Semi-solid metal is a kind of slurry in which solid particles are suspended in a liquid matrix. The rheological behavior of the semi-solid slurry enables it to flow well and be easily made into metal parts via general processing.

With a thixomolding machine, magnesium alloy chips are fed into a barrel, sheared by a rotating screw and gradually heated to semi-solid slurry.

**Development of Thixomolding Technology**

In the 1970s, Massachusetts Institute of Technology conducted the research and development of semi-solid metal forming technology, which was a new field of metal forming technology. This groundbreaking technology was further developed with magnesium and magnesium alloys (thixomolding technology in 1990). In 1991, well-known hydraulic die casting equipment manufacturer HPN from the United States was the first to acquire technology patent license and developed the first-generation thixomolding machines that were sold later. Japan’s JSW and Canada’s Husky also launched similar products in 1992 and 1997 respectively.

In recent years, thixomolding technology has been introduced to China. In 2009, Yizumi succeeded in developing China’s first thixomolding machine which aroused intensive attention. The new product, named after MG series, passed domestic technical evaluation.

In 2014, Yizumi conducted the formulation of “Thixomolding Machine Industry Standard” as one of the main drafters.

In 2015, the new generation of semi-solid magnesium alloy thixomolding machine UN950MGII was successfully developed; and various technical indicators have been comprehensively upgraded, comparable to the current leading technologies in Japan and the world. The products were named the MG series and went on sale in the same year.

In 2018, through the technical cooperation between China and Germany, the large injection volume model UN1250MGII was developed, with an injection volume of 2.5kg, which is the maximum injection volume that can be achieved by similar machines in the world.

In 2019, the semi-solid magnesium alloy hot runner technology was developed and successfully applied to the German customer’s scooter mold to produce better quality products.

**R&D Background of MGII Series Thixomolding Machine**

- **2009**
  - Yizumi developed China’s first MG series thixomolding machine that passed technical evaluation.

- **2013**
  - Development of the 2nd generation of semi-solid magnesium alloy thixomolding machine began.

- **2014**
  - The large injection volume model UN1250MGII was successfully developed.

- **2015**
  - UN950MGII, a model in the new generation MG series thixomolding machine, was successfully developed, produced and launched for sale. All technical specifications of the new product were upgraded.

- **2019**
  - The semi-solid magnesium alloy hot runner technology was successfully developed.

**Advantages of Thixomolding**

- **Shaping more complex parts**
- **Low molding temperature, long mold life and little deformation of products**
- **High precision and good surface quality of finished parts**
- **No S6 shielding gas, environmentally-friendly**

**Q&A**

**Q: What’s the difference between thixomolding and powder metallurgy?**
A: In powder metallurgy, a general injection molding machine is needed for melting only the plastic materials in feedstock for part forming.

**Q: Does thixomolding need melting furnace and conveying device?**
A: No. Thixomolding is a process in which magnesium alloy chips are directly fed to the machine for semi-solid injection molding. The feedstock is melted by the barrel heaters, without additional melting and conveying devices.

**Q: Can a thixomolding machine produce aluminum alloy parts?**
A: The screw and barrel suitable for semi-solid aluminum alloy molding have not yet been developed, so aluminum alloys now are not applicable to thixomolding.

**Q: Are the screw and barrel of a thixomolding machine the same as that of the injection molding machine?**
A: They basically work the same way. But a thixomolding requires higher temperature, the screw and barrel of a thixomolding machine are made of a special type of alloy.
More Than 20 Years of Mature Technology

- **Clamping unit**: The design of clamping unit has been applied to die casting machines for hundreds of times and proven to be reliable.

- **High-speed mold opening and closing technology**: Specific patented technology that has been proven by hundreds of cases offers excellent performance and high reliability.

- **User-friendly and easy-to-use controller with a 10.4-inch color touch screen**:

- **Barrel assembly**: Reliable and durable barrel assembly that is proven by massive practical applications.

- **Innovative technology**: Real-time control of high-speed injection is available thanks to the closed-loop injection control technology which is well-known intellectual property and the use of self-developed control software and algorithm; maximum injection speed is up to 5 m/s.

- **Electrical enclosure and controller cabinet designed with dust- and waterproof properties to prolonging the life of electronic and electrical parts.**

- **Safety gates of clamping unit and injection unit are monitored and controlled by safety relays for higher security.**

- **Easily accessible design that is maintenance and repair-friendly.**
**Application**

The 10.4-inch touch screen and 500MHz controller facilitate operation and high-speed control via Ethernet.

Modular design of the control system facilitates extending functions. Ethernet interface is available as a standard feature for the purpose of information exchange with other equipment and data management software.

Parameters of the machine are clearly displayed and monitored on screen in real-time.

Quick setup screen, where all injection molding parameters can be set.

Real-time graphic display of high-speed injection.

**Molding Case**

**Hot Runner Technology**

The hot runner mold technology maintains the magnesium alloy material in the hot runner of the mold in a semi-solid state by heating. The hot runner system is an extension of the nozzle that eliminates the need to remove the aggregate from the runner after shutdown and only needs to be heated to bring the hot runner to the desired temperature for the next injection. This technology is especially suitable for mass production, high raw material prices and high product quality requirements.

**Advantages of hot runner mold technology**

- Reduce manufacturing cost
- Excellent process control

**Scooter chassis (Application of hot runner technology)**

- Cavity: 1
- Size: 144mm x 40mm x 142mm
- Weight: 1.7kg
- Cycle time: 43s
- Thickness: 1~4mm

**PC keyboard base**

- Cavity: 1
- Size: 335x236x10mm
- Weight: 32g
- Cycle time: 36s
- Thickness: 0.45~0.60mm

**Sound equipment of car**

- Cavity: 1
- Size: 150x80x11mm
- Weight: 20g
- Cycle time: 36s
- Thickness: 2~11mm

**UAV battery shell**

- Cavity: 1
- Size: 130x136x51mm
- Weight: 31.3g
- Cycle time: 36s
- Thickness: 0.4~0.6mm

**Car electrical element**

- Cavity: 1
- Size: 200x140x50mm
- Weight: 350g
- Cycle time: 36s
- Thickness: 2~10mm