

JMT NEWS

JSW MAGNESIUM TECHNOLOGY NEWS

Message from Managing Director

The Japan Steel Works, Ltd. (JSW) has supplied more than 200 thixomolding machines to the world market since it began the magnesium business in 1992. Since then, we have been doing R&D in many aspects including process know-how, mold design, surface treatment and magnesium material for molding. Now I think it is time to open the information obtained through those R&D activities to public. I wish this newsletter is interesting to all people, who may already be users of thixomolding machines or who are just wondering about thixomolding machine and thixomolded magnesium parts.

If you have any comment or question, please don't hesitate to contact us. It will be my great pleasure if JSW can promote the application of this fascinating material and technology together with you.

Thank you for your corporation.

Naonobu Izumiya,
Managing Director of Magnesium Process Equipment & Products Div.,
The Japan Steel Works, Ltd.

Technical report : Development of Hot-Runner System for magnesium injection molding

Hot-runner process

Thixomolding machine makes it possible to mass-produce high-performance magnesium parts in a safe process, which is similar to plastic injection molding. In plastic injection molding, hot runner system is widely used in order to increase the productivity and material efficiency. JSW developed a hot-runner system for magnesium injection molding.

Although there are many types of hot-runner system for plastics, the induction heating and valve-less type is employed. In this system, the nozzle tip is sealed by a cold plug of magnesium formed in the tip after each shot and opened by melting the plug just before next injection. This system was co-developed with JU-OH INC. that is a Japanese supplier of induction heating type hot-runner.

The main structure of the hot-runner for magnesium, illustrated in Figure 1, seems to be the same as the one for plastics, but the detail is designed to adapt to magnesium. A special material developed by JSW was selected for hot-runner parts. The nozzle tip is designed so that a smooth operation can be maintained. JU-OH also modified the material and shape of induction coil in order to have a efficient and uniform heating. The controller and the power supply of this system shows a enough performance of quick heating up with precise control.

Figure 2 shows a temperature change for nozzle tip during a continuous molding operation. The thixomolding machine and the hot runner system exchange electronic signals each other in order to control the timing of injection and nozzle temperature precisely so that their synchronous behavior, which is absolutely necessary for stable molding operation, can be maintained.

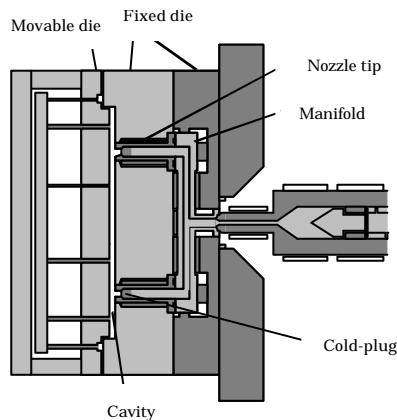


Fig. 1 Cross-section of hot-runner mold

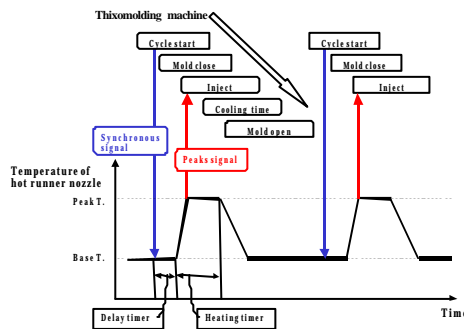


Fig. 2 Nozzle tip temperature shift

JSW

MAGNESIUM

Vol.1(No.1)

April 2001

What is JMT NEWS?

We would like to offer useful information to our customer and people who are interested in thixomolding technology. If you have any comment about JMT NEWS, please feel free to contact us.

FAQ

Question 1 : Can the cycle time of thixomolding be shortened by the use of hot-runner?

Answer 1 : Yes! The hot-runner system can decrease the metering time by reducing the shot weight and the metering volume. The hot-runner system can reduce cooling time of nozzle in order to make plug.

The hot-runner system can reduce die clamping force required because of smaller projected area and make it possible to mold a part by smaller machine that can be operated with a shorter cycle time.

Question 2 : How many hot-runner for magnesium are now in operation?

Answer 2 : More than 10 systems have been employed in Japan and they are in mass-production use as well as experimental one.

Question 3 : Should any special attention be paid for hot-runner operation?

Answer 3 : An adequate mold design will require basic know-how such as nozzle tip design, manifold construction (Photo 1) and induction coil adjustment. JSW can assist you.

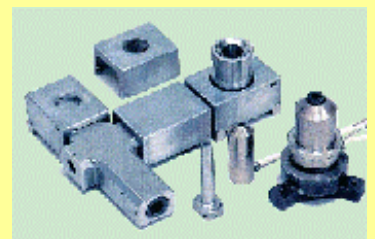


Photo 1 Nozzle tip and manifold

Advantages

Advantages of hot-runner process at magnesium injection molding are as follows.

(1)Material saving

In thixomolding, it is necessary to use thick sprue and runners so that solidified metal will not block the way into the cavity. Frequently, the weight of sprue and runner can be equal to or heavier than the part itself, especially when the parts is thin, for example, casings of electric appliances. The hot-runner can reduce the amount of material used for sprues and runners dramatically by using shorter runner or direct gates.

An example is the thixomolded laptop computer housing molded with hot-runner shown in Photo 2(b). 30% reduction of material used and cycle time cut down from 40 seconds to 25 seconds were achieved by using the hot-runner system compared with part molded with cold-runner shown in Photo 2(a). Photo 2(c) shows a box type test piece molded by a direct runner mold. In this way parts are molded with little amount of scrap while it is necessary to finish gates by machining.

(2)Larger moldable part size;

The size of moldable parts is limited by two reasons. The first is the limitation of the distance that molten magnesium can flow before it solidified. Hot runner can increase the flow length by eliminating the temperature decrease at sprue and runner.

The second reason is the limitation of die clamping force. Lacking sprue and runner, which is indispensable for conventional cold runner dies, the hot runner can reduce the projected area considerably. Photo 3 shows an example of large part molded by using hot runner.

(3)Increasing productivity by multiple cavity ;

The hot-runner works as a distributor of the melt to each cavity and solves an unbalanced flow into each cavity of the mold. Photo 4 shows a magnesium body of portable telephone molded by 4 cavities mold with hot-runner.

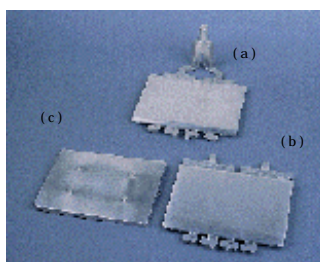


Photo 2 Laptop (a) (b) and test piece (c)



Photo 3 1/4 model of Instrument panel



Photo 4 Body of portable telephone

Topic : Second T²EAM meeting in Japan

Second T²EAM meeting was held for JAN 16-17, 2001 in JSW Hiroshima Plant in Japan hosted by JSW.

35 participants representing 19 licensees attended the meeting. Dr. Stephen LeBeau, from Thixomat, presented update activities of research and development in Thixomat. Ryuichi Sakamoto, Takeshi Yamaguchi and Dr. Kengo Takeya, who are JSW's engineers, presented new technologies developed in JSW. Dr. Ken Saito of JSW reviewed the potential of thixomolding process. A fruitful discussion was made on those topics by all participants.

The meeting included a plant tour of JSW and MG-Precision Co., where people saw a demonstration of thixomolding with hot-runner system and production line of portable telephone housing.

In evening party on JAN 16, participant talked each other about trend of magnesium business and technology.

We would like to say "Thank you for your visiting our plant and earnest discussion!"

Whom you should contact to:

The Japan Steel Works, Ltd.

Magnesium Process equipment & Products Division

HOME PAGE : <http://www.jsw.co.jp/>

Sales Department

Address : 1-2,1-chome,Yurakucho, Chiyoda-ku, Tokyo, Japan

TEL : +81-(0)3-3501-6164 FAX : +81-(0)3-3595-4615

E-mail : info-mg@jsw.co.jp

Engineering Department Research & Development Group

Address : 6-1,1-chome, Funakoshi-Minami, Aki-ku, Hiroshima, Japan

TEL : +81-(0)82-822-3050 FAX : +81-(0)82-824-1518

E-mail : MGKAIHATSU2_HIROSHIMA@hiro.jsw.co.jp

Events

Second Annual Licensee Conference, Thixomolding Magnesium EXPO 2001

Second Annual Licensee Conference, Thixomolding MAG EXPO 2001 is set for JUNE 4-6, 2001 in Hiroshima, Japan hosted by Thixomat and JSW.

MAG EXPO program will include keynote lecture, showcase of thixomolded parts, plant tour and Thixomat's design seminar.

If you want to know details of this conference, please see Thixomat's Home Page (<http://www.thixomat.com>) or contact to Thixomat (TEL : +1-734-995-5550, FAX : +1-734-995-5558).

CONFERENCE AND SHOW EVENTS THAT JSW WILL PARTICIPATE

OCT 25-NOV 1, 2001

K2001 15th International Trade Fair Plastics and Rubber (Düsseldorf, Germany)

Thixomolded parts and panels will be presented.

MAR 14-16

The 103rd meeting of The Surface Finishing Society of Japan

Katsuyuki Araki of Research and Development Group will present what he has found.

MAY 19-20

The 100th Spring Meeting of The Japan Institute of Light Metals at Okayama University of Science

Tadayoshi Tsukeda, Isao Nakatsugawa and Ryohei Uchida will talk on their recent research activities.

MAGNESIUM EVENTS

MAR 28-30, 2001

The Japan Institute of Metals Spring Meeting (2001) at Chiba Institute of Technology

MAY 20-23, 2001

International Magnesium Association 58th Annual World Magnesium Conference (Brussels, Belgium)

Thixomolded parts No.1



J-SH05s

Product : Portable telephone
 Maker : Sharp Corporation
 THX parts : The frame for LCD-panel
 LTH-molder : MITSUBISHI PLASTICS, INC. and MG-Precision Co.

Notes : This is the first portable telephone using the TFT-liquid crystal display panel in Japan.