Technology

'INMOULD' Process

INMOULD differs from other methods of manufacturing in that NODULARISATION takes place within the mould. This enables certain economies to be obtained and assures clean, superior castings.

Conventional Nodular Processes
Melting
Desulphurising
Nodularising alloy treatment
Temperature control
Inoculation
Deslagging

Time control
Specimen testing
Heat-treatment
Pouring
Inspection

Equipment

No magnesium fume or smoke is produced during pouring, hence no fume extraction or cleaning equipment is required. INMOULD assures a clean atmosphere and improved working conditions.

DIRECT SAVINGS IN NODULARISING ALLOY

(1) Processing

Normal ladle treatment uses 1.8% to 2.5% of alloy whereas INMOULD uses 0.75% to 1% of alloy. This represents a saving of over 50% of the Nodularising alloy by the use of INMOULD.

(2) Over Treatment

Over treatment with magnesium at the beginning of production pouring is common practice in order to ensure that a fully nodular graphite structure is assured at the end of the pouring cycle. This practice results in considerable variation in structure, strength properties and machinability of the castings. (Fig. 1)

(3) Pourdown Metal

The molten iron in the ladle, pouring basin and gating system of INMOULD do not carry any magnesium treatment, hence, there is a saving in both the quantity of Nodulariser alloy and labour.

The graph (next page) shows the total liquid iron loss due to slagging and pigging in the manufacture of ordinary Nodular iron is some 10% of the total melt. With INMOULD, slagging is unnecessary and the molten iron left over at the bottom of the ladle can be reused.

(4) Post Inoculation

This is a common operation in most nodular iron foundries. It serves a number of purposes such as:

(a) avoiding embrittling carbides,
(b) restoring 'fading' of nodularity,
(c) improving nodule count,
(d) improving machinability.

Fig. 1

INMOULD Process
Melting
Desulphurising
Alloy addition
Temperature control
Pouring
Inspection

With INMOULD there is no loss of temperature, hence, a uniform structure free from carbides is obtained throughout the pouring operation. (Fig. 2)
(b) 'Fading' of Nodularity.

(c) Cooling of treated molten iron in the ladle caused by 'Equipment' breakdown.

(d) Dirty Automatic pouring units may cause delays in production lines with loss of productivity.

(e) Having to use slagging tools, auxiliary equipment such as Piggings Moulds and extra labour etc.

INMOULD eliminates all of these disadvantages and extra costs.

(7) Heat Treatment

INMOULD reduces or eliminates the necessity for annealing. This saves the purchase of Capital Equipment, Fuel and Labour. Annealing itself is also a costly process and may result in distortion and scaling of the castings which means extra cleaning and straightening operations.

It has been claimed, however, that INMOULD can cause inclusion defects in certain castings if the sulphur exceeds 0.015% in the metal. If this is true to INMOULD then it must be true to other Nodular Processes in that both would use extra quantities of nodularising alloy to reduce the sulphur content.

In actual experience of many large foundries manufacturing thousands of tons of INMOULD Nodular Castings over the past 4 years, this particular defect has been extremely rare.

From long experience of foundries using the process in the USA, Germany, Italy and England etc., the spheroidizing treatment inside the mould has proven extremely attractive because of its advantages including:—

Simplification of Manufacture and Control
Use of less costly charge materials
Lower production costs
Improved product quality and consistency over other processes with fewer defects
Reduction of heat-treatment cost
Improved Environment conditions in the foundry

Originally it was thought that the process would be limited to small and medium sized castings in long runs. However, experience has shown its use can be extended to complex parts such as truck wheels, bus rear axle clusters (850 lbs.) large crankshafts, reduction gear boxes, hub castings (1500 lbs.) etc.

DI-CO-MAT process

Materials and Methods Ltd., recently announced the availability of materials and techniques applicable to the die-casting of grey and nodular irons. At the heart of the process is a wet spray which when applied to the heated die, forms an insulating coating which in association with the correct inoculation techniques, eliminates cementite. In trial production of centrifugal cast pipes in grey iron the need for heat treatment was eliminated and estimates for improvement in die life were up 400% over previous uncoated practice.

The system was also successfully applied to the production of nodular iron pipes, in this case the production of the nodular iron was switched to FLOTRET. The excellent nucleation characteristics associated with the FLOTRET Process and the use of the DI-CO-MAT insulating spray again resulted in cementite free pipes which required only the feritisation anneal. The process is also applicable to static dies where similar metallurgical results have been achieved.

Micro Computers in the Iron Foundry

Today it is impossible to pick up a technical magazine without reading about the use of microcomputers in the foundry industry. From our own experience, both computers and software are like confetti. They claim to be the answer to every manager's dream.

In the industry it is accepted that no two foundries are alike, type of casting produced, method of manufacture, raw materials, melting equipment and sand. Therefore, it is difficult to buy "off the shelf" programmes that can be introduced to commence work immediately.

A recent American foundry publication survey indicated very few foundries use this method for quality metal control particularly for correcting melts. Although 93% had a computer only 10% used it for process control. Is this because of variations in standards or practice specification or as one foundryman responded as "fear"? However, the magazine did suggest in the future, 17% of the foundries thought "Process Control" was the leading application.

May be the comment "fear" was promoted by the foundrymen because of the difficulty of identification with the computer expert. In the average foundry the systems will have to be operated by a metallurgist, foundry technologist for the application to process control.
Technology (Contd. from Page 36)

A new product NOKLAT 87, a 75% ferro-silicon containing 5% Mischmetal is now available from Materials and Methods and is finding application as an inoculant and preconditioner throughout the range of flake and nodular irons.

COVNIJ in Holland announced recently the successful installation at the Soester iron works. The foundry produces ferritic grades of nodular 'as cast' with the FLOATRET Process and the lack of fume and flake was greatly appreciated by the work force. —Courtesy: Materials and Methods Ltd., 38 Albert Road North, Reigate, Surrey, England.

New engineering plastic

A new extruded engineering plastic has been developed in Japan for patterns, models and NC tape confirmation. According to the U. S. distributor, American Colloid Co., the plastic is a modified ABS resin that is especially formulated for easy machining and dimensional stability. "Called Cycowood," the plastic board may be cut with any type of machine tool and forms small-curl chips without creating dust.

The dimensional stability makes Cycowood especially applicable to patterns or sand casting, masters and duplicates and/or NC tape confirmation. It does not change dimensionally when exposed to moisture, temperature changes or rough handling. Cycowood is said to have excellent abrasion resistance and is not affected by most chemicals. It is available in boards which are dense solids with no voids. It may be joined into laminations like wood.

—American Colloid Company, 5100 Sutfield Court, Skokie, IL, USA.

Coremaking processes in German foundries

It is interesting to note how the application of the different core production processes has changed in German foundries within five years.

Though mainly economic considerations were the reason for a change of process, requirements such as working safety, environmental protection and waste disposal as well as the question of the technical limitations of use and the quality of the casting were other contributory factors. We propose to present details of some of these processes in our subsequent issues.

<table>
<thead>
<tr>
<th>Moulding material/ moulding process</th>
<th>Production share in % 1977</th>
<th>1982</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clay-bonded sand</td>
<td>4.4</td>
<td>3</td>
</tr>
<tr>
<td>Sodium silicate-bonded sand</td>
<td>4.1</td>
<td>11</td>
</tr>
<tr>
<td>Cement-bonded sand</td>
<td>3.1</td>
<td>1</td>
</tr>
<tr>
<td>Oil-bonded sand</td>
<td>3.2</td>
<td>1</td>
</tr>
<tr>
<td>Cold-box process</td>
<td>8.8</td>
<td>20</td>
</tr>
<tr>
<td>Furan resin-bonded sand</td>
<td>15.4</td>
<td>15</td>
</tr>
<tr>
<td>Phenolic resin-bonded sand</td>
<td>2.2</td>
<td>3</td>
</tr>
<tr>
<td>Hot Box process</td>
<td>28.9</td>
<td>25</td>
</tr>
<tr>
<td>Boron process</td>
<td>19.6</td>
<td>20</td>
</tr>
</tbody>
</table>


We offer MECTEL (Core Oil) of various types to suit individual need

Our MECOL-L (Liquid Coal) totally eliminates Coal Dust

Write for details to:
 Manufacturers & Exporters

MERCURY ENGINEERING CO.,
(Chemical Division)
4-1-885, Tilak Road, Hyderabad-503001.
Phone No. Off: 22 3473
Grams: "MERCURY"