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Brown Machine LLC, NPE 2006 News (Booth #S1409):

## **Brown Machine Advances Patent-Pending Independent Plug Motion Technology with Precision Roller Screw Actuation**

Beaverton, MI – Brown Machine LLC announces the incorporation of an advanced patent-pending single roller screw design for actuation of independent third platen plug assist motion. This advanced technology provides higher stiffness, greater load capacity, and longer, more dependable operation for Brown continuous thermoformers requiring 3<sup>rd</sup> motion applications.

This design is being incorporated in all Brown CS and SRS Series Thermoformers with third motion capabilities and has been installed and proven in recent production equipment.

Advantages of this roller screw design also include:

- Rollers are manufactured with the same thread angle as the nut, which is ideal for high-load, high-speed applications,
- Fixed screws allow the roller screw to work at higher RPMs than ball screws that tend to be speed limited,
- With higher load capacity and multiple contact points, roller screws can provide a service life up to 15 times greater than comparably sized ball screws.

The plug platen system is actuated by a single roller screw (patent-pending) driven by a servo motor. The platen is guided by eight (8) linear bearings and incorporates quick change cylinder locks for attachment to the tooling plug plate. An independent oil lubrication system is included to effectively lubricate the roller screw system.

### **Vacuum pulse circuit and start up mode**

In addition to this new roller screw design, Brown's third motion solution also includes a patented vacuum pulse circuit. This pneumatic circuitry provides a momentary pulse of vacuum on the plug assist side to prevent the material from prematurely contacting the lip of the cavities, thus providing better material distribution and virtually eliminating



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unsightly chill marks. A start up mode that allows running the form station without actuating the 3<sup>rd</sup> platen until initiated by the operator is also included. If sheet temperature falls below a pre-set level (read by an infrared sensor mounted in the oven) the 3<sup>rd</sup> platen system will turn off. These start up features are designed to minimize plug assist damage caused by plugging cold sheet.

## How the third motion plug assist works

Thermoformers that incorporate independent plug assist motion, separates the motion of the form station platen from the motion of the plug assists. Although the plug assists remain an integral part of the pressure box tool, actuation of the plug assists is controlled independently. This provides an operator with the ability to change timing and speed of the plug motion, independent of the speed and timing of the pressure box motion—thus expanding the process window.

Advantages of an Independent Plug Platen with Third Motion Design include:

- Improved material distribution,
- Tighter clamping between the mold base and pressure box,
- Pre-clamping of the sheet prior to plug plunge,
- Cycle time improvement,
- Reduced starting gauge of the material,
- Lower gram weights of the finished product,
- Servo-controlled roller screw actuation for precise plug speed and control,
- Plugs retract after form pressure is applied,
- Safety circuit prohibits plug actuation into cold sheet.

## Pressure Boxes with external plug assist plates

Thermoforming tools with Brown's patented external plug assist plate provide users with significant reductions in air consumption for their third platen thermoforming tooling. Third platen thermoforming tools with traditional internal plug assist plates use

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significantly more blow-form air than tools with Brown's external plug assist plates. In fact, for round products, a pressure box with an internal plug assist plate typically will use twice the blow-form air that would be consumed by a similar pressure box with an external plug assist plate. This tooling design also provides much greater clamping strength with virtually no flex in the clamp plate.

### **Leaders in 3<sup>rd</sup> motion solutions**

Brown's patent-pending servo actuated roller screw design, patented vacuum pulse circuit and start-up mode coupled with Brown's patented external plug assist tooling clearly defines Brown as the leader in solutions for thermoforming products with independent plug motion technology.

### **Brown Machine at NPE 2006**

Brown Machine will be exhibiting at NPE 2006 at McCormick Place in Chicago, IL, June 19-23, 2006 at booth #S1409 and can answer your questions regarding independent plug motion thermoforming.

### **On Brown Machine LLC**

As a global leader of thermoforming technologies, Brown Machine LLC engineers and builds a complete standard line of continuous and cut-sheet thermoforming equipment and related tooling/peripheral equipment. Specialty thermoforming systems suited to a wide range of markets (including automotive, recreational, packaging, appliance and various other industrial segments) can be custom built to exact customer specifications. Brown Machine fully supports the thermoforming industry (Brown machine owners and competitive models, as well) with a full complement of 24/7/365 on-call service and parts support.

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