Why Is Magnesium Used In Steel? – Magnium Australia

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Why Is Magnesium Used In Steel?

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For a long time now, we've been using magnesium in car wheel alloys and engine parts, thanks to their lightness and strength. We've also extended our use of magnesium to car seats, gearbox housings and crankcases. Due to being so lightweight, every kilogram of magnesium used in motor vehicles is estimated to reduce carbon dioxide emissions by 50 kilograms over the motor vehicle's life.

For a long time, steel has been one of the crucial building blocks on which our society and infrastructure is based. It's the world's most important engineering and structural material, used in basically every aspect of our lives - from roads to refrigerators; cars to cargo ships; pipelines to planes.

And without magnesium, our steel wouldn't be half as useful as it is today. Magnesium is an essential component in creating steel and, here, we let the experts at Magnium Australia explain why.

Desulphurisation of steel

About 13% of the world's magnesium is used in the desulphurisation of steel. Magnesium is one of the main desulphurising agents, along with calcium, used in steel.

How it works

The most effective method of desulphurising steel is to inject molten steel with desulphurising agents (magnesium and calcium) in order to achieve deep desulphurisation. The magnesium can take form in either a cored wire which contains the agent, or a powder which is injected into the molten steel using a lance. When mixed in with the molten steel, magnesium effectively produces an ultra-low concentration of sulphur in steel, containing just 0.0002% sulphur.

Why does sulphur need to be removed from steel?

Sulphur has a range of negative impacts on the mechanical and structural properties of steel, hence why it needs to be removed to produce certain types of steel. In other types of steel, where more malleability is desired, sulphur is actually added back to it – a process known as resulphurising steel.

Negative impacts of sulphur on steel

Sulphur has a range of negative influences on the quality of steel. An undesirable impurity, amounts of more than 0.05% sulphur can cause:

Increased ductility Low ductility is ideal when creating less malleable steels, like high-strength steel plates and special bar quality steel products. A material that can bend and deform easily without fracturing is more ductile, while a brittle material is the opposite. Iron is naturally a ductile metal, which limits its usability for some projects. By using magnesium to remove sulphur from steel, the result is less ductility and greater tensile strength.

Decreased corrosion resistance As a corrosive substance, sulphur can decrease corrosion resistance in steel. That's why where corrosive-resistant steel is required, magnesium is used to desulphurise steel to an appropriate level.

Decreased toughness Sulphur in steel improves machinability but decreases its toughness, limiting its application in projects where tough steel is required.

Magnesium is, therefore, one of the keys to creating tough, low ductility steel. Magnium Australia understand the incredible role that magnesium has in Australia's future. That's why they're developing the world's first decarbonised magnesium metal plant. Magnium's breakthrough technology combines Australian feedstock with renewable energy to produce zero-carbon magnesium metal ingots of over 99.8% purity. Using carbothermic reduction to produce magnesium in a way that's sustainable and low-emission, Magnium are committed to solving the problem of climate change by decarbonising mineral processing.

Indigenous Engagement Strategy

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