Progress of Research on Semi-solid Forming of Aluminum Alloy

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General Situation in China

- Initial research in late 1970’s
- Research focused on thixoforming and related technology
- Lack of commercialized application
- More and more end users in China are interested in SSM technology
- SSM research initiated in Tsinghua University in mid 1990’s
In Tsinghua University, SSM research aims at commercialized application, which includes:

- Billet preparation on medium or large scale
- Rheological properties of SSM billet at elevated temperature
- Thixocasting of aluminum alloy
Sketch map of semi-solid billet caster for aluminum alloy developed by Tsinghua University
Caster Features

- Two molds \((\text{Pre-mold+End-mold})\) plus mold vertical vibrating (AM and FM) for the control of solidification and billet forming
- Dragging roll for continuous billet production
- Synchronized cutting for billet collection
- PLC control, on-line monitoring of caster in operation
Caster for billet production
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Test SSM billet
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Microstructure of A356 billet

Φ 90mm billet edge

Φ 90mm billet center
SSM billet reheated

Original

Reheated (at 580°C)
SSM billet compressing test

Before deformation

Deformation at 565°C
SSM billet compressing test

Before deformation

Deformation at 565°C
Further research

- Stable drawing process of SSM billet caster
- Other alloy systems than Al-Si-Mg system
- Commercialized thixocasting technology
- Rheocasting or other SSM processing technology
Thank you.