

## CGI – The next generation.

Graphyte is a company in the NovaCast Technologies Group. It specializes in advanced simulation and process-control systems for mass-producing Compacted Graphite Iron (CGI).

CGI is needed to make high-pressure engines – which the automotive industry will need to make millions of in order to cut fuel consumption and reduce the environmental load worldwide.

Graphyte's third-generation CGI process is available in two versions: Graphyte Batch®, a single-step ladle approach, and the acclaimed Graphyte Flow®, where the magnesium treatment takes place inside each mold.

*NovaCast Technologies Group benefits the global automotive industry and its subcontractors, mainly foundries and tool manufacturers, through faster and more accurate production processes. The subsidiary Camito uses a unique method of casting tools and dies in one solid piece, which reduces the lead time considerably compared with traditional methods. Other NovaCast companies provide software systems for methoding, simulation and process control, as well as systems for mass-producing automotive goods in CGI.*

# graphyte

a novacast technologies company

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# Great news for people who make diesel engines:

## CGI for the real world.

## CGI – Generation 1:



### Lab production.

Compacted Graphite Iron (CGI) is by no means new.

Already half a century ago, the technique of treating base iron with magnesium was essentially the same as for making ductile iron. The trick with CGI was to keep the magnesium level within a very narrow process “window”, usually less than  $\pm 0.003\%$ . Also, both a maximum and a minimum limit had to be considered.

Some metallurgical labs were able to do this from the 1950s and on. But making commercial quality CGI takes more than merely the right amount of magnesium in the melt. Oxides, sulphides and other compounds that can't be detected with a spectrometer are equally critical.

Lacking an accurate metallurgical process-control method, the lab production suffered high scrap levels and wide variations in quality.

## CGI – Generation 2:



### Test production.

In the early 1980s, the advent of computer-based systems for metallurgical simulation and process control brought CGI out of its lab confinement.

These systems made the CGI process predictable enough to allow commercial production (albeit in low volumes).

The prevailing method at the time involved a two-step ladle approach. After the initial Mg treatment, the thermal and oxygen status of the melt was analyzed. A second, corrective treatment was then made based on the results.

Such methods yielded considerable improvements in quality and consistency and are still in use. But because the process requires many time-consuming (and costly) procedural steps, it has not been suited for high-volume production.

## CGI – Generation 3:



### Mass production.

At last – some 50 years after its metallurgical birth – CGI is ready for the kind of mass production needed by today's automotive industry.

This means that a whole new incarnation of diesel engines can be made for cars and heavy vehicles. Engines that combine fuel-economy and environmental lenience in a way that legislators are already stipulating.

Such high-combustion, high-performance, high-pressure diesel engines are best cast in CGI.

And now they can finally be mass-produced, thanks to Graphyte Flow® – the third generation of CGI processes.

Graphyte Flow eliminates most of the limitations of earlier CGI processes. Because the casting involves only one step, it happens much more rapidly. And because the magnesium treatment takes place inside each mold, rather

**GRAPHYTE  
FLOW®**

than in an external ladle, the same base iron can be used for a variety of CGI specifications.

The result is a fast, predictable and highly automated process with less downtime in the molding line – exactly what the automotive industry needs. It uses considerably less alloy, less energy and less manpower – and it generates no smelly fumes (because the smelly alloy reactions are locked in).

Even the iron produced with Graphyte Flow is superior to earlier generations of CGI. It comes out slightly more elastic, which facilitates machining, with less wear and tear on machining tools.

Graphyte Flow is, quite possibly, the best news for CGI casting, engine manufacturing – and the environment – in well over 50 years.