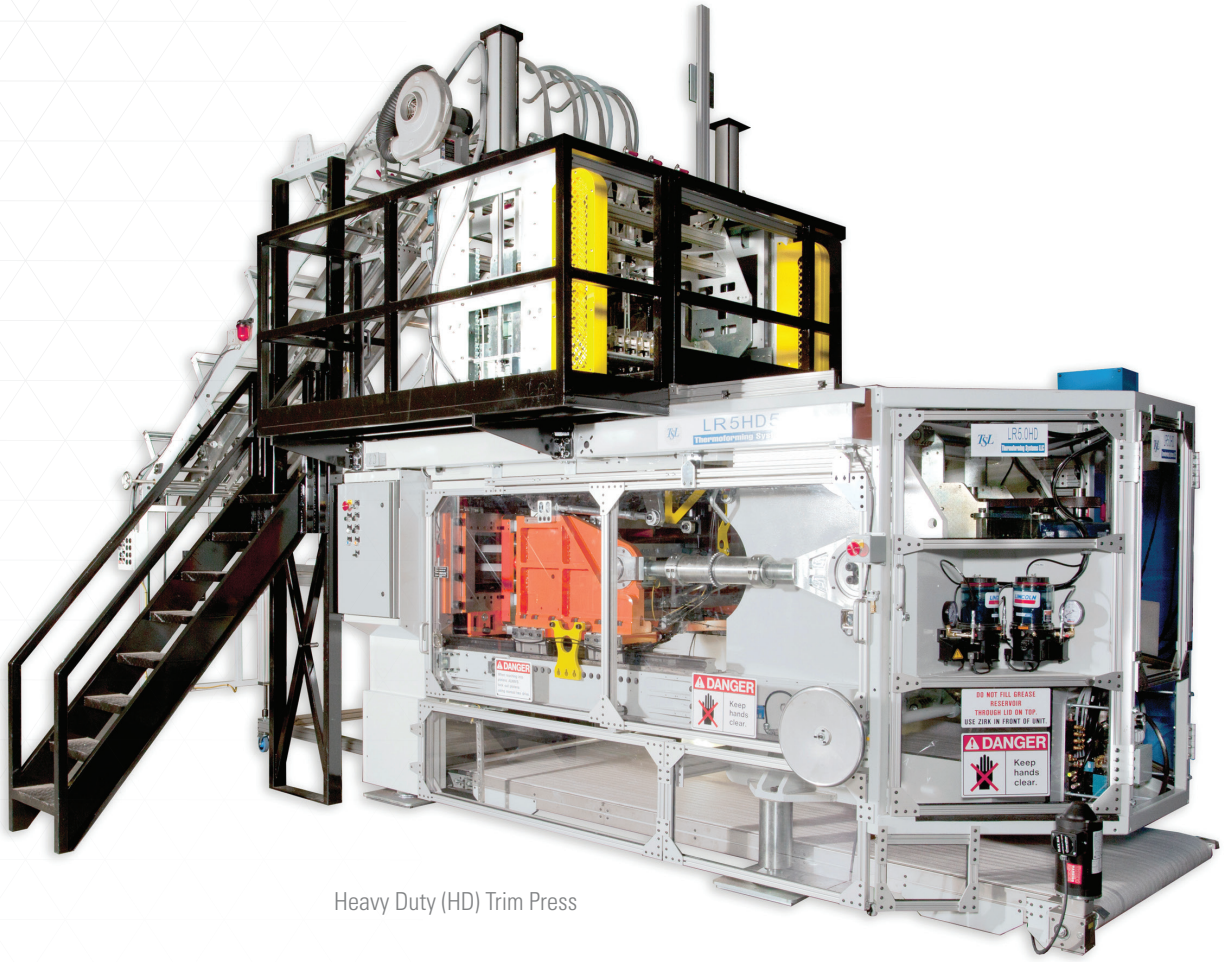
Drink cups and lids

Technology advantages:

- Low flex technology
- Trim accuracy
- Reliability
- Process-ability
- Maintenance accessability
- Process viewer, OPC

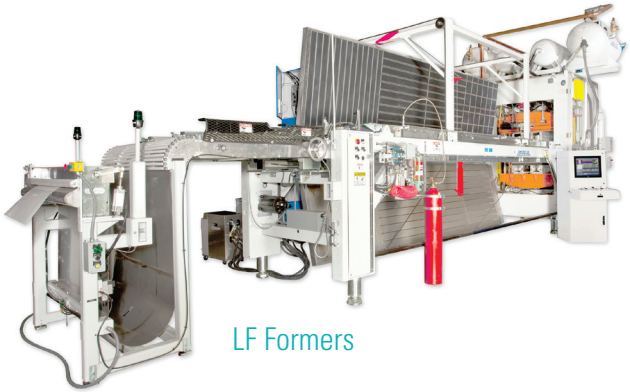
Recent innovations:

- LFX - 40% less deflection than LF5.0
- LR3 & LR6 - linear rail trim presses
- Rotary, PP lids



Heavy Duty (HD) Trim Press

Technology Overview



LF Formers



Trim Presses &
Punch Presses



FT Formers

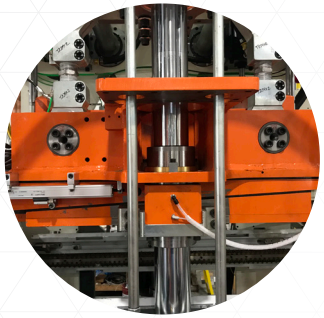


Mold & Trim
Tool Carts



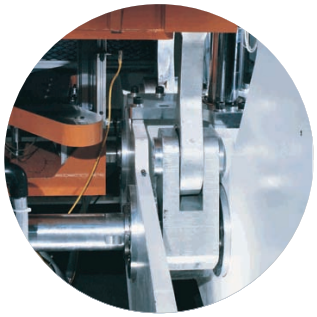
Rotary

Technology - Low Flex Technology Features



Sash

- +/- 0.100" vertical adjustment of the top platen for shut height sheet thickness, and/or seal compression adjustments via the HMI
- Eliminate risk of exceeding machine tonnage
- Can be adjusted while machine is running



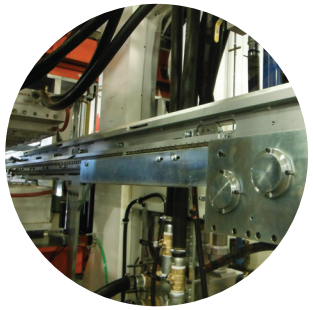
Doubler Plates

- Patented frame reenforcing or doubler plates - enhanced strength and deflection resistance of the frame
- Independent set of frame bearings - reduce the flex or deflection in the shaft
- Process any sheet type without air leakage



Servo Plug Drives

- Servo plug drive provides uniform wall thickness in product development
- Available in a variety of configurations
- Available with one or two motors and two types of screws
- The 4th motion is located on the top platen for formed down products



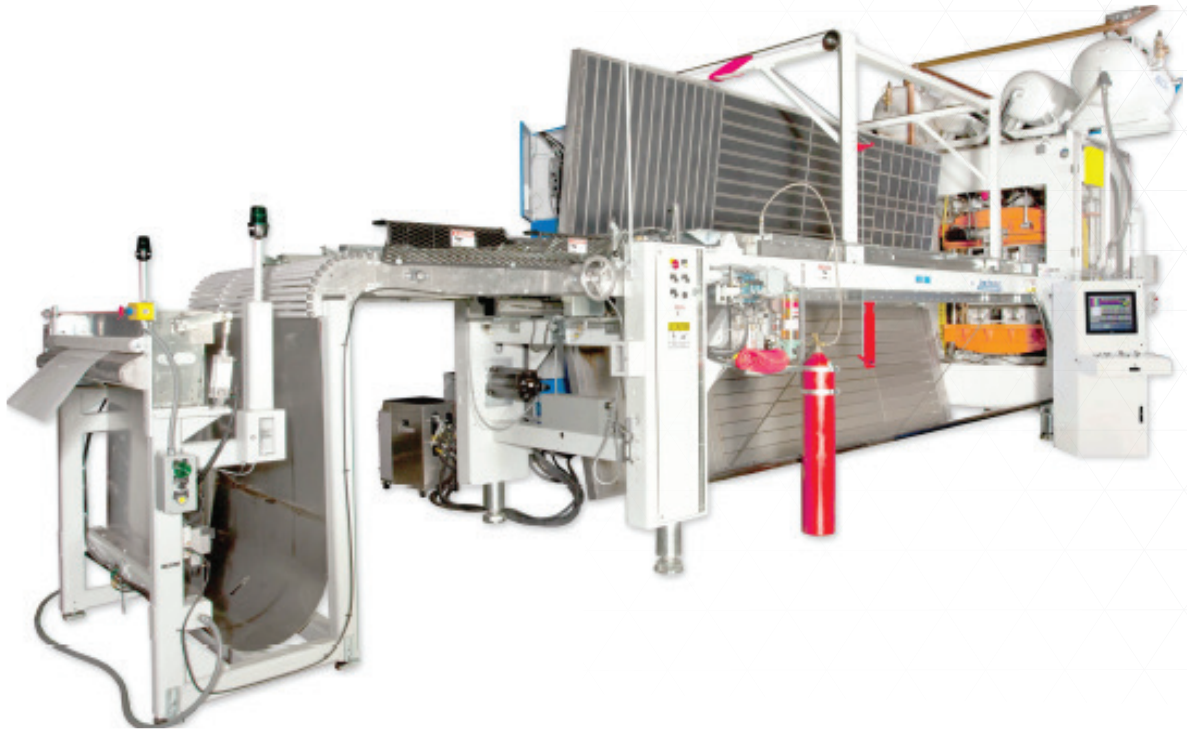
Heat Tunnel and Chain Rail

- Energy efficient quartz panel heaters
- Easy to clean aluminum pan-faced heaters on bottom
- Up to 170 degrees opening for ease of access to all heaters and safe clearing of sagging plastic
- Available in lengths up to 335”
- The chain rail has motorized adjust option for sheet sag control
- Size 50 and 60 chain, single and double roller are options

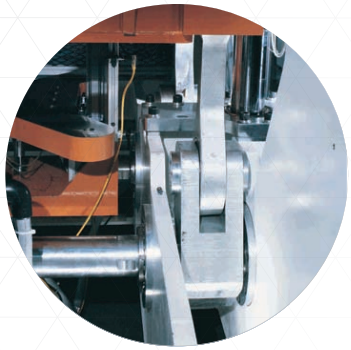
Technology - Low Flex (Thermoforming versions LF3.0, LF4.0, LF5.0, LF5.ODD, & LF6.0)

The Low Flex® thermoforming system is a durable and reliable machine for deep and shallow draw applications. The Low Flex ® Series comes in four models with forming areas ranging from 33.5" x 52" to 65" x 67". The Low Flex Series can readily process a number of plastic resins: HIPS, PP, TFPP, PET, CPET, PLA, PVC, HDPE, and ABS. The machine can be roll fed or run inline with the extrusion process. The Low Flex thermoformer includes many innovative and advanced features that enable it to outperform the competition.

The patented Low Flex frame technology is key to reducing the frame flex, allowing the 190 ton LF5.0 machine to handle 100psi of air pressure and coining of full size molds. Its side frame and doubled plate straddle the platen toggle assemblies on both side and yoked design transfer load to reduce deflection.



FT with HSRS Technology



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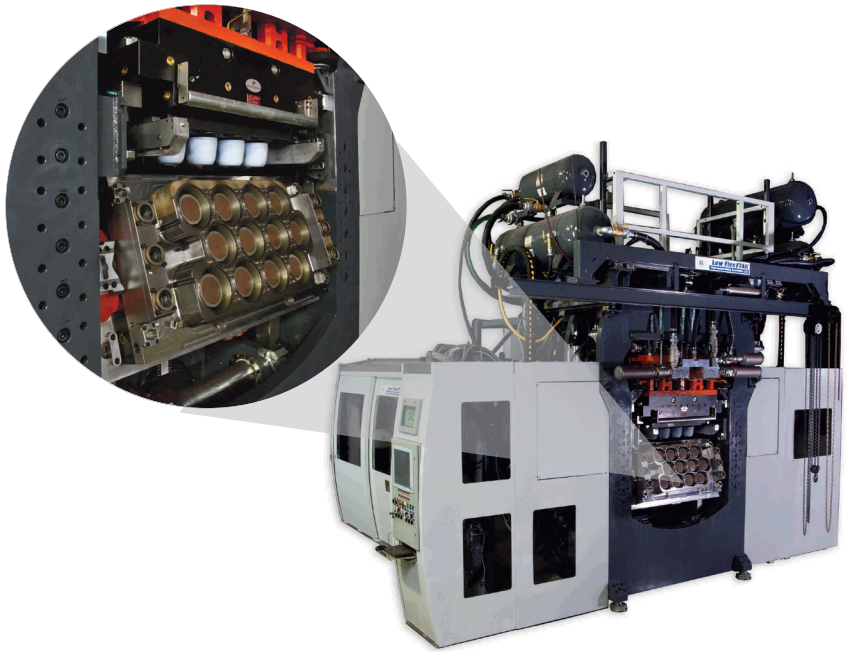
Technology - FT (Thermoforming Series versions FT4K, FT8K, & LF5.0FTP)

The FT8K form and trim-in-place machines are ideally suited for PP products that require precise trim tolerances.When incorporated with a High speed Retrieval System (HSRS) the TSL FT series machines offer a high output solution with automation to deliver packaged products prepared for delivery to the end customer.

The FT and FTP series incorporates the Patented Low Flex Frame Technology which is the key to reducing the frame flex allowing the machine to handle 100 psi air pressure in full sized molds. The strength and deflection resistance of the frame is enhanced by the patented frame reinforcing or doubler plates.



TSL FT8K



Tilt Technology

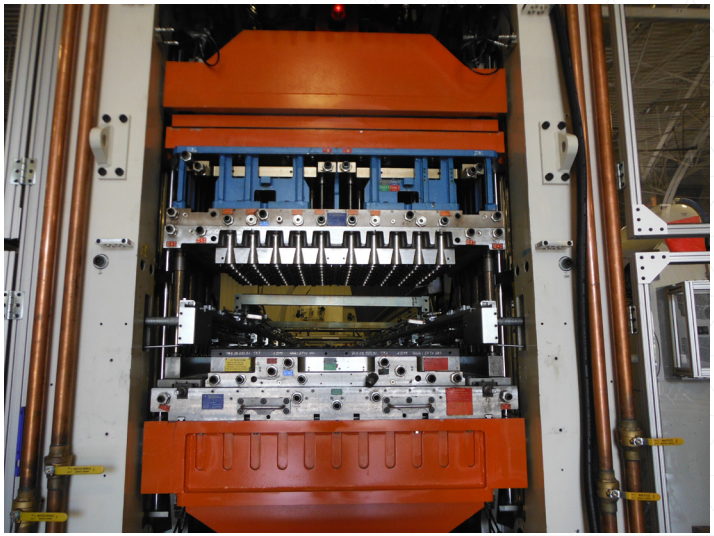
The FT4K tilt technology utilizes a synchronized dual servo toggle driven design which provides a rugged, high speed forming platform for a reliable and repeatable thermoforming process. The platen rotates 80 degrees, proud of the frame, allowing for ease of product ejection into automation or into an In In-Mold Labeling System (IML). With a platen move time of 1 second the FT4K can achieve speeds of up to 40 cpm, with non-IML automation.

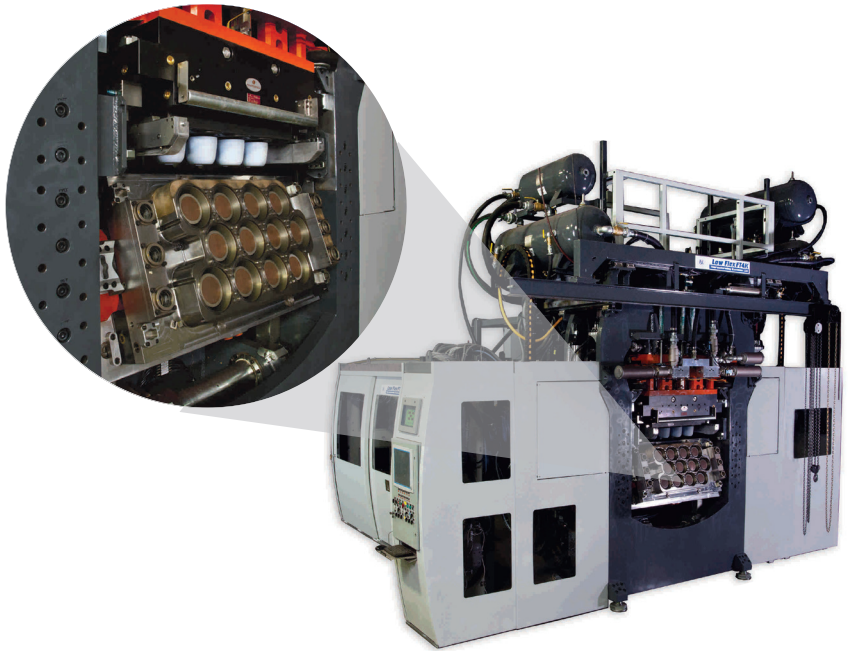


Technology - FT Technology Features

FTP Technology

The LF5.0 FTP machine is Form and Trim in Place, using a Low Flex 5.0 forming station with all of its technological advantages for production of HIPS (High Impact Polystyrene) plates, bowls, and trays intended for the retail market and small count stacks. Cycle speeds up to 40 CPM with cut-place trim accuracy with a labor saving counting and stacking feature is incorporated in the process.





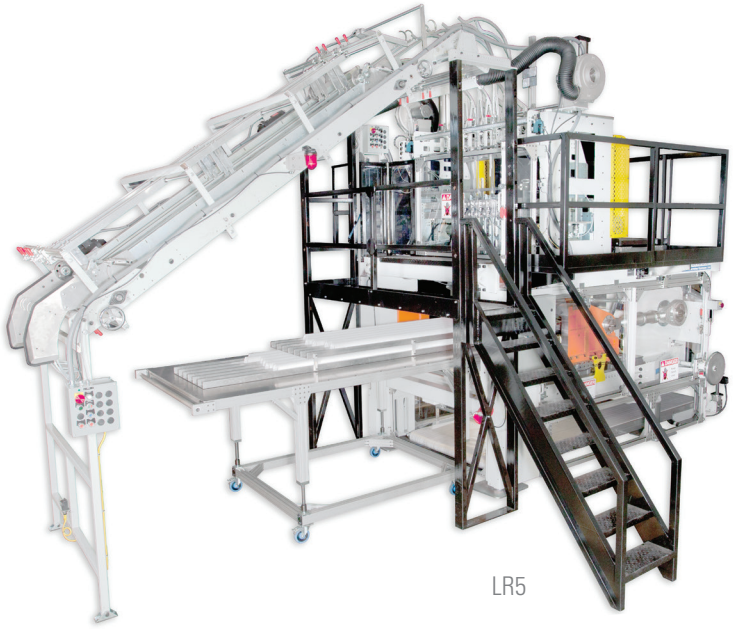
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Technology - Linear Rail (LR) Trim Press (Linear Rail: LR3, LR5, LR5 VTS, LR5 Pre-punch, LR6)

The TSL LR series trim presses are engineered with strength and precision in mind. Starting with a massive stress relived frame, a 85mm linear rail and a linear bearing system provide the load carrying ability and precise platen location required to trim heavy gauge plastics. The linear rail provides a cleaner running press the use of grease lubrication as opposed to oil, critical for the food service packaging industry.

The LR TP is designed to allow side loading of the trim tool for safer and faster trim tool installation. The LR TP is available in three models of the horizontal press as well as a vertical trim press and a pre-punch for ventilated containers, or scoring press, for tamper evident containers.



LR5

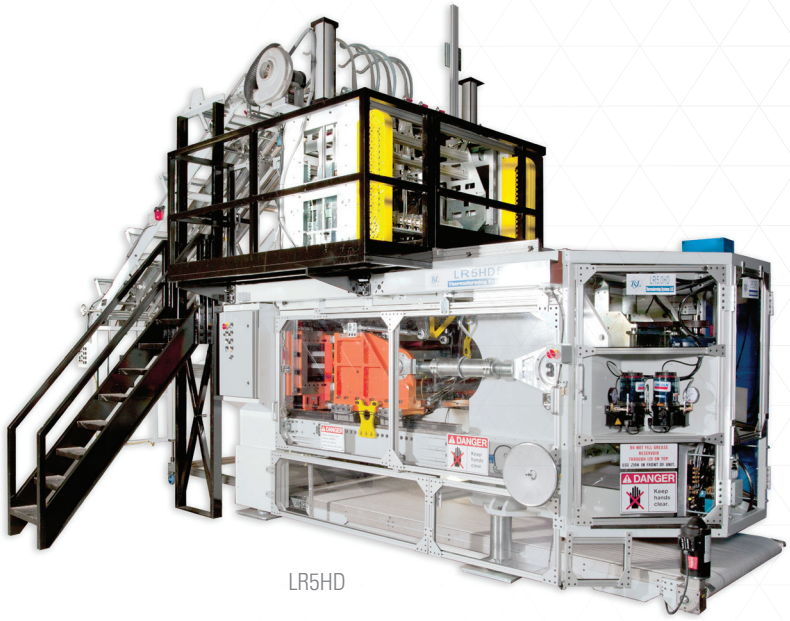
Improve operator safety and reduce the time of a tool change

- Optional trim tool carts
- Pneumatical upward Internal tool lift table
- Treadle design with quick change guides with jigs and reference scales.
- Guide optional positioning bars for repeatability.

Technology - Heavy Duty (HD) Trim Press (Heavy Duty "HD": 3.0HD, 4.0HD, 5.0HD, 6.0HD)

The TSL HD series trim presses are engineered with strength and durability in mind. The heavy duty stress relieved frames and proportionally designed die post, drive train and platen assembly provide a reliable and durable trim press. It is a proven platform with the strength and precision needed for the trimming of heavy gauge plastics.

The HD series is available in four horizontal versions and options include a reverse trim canopy, linear motion treadle, servo ejector, trim tool cart and other customer and process specific options.



LR5HD

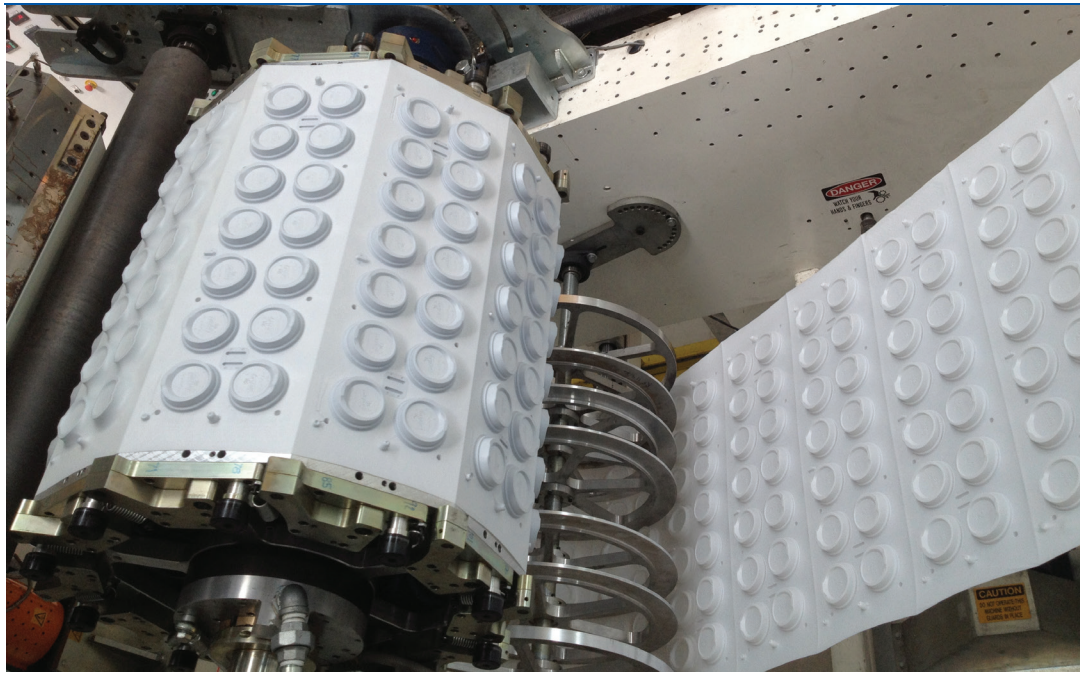
Options include:

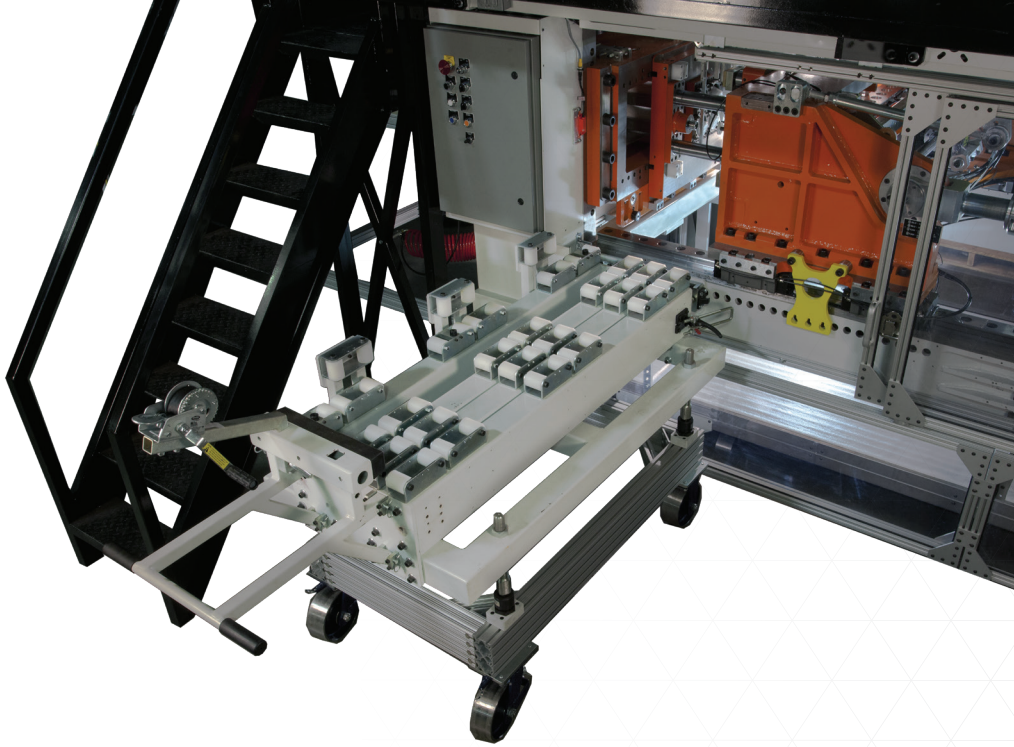
- Reverse trim canopy
- Linear motion treadle
- Servo ejector
- Trim tool cart

Technology - Rotary Thermoformer Version RF500

Melt to Mold Technology

The TSL Rotary Thermoforming Systems, model RF500, utilizes a Melt to Mold technology in which an in-line extruder feeds HIPS or PP sheet directly onto a rotating wheel to which the mold cavities are mounted. The lids are trimmed down stream in a TSL trim press, version LR or V.





Technology - Mold and Trim Tool Carts



TSL manufactures a number of cart design for mold installation in the forming station as well as the punch and die set in the trim press.


0.25
1.00
2.00
2.00
0.20
Servo 100 %
65.00
3.00
ON
Stripper
Top Angle Opening
2.00
Duration
0.50
OFF
Sheet Clamp
Bottom Angle Closing
2.00
Before Form Ends
0.20
Btm
Open Rate
Close Rate
Open Dwell Time
Plug Assist
Extend at Bottom Angle
Extend Position
Extend Rate
Extend Time
Retract Position
Retract Rate
Max Retract Position
SASH
SASH Position
Index
Distance
Rate
Start at Top
Slow Feed Rate
Index Rail Adjust
0.00
12.22
4.91
19.43
19
26.04
26.15
26.16
51.22
56.50
56.70
52.10
52.28
52.30
26.05
26.13
26.14
Indexing
Former
Heat
Trim

Technology - TSL Machine Control

The TSL machine control is a user friendly, state of the art system that incorporates non-proprietary commercial hardware and machine specific software developed by TSL. While we continually improve, and add new features, it is renowned for its consistent user experience' for over 20 years, minimizing training time, and expense.

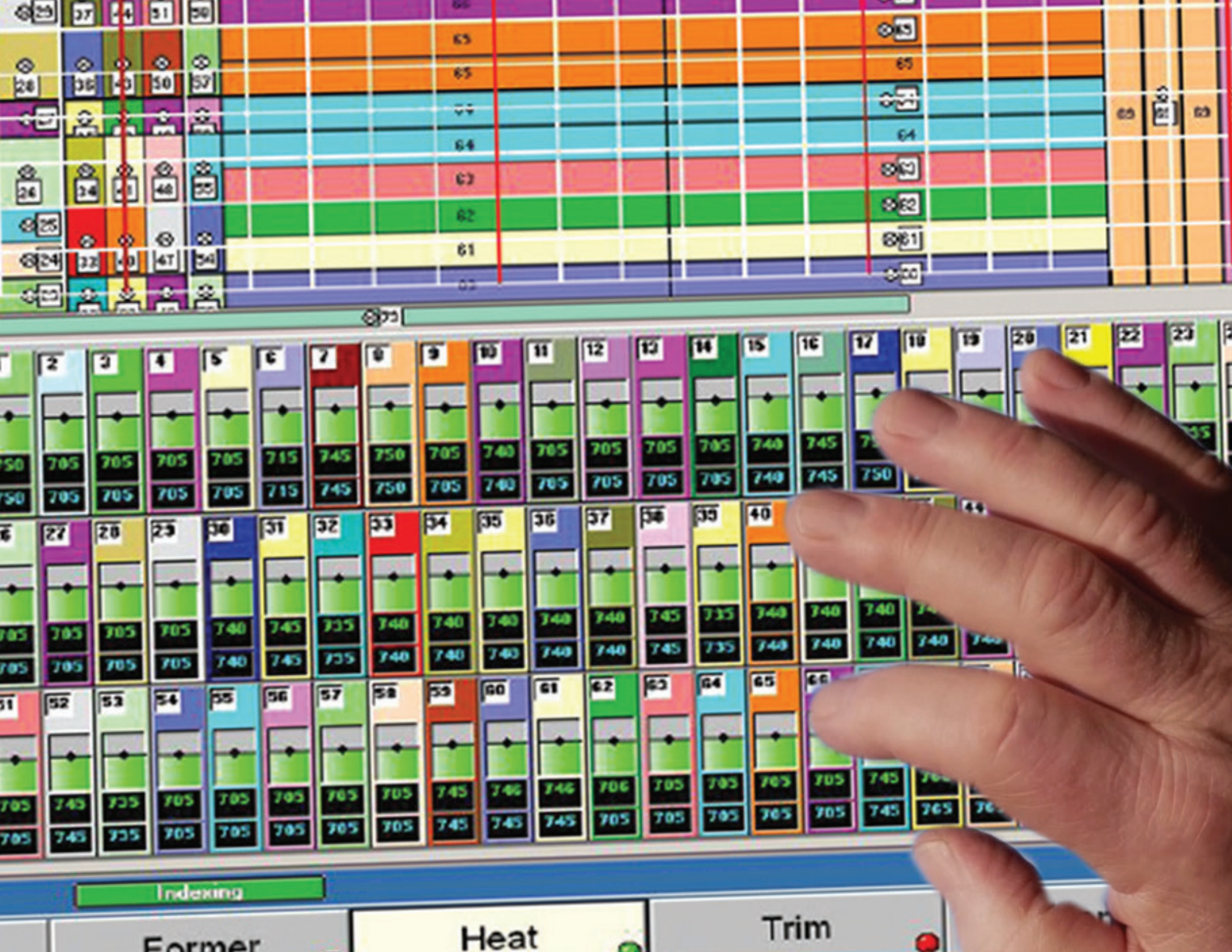
The HMI uses a standard industrial Windows 10 PC, with a 19" LCD touch panel. The PC is not responsible for any actual machine control. As such, in the event of a PC problem, the machine can still run production.

- The HMI includes:
  - Configurable user access levels, with passwords
  - Process recipe management
  - Time stamp log of all process changes, machine events, and faults
  - Supports 7 different languages
  - Extensive diagnostic tools
  - Hosts OPC data exchange, for data acquisition
  - Remote support, via secured internet connection

- While Yaskawa is TSL's servo system of choice, we can use any servo system with an analog/quadrature interface

- All mold related motors, and solenoid valves are not fixed, but highly configurable

- All panels are labeled to UL508A standard and they are Arc Flash friendly for easier maintenance


Indexing
Former
Heat
Trim

Technology - TSL Machine Control

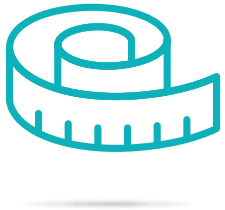
Control platform is Opto22(USA), tightly integrated with Galil Motion Controller(USA)

- Opto22 is responsible for all generic I/O, and all oven control
- Galil Motion Controller coordinates all servo motors, and all other cycle event timing

- Flexible oven control
  - All oven zones controlled by separate PID control loops
  - Temperature set point change, by value, in single or group selection
  - Temperature set point change, by percentage, in single or group selection
  - The oven control allows 'on the fly' zone configuration
  - Zones are color coded
  - Mold layout can be superimposed on oven graphic, to tailor heat profile
  - Power efficient design, lowering operating costs
  - All oven parameters included in process recipe

- Motorized chain rail adjust
  - Includes three different position modes; Tool Load, In, Out
  - Provides complete control of sheet vee profile
  - Able to independently move the four corners in the mold area
  - All parameters included in process recipe





Tailored Solutions

Partnership to take standard offering & tailor to customer's business & technical needs

Innovation Starts Here

TSL has mastered the art of working with progressive customers and industry partners to break old paradigms & develop Thermoforming & press product platforms that provide a competitive advantage.

Packaged Solutions

From concept to reality, experienced engineering teams turn specific objectives into high performance manufacturing solutions. Well-equipped pilot facilities enable customers to test and prototype concepts, building a foundation of confidence.

Customization Is Key

Major components of our Thermoforming lines are often tailored to address specific customer needs. This can be as simple as combining existing design elements in a unique way or developing a new solution to enhance existing capabilities.

Technology Leadership

By consistently reviewing technology fundamentals, TSL addresses major industry trends of industry 4.0 & productivity improvements.


24/7 Emergency request > +1 844 MY DAVIS



24/7 Customer Service

We are proud to offer a one-stop, parts and service center for maintaining, reconditioning and retrofitting your machinery. Think of us as your extrusion partner for the life cycle of your equipment. Available around the clock and around the globe.

Extensive Parts Inventory –

We maintain a vast selection of mechanical and electrical spare parts inventories to serve immediate needs.

24/7 Customer Service –

Our service technicians are available 24 hours a day, seven days a week, to handle emergency parts inquiries and service needs.

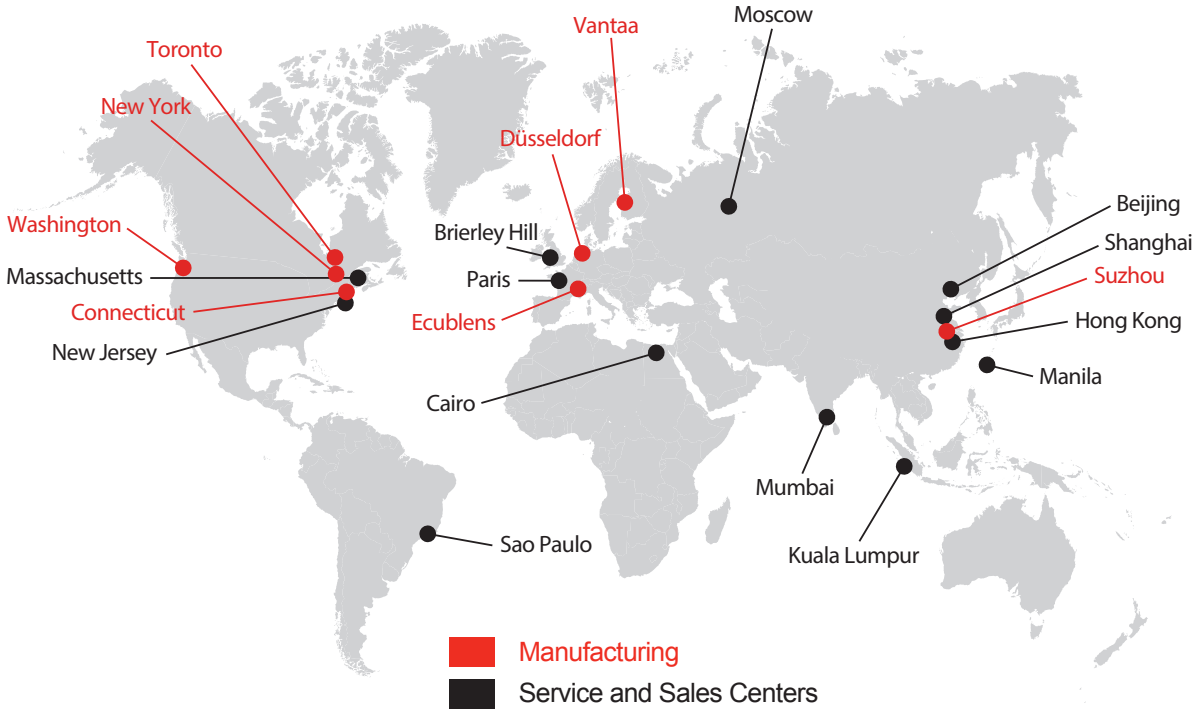
Timely Response –

In-stock parts are often shipped within one business day. For emergencies, we work with you, side-by-side, to get your machinery up and running as soon as possible.


CHEVROLET

Davis-Standard - A Global Company

Production Across Three Continents - Quick Response Parts & Service







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Thermoforming Systems LLC
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PUT US TO WORK FOR YOU.

We strive to do whatever it takes to ensure that you are able to produce a superior end product, at a superior profit. Contact us today to learn how we can help you succeed.

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Where your ideas take shape.