

Electromagnetic Pumps Keep Auto Manufacturer's Casting Scrap Rate Under 4%

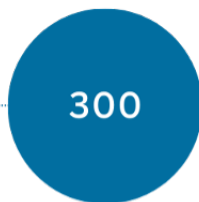
CMI Novacast's PG 450 electromagnetic pumps have played an integral role in a major automotive manufacturer's production lines for 30 years. The pumps excel at minimizing casting scrap – and help the manufacturer consistently achieve its yield targets.

For three decades, a well-known automotive manufacturer has exclusively used CMI Novacast's PG 450 electromagnetic (EM) pumps to cast one of their precision automotive parts. In that time, the PG 450 pumps have cast nearly **6 billion pounds** of metal for the manufacturer – which means there's a high likelihood you either drive, have driven, or have been a passenger in a car that contains a part cast by a CMI Novacast pump.

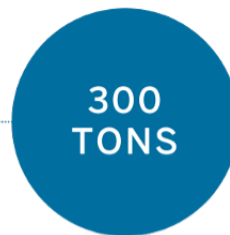
The secret behind the longstanding relationship is this: the pumps have played an integral role in keeping casting scrap rates in the low single digits. No other casting method would be able to produce such impressive results – or allow the manufacturer to achieve its overall scrap level target of under 4%.



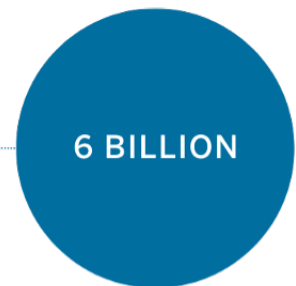
Years



Pouring days per year



Of metal poured daily



Pounds of metal poured

The Implementations

The manufacturer first approached CMI Novacast in the early 1990s, during a period of operational transition. They sought to lightweight one of their critical parts and craft it

with increased precision and decreased scrap – which meant moving away from iron and gravity pour casting.

To achieve their goals, they decided to use aluminum and adopt the rollover process, a proprietary casting method developed by Cosworth Engineering in England. The process, which was initially developed to cast engines for the automotive racing industry, produces highly precise parts – and relies on **electromagnetism** to move metal. Having previously installed a CMI Novacast **EM pump** in one facility for research purposes, the manufacturer knew CMI’s pumps would be up to the task.

It was quickly determined that the model PG 450, a “workhorse” pump developed in 1988, would be the best fit for the manufacturer’s needs. The pump, which uses electromagnetism to move molten metal – and no moving parts – is highly responsive, gives

users a high degree of control, and **improves the overall quality and finish of metal**. Parts cast with the pump are unparalleled in their precision – which is exactly what the manufacturer sought.

The first implementation was a success and the pumps’ performance exceeded expectations – when the parts passed through x-ray inspection, they were error-free, which meant scrap associated with casting was minimal. As new production lines for the part have been added, so, too, have PG 450 pumps. Today, the pumps are used in six production lines across several of the manufacturer’s North American factories. In total, CMI Novacast has completed 11 successful implementations with the manufacturer in four of its factories.

BY THE NUMBERS

11

Implementations

across

4

Factories

servicing

6

Production Lines

The Casting Process

The manufacturer’s primary objective when casting the precision part is to decrease scrap. Therefore, each step of the casting process they adopted was designed to reduce the potential for **turbulent flow**: metal either moves uphill or remains level and never falls. When molten metal drops from a height **greater than 12.7 mm**, the flow becomes turbulent – which means irregularities, including pockets of low pressure and entrained air, get trapped in the casting. These irregularities significantly increase scrap and decrease throughput – and cost manufacturers in both time and the steep cost of remelt.

At a high level, the precision parts are cast by:

- Melting aluminum ingots in stack melters
- Pumping the molten metal via **transfer pump** upward into a trough launder
- Traveling through the trough to a filter box
- Flowing into a reverberatory furnace, with a PG 450 pump inside
- Pumping metal into the casting

All the care taken to keep metal from dropping would be for naught if an EM pump wasn't ultimately used to cast the metal. Unlike other methods of casting – including hand ladling, automated ladling and robotic ladling – which drop metal from a height into a casting, the PG 450 pulls metal from deep within a furnace and pumps it directly into a mold. Because of this, turbulent flow is either greatly reduced or even nonexistent. And, because the metal is pulled from below the surface, no dross or oxides are included in the final casting.

As a result, the precision parts cast by the PG 450 pumps are composed of only the highest quality metal – and aren't vulnerable to the imperfections created by turbulent flow.

Because of this, nearly every part cast for the manufacturer passes an x-ray inspection, which helps to keep overall scrap rates in the low single digits.

The Results

The PG 450 pumps produce consistent results for the manufacturer across the six production lines. While precise numbers vary per day and per plant, the scrap associated with the pumps (discoverable during x-ray inspection) consistently remains under 1%. That impressively low number wouldn't be possible without the PG 450 – and the three-decade long relationship between the manufacturer and CMI Novacast is testament to that fact.



About CMI Novacast

Founded in 1981, CMI NOVACAST manufactures electromagnetic (EM) pumps with no moving parts that automate the movement of liquid metal in foundry casting and non-casting applications. Foundry casting applications include pumping aluminum, magnesium, zinc, and other alloys to improve the safety, productivity and retention of workers while also increasing metal quality and consistently reducing scrap rates to below 4% – this helps foundries eliminate hand ladling, maximize yield, and reduce production costs with options for gravity pouring and low-pressure side/bottom-filling. Non-casting applications include pumping liquid sodium that keep secondary cooling systems in nuclear power plants available on a 24/7 basis without needing maintenance – ever.