Metamag® Molten Metal Transfer System
Metamag® Patented Pumping System

• Metamag’s patented pump is controlled by a proprietary PLC program. This offer un-matched process control over pour speed and pour time.

• No touching parts below the molten magnesium surface. This means less wear, therefore increasing the effective life of replaceable components.

• Heated transfer pipe for quick metal delivery.

• Removable non-wetting refractory Nozzle for Easy Cleaning

• Eliminates run-on and drips
**Metamag® Pumping Control and its Effect on Quality**

The Metamag® Pumping system helps improve and stabilize the internal quality of the die casted parts by reducing shot sleeve fill time. Because of the faster shot sleeve fill time, the injection process is activated faster and the pressure buildup gives you faster part cavity fill time, thus compressing the porosity out of the casting more effectively.

In a typical die cast application of an armature weighing 1.5 kg, a conventional transferring device would be between 2 to 4 seconds. The Metamag® Pumping System can transfer the same weight in between .75 and 1.5 seconds. It is evident that the faster the molten metal is transferred the better the quality of the part. Wear and tear is reduced by the die cast machine by allowing it to operate successfully at lower pressures.
Metamag Inc. is now using the E-Palm as a hand held operator interface for pump control. It can also be used to operate furnaces and ingot preheaters on turn key systems.

All pump functions needed to transfer liquid metal to the die cast machine will be accessed using the E-Palm. This replaces the older style Operator Pendant which did not display any operating parameters of the pump while in set-up or in production mode. It also includes hard wire e-stops, dead man stop buttons on both sides. The EPalm Pump Control start-up menu contains six (6) function buttons.
Metamag® EPalm Programmed Functions:

F2 Rotating:  Forward/ Reverse

F3 Speeds:  Pumping Speed Measured In Hertz

F4 Control Timers:  Pumping Time Measured in 10ths of a Second


F6 Pump Modes:  Idle Speed, Production, Shut Down

F7 Pump Options:  Max/Min Set Point Adjustment for all Pumping Parameters, Ramping Time and Speed, Bath Temperature monitoring, Increase/Decrease Adjusting Speed.
EPalm Controls Metamag® Control Panel & Pumping System

EPalm

Metamag® Control Panel

Metamag® Pumping System
EPalm10 Features:

- Graphical display 0x64 pixels (up to 8 lines 20 characters)
- Highly visible transflective LCD display
- 27-keys keypad with tactile feedback
- Connection to industrial bus systems
- Large memory size (512 KB Flash card)
- IP65 protection
- Emergency Stop button
- ‘Dead-man’ buttons
## Metamag® Pumping Parameters

<table>
<thead>
<tr>
<th></th>
<th>MP 4000</th>
<th>MP 6000</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pump Capacity in Pounds</strong></td>
<td>.05-10 lbs / 0.25 - 4.5 kg.</td>
<td>10-75 lbs. / 4.5 - 40 kg.</td>
</tr>
<tr>
<td><strong>Optimum Pour Time</strong></td>
<td>.75-5.0 seconds</td>
<td>3.5-10 seconds</td>
</tr>
<tr>
<td><strong>Repeatability</strong></td>
<td>99%</td>
<td>98.5%</td>
</tr>
<tr>
<td><strong>Accuracy of Shot Weight</strong></td>
<td>+/- 3%</td>
<td>+/- 2%</td>
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<tr>
<td><strong>Response Time in Milliseconds</strong></td>
<td>1</td>
<td>1.5</td>
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<tr>
<td><strong>Motor Temperature Rating</strong></td>
<td>210°C</td>
<td>210°C</td>
</tr>
<tr>
<td><strong>Motor Control</strong></td>
<td>Vector Drive</td>
<td>Vector Drive</td>
</tr>
<tr>
<td><strong>Motor Braking</strong></td>
<td>Resistor</td>
<td>Resistor</td>
</tr>
</tbody>
</table>
Metamag® Molten Metal Transfer Movie

Double click image to view animation
VECTOR DRIVE
MOTOR FOR
ACCURATE SPEED
CHANGE

DOUBLE
SUPPORT
BEARINGS
FOR TROUBLE-
FREE OPERATION
OF SCREW
BELOW METAL
LEVEL

MAGNESIUM ENTERS
PUMP IN THE CLEANEST
AREA OF THE BATH

POSITIVE DISPLACEMENT
SCREW DOES NOT
TOUCH ANY PARTS
UNDER THE METAL
SURFACE. WEAR
OCCURS ONLY THROUGH
EROSION

WHEN PUMP IS AT
IDLE SPEED THE
MOLTEN METAL IS
MAINTAINED AT
THIS POSITION

NON-WETTING
REFRACTORY LINE
POURING NOZZLE
PREVENTS MAGNESIUM
FROM CLOGGING OUTLET.
FITTED WITH A
PROTECTIVE GAS PORT

RED
INDICATES
MOLTEN
MAGNESIUM IN
CRUCIBLE AS
WELL AS IN
TRANSFER
TUBE.

BALL COUPLER BETWEEN TUBE
AND PUMP, TUBE IS ALLOWED TO
ROTATE FOR DIFFERENT SHOT
SLEEVE HEIGHT

Metamag® Pump
Metamag® Transfer Tube Construction

CLAMP FOR EASY REMOVAL OF POURING NOZZLE

ELEMENTS JUNCTION BOX AND POWER CONNECTION

SECONDARY OUTLET ELEMENTS KEEP TUBE END HOT ENOUGH TO PREVENT MAGNESIUM FROM BURNING AND FREEZING

THERMAL COUPLE SENDS FEEDBACK TO TEMPERATURE CONTROLLER

ONE CONTINUOUS HEATING ELEMENT IS THE PRIMARY HEAT SOURCE FOR MAGNESIUM TRANSFER TUBE. THE MAGNESIUM CAN BE FROZEN INSIDE THE TUBE. ELEMENTS HAS ENOUGH KW TO RE-MELT FOR PRODUCTION

SEE CUT AWAY VIEW FOR MORE DETAILS ON TUBE CONSTRUCTION
Cut Away View of Metamag® Transfer Tube

- OUTER TUBE PROTECTIVE CASING
- STAINLESS STEEL FOIL WRAP
- CERAMIC FIBER INSULATION 50MM THICK
- INNER TUBE, 410 STAINLESS STEEL TUBE
- 240 V HEATING ELEMENT
- 1/8” PAPER INSULATION
- STAINLESS STEEL FOIL WRAP
Metamag® Refractory Nozzle

- Removable Protective Gas Feed Tube
- Coupling Plate Fits Tightly to the Outlet End of the Transfer Tube
- Clamp Locking Ring
- Non-Wetting Refractory Lining Prevents Magnesium from Sticking and Dripping