



MgFeSi alloy consumption reduced by

150 MT/year

CASE STUDY

Reviewing alloy additions in the production of safety-critical castings

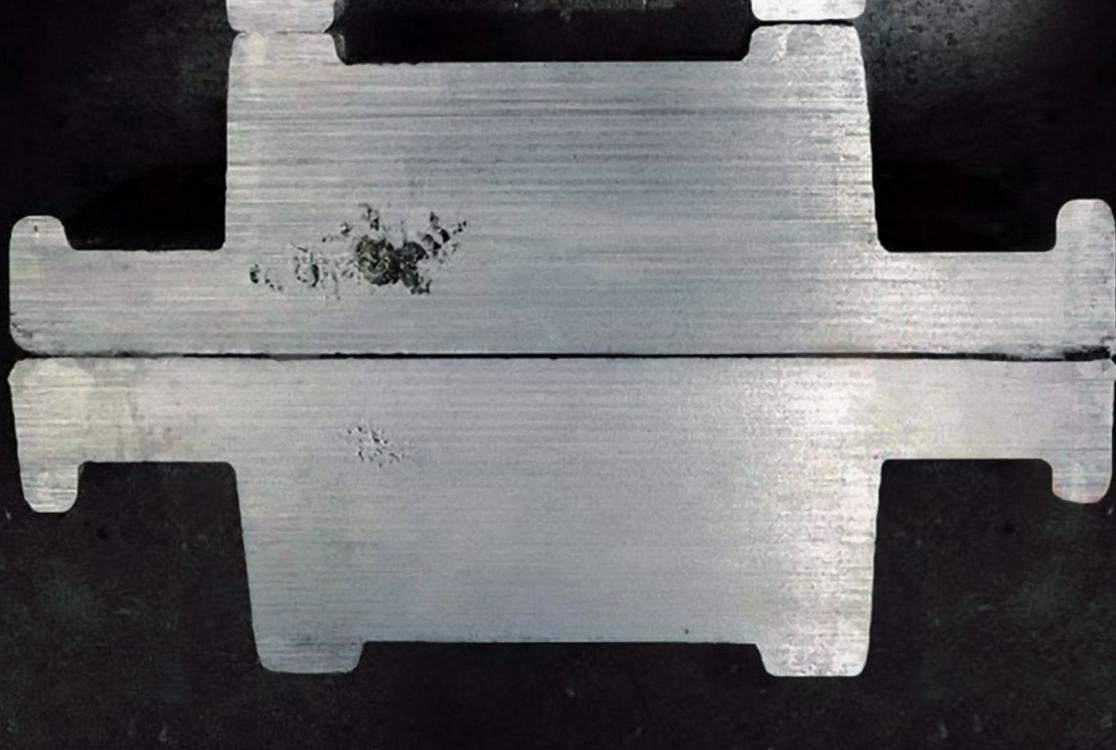
Background

One global growth area for steel is the upgrading of rails to accommodate high-speed trains (HST). This requires improvements in infrastructure components, one of which is the safety-critical tie plate used to attach the rail to the sleeper.

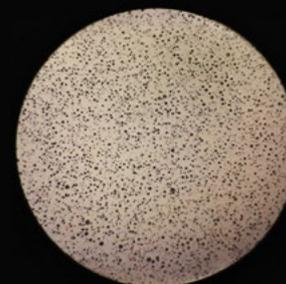
Our client is a leading producer of ductile iron high-speed railway tie plates. Their foundry produces 26,000 tonnes of tie plates per year for new HST infrastructures.

Challenge

The foundry faced some serious challenges to meet both the increased demand for castings and to overcome some metallurgical problems necessary to meet the required safety standards, especially shrinkage control.



Usual microstructure



Elkem microstructure

“Our plate castings are under permanent scrutiny. When the issues in this particular part became a concern, Elkem was able to help us eliminate shrinkage and improve processes.”

Solution

When approached by the foundry, Elkem conducted a full process audit. Key areas for improvement were quickly identified as:

- ▶ The nodularising treatment ladle
- ▶ The high demand of Mg + RE alloy
- ▶ The oil covered steel punchings

In conjunction with foundry management, the following changes were implemented:

- ▶ New 2:1 internal height to diameter ladle was installed with a pocket, calculated to hold the MgFeSi and cover
- ▶ Change from a 7% Mg, 1.5% Re alloy to Lamet® 5922, a 5.9% Mg, 0.5% La nodulariser
- ▶ The new ladle and alloy enabled the foundry to lower the MgFeSi addition rate from 1.5% to 1.2%.
- ▶ A Ca/Ba inoculant was previously being used both as a first stage and in-stream inoculant. This was changed to a 50% FeSi cover on the Lamet® followed by Ultraseed® Ce in-stream as the inoculant. The ladle inoculant was eliminated.

Results

- ▶ Shrinkage minimised to within accepted limits
- ▶ Improved nodularity
- ▶ Higher nodule count
- ▶ Higher Mg yield
- ▶ 150 MT/year reduction in MgFeSi alloy
- ▶ Less slag in the metal
- ▶ Less power used in melting by reducing the tapping temperature

A combination of Lamet® nodularisers and Ultraseed® family of inoculants has proved to be the optimum combination to minimise shrinkage issues in safety critical ductile iron castings.

If you would like to find out how Elkem can help, contact your regional Elkem representative on elkem.com/foundry