

Drive & Control profile

Sand and Deliver:

Pennsylvania Foundry Is First to Install Next Generation, Automatic Matchplate Sand Molding Machine

In June 2003, a leading Pennsylvania foundry became the first to install a BSM2016G" Series Matchblomatic® manufactured by Beardsley & Piper, LLC—an automatic matchplate molding machine that produces flaskless green sand molds that are ready to pour. The first-generation Matchblomatic® was the first matchplate machine using a blow-squeeze molding method to produce uniformly high-quality molds.

Now, the new second-generation BSM2016G" operates at up to 180 molds per hour with the precision of a machine tool. Employing a simplified design developed through the collaborative efforts of Flodyne/Hydradyne, Inc. and the Industrial Hydraulics business unit of Bosch Rexroth Corporation, a single, low-cost



The BSM 2016G" autoomatic matchplate molding machine features advanced drive and control equipment from Rexroth.

machine offers the productivity of three to five jolt-squeeze molders and requires little more space than a single jolt-squeeze machine.

Hydraulic Package Includes Custom Power Unit

According to Boris Shiller, Beardsley & Piper engineering manager, the new Matchblomatic® series features a semi-enclosed design, independently variable cope and drag height, an updated Rexroth proportional control system, quick-change pattern features, automatically adjustable blow pressure, larger volume sand magazine, a butterfly valve sand gate, an automatic spray pattern and a fully updated control and operator interface scheme.

The 80-gallon hydraulic package designed and built by Flodyne/Hydradyne includes a custom hydraulic power unit, which incorporates a Rexroth 42 gpm maximum AA10VSO high-performance horsepower-limiting pump driven by a 30 hp 1800 electric motor. The high-pressure portion of the duty cycle is 3000 psi.

“The horsepower limiter greatly reduced the size of the electric motor, while also allowing for a low-pressure standby mode for the machine,” says Mike Gluchman of Flodyne/Hydradyne Inc. “This pump was also selected for its high efficiency, low noise and reliability.”

Also included were three loose valve assemblies, which incorporated one 4WRZ10 and three 4WRTE Rexroth proportional valves, plus various other valves. Selection of these components was based on the recommendations of Flodyne/Hydradyne and Bosch Rexroth, which thoroughly reviewed Beardsley & Piper's design and performance requirements.

By incorporating a Rexroth HNC 100 Series 2X digital servo drive, Beardsley & Piper was able to rapidly, precisely and smoothly synchronize position, while at the same time bumplessly transition to the force control mode on the cope and table actuators during the squeeze portion of the cycle. The HNC 100 is a freely programmable, bus-capable NC control for electromechanical and electrohydraulic drives, and offers true axis synchronization.

Due to open- and closed-loop control algorithms specifically tailored to the special characteristics of hydraulics, optimum performance of electrohydraulic drives can be achieved. The customer can program the sequence via a PC using the HNC's WIN-PED software. The NC programming provides greater flexibility of the HNC, and it can complement existing user know-how with its common platform.

As a standard, each Rexroth HNC 100 features a local CAN-bus, which can be used to link the individual drives for general data exchange or for implementing synchronization controls, resulting in a scalable automation concept using modular principles. The Rexroth HNC 100 can also communicate with higher-level controls via Profibus-DP, INTERBUS-S and CANopen fieldbuses, and is available with a SERCOS interface, the most common communication system for electric drives.

The implementation of the Rexroth HNC 100 also produces a significantly faster, more controlled squeeze, which decreases the cycle time of the machine and increases mold output. It also eliminates mold pattern breakout by closely matching both cope and table squeeze forces and providing a menu-based automatic adjustment of pressures, forces and hydraulic actuator velocities and positions for the various patterns. This automatic setup completely eliminated the need for the operator to manually adjust the machine, resulting in not only quicker but also extremely repeatable parameter changeover.

In addition to the HNC 100, Beardsley & Piper uses the Rexroth DMX-1X digital servo drive on the drag flask, which provides exceptionally fine control

of position, while also allowing a bumpless force override on the position of the drag flask hydraulic actuator during squeeze. The DMX-1X optimizes the hydraulic axis for analog position, pressure or force control. All card settings can be accessed with the onboard pushbuttons and a digital display, and the end user can perform application configuration and commissioning. This includes the correct mechanical, hydraulic and electrical installation.

Rexroth
Bosch Group