

Recarburiizer for Cast Iron

Freiberg

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by
Dr. Sören Köster

Main Markets Served

- **Cast iron foundries**
 - Recarburiizer (Desulco, Xcarb, Super-G)
 - Graphitic Inoculant (Super-Carb)
- **Steel works**
 - Graphite Electrodes (ARK)
 - Recarburiizer (Desulco)
- **Friction industry**
 - Resilient Graphitic Carbon (RGC)
- **Oil drilling**

Cast Iron Types - Gray Iron

Carbon Content: 3,2 – 3,4 %

Properties:

- ↑ Thermal conductivity
- ↓ Mechanical strength (brittle)
- ↑ Machinability

Applications:

- Engine blocks/heads
- Brake discs
- Pump housings

Micrograph:

Three dimensional
graphite flakes



SUPERIOR  GRAPHITE

Cast Iron Types - Ductile Iron

Carbon Content: 3,4 – 3,8 %

Properties:

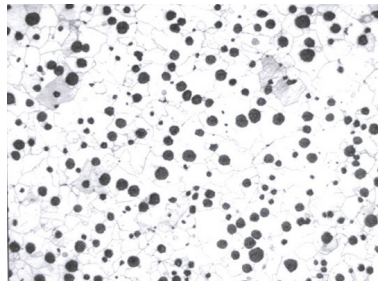
- ↓ Thermal conductivity
- ↑ Mechanical strength (tough)
- ↓ Machinability

Applications:

- Suspension parts
- Crank shafts
- Pipes

Micrograph:

Graphite nodules
enhancing ductility



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Cast Iron Types - Compacted Graphite Iron (CGI)

Carbon Content: 3,4 – 3,8 %

Properties:

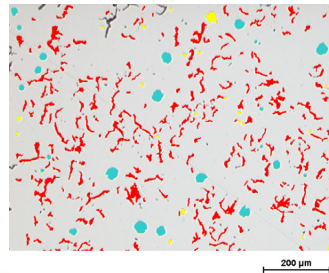
- o Thermal conductivity
- o Mechanical strength
- o Machinability

Applications:

- Diesel engine blocks
- Exhaust manifolds
- Turbo housings

Micrograph:

Vermicular graphite



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Recarburiizer in Iron Foundries

Applications in cast iron:

1. Addition to the Charge
2. Carbon trimming
3. Pre-conditioning
4. Inoculation



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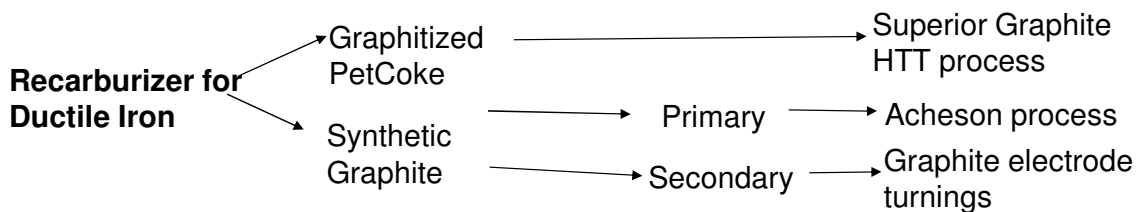
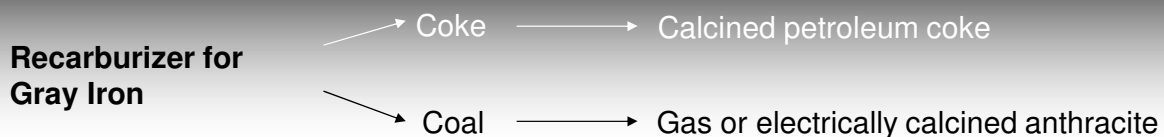
Application 1: Charge

- Recarburiizer is added prior to or during the melting of the cast iron charge materials (pig iron, steel scrap, returns)
- The type of carbon used depends on the cast iron type:
 - In gray iron ususally medium sulfur calcined petroleum cokes are used
 - In ductile and compacted graphite iron melts recarburiizers with low sulfur and nitrogen content are used



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Types of Recarburiizer

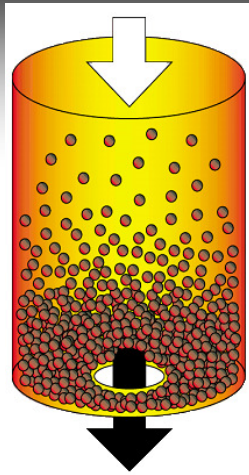


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Superior Graphite HTT Process

Characteristics:

- + Fluidized bed technology
- + Rapid continuous process
- + High temperature technology ($T > 2760^{\circ}\text{C}$)



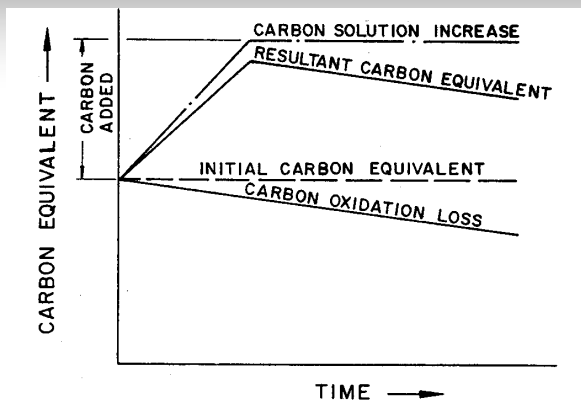
Achievements:

- = High carbon content ($>99.9\%$)
- = High purity and less impurities
- = Special morphology (porosity)
- = Partial crystalline structure
- = High product homogeneity and consistency
- = Reproducible process

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Dissolution Speed of Recarburizer

Advantages of a fast dissolving recarburizer used in the charge of cast iron melts:



- Better energy efficiency
- Higher process reproducibility
- Higher productivity
- Lower reject rate

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Application 2: Carbon trimming

- The recarburizer is added into the base melt at the end of the melting process to achieve the final target carbon content of the cast iron
- After the trim addition the melt needs to be shortly overheated to fully dissolve the recarburizer in the melt
- Products with a fine particle size distribution and a high dissolution speed are most preferred



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Application 3: Pre-conditioning

- The objective is to increase the state of nucleation in the base melt
- The recarburizer is added shortly prior to the furnace tapping including a short melt overheating to ease the dissolution
- Desulco, primary and secondary synthetic graphite is used for this application only, independent of the cast iron type because just these carbons have the potential to increase the nucleation of the iron melt

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Application 4: Inoculation

- Graphite/ carbon has been known as inoculant for cast iron for decades
- The degree of cristallinity determines the nucleation potential of a graphite
- Inoculants are usually added into the pouring stream
- The carbon needs to dissolve extremely fast in order to avoid non dissolved graphitic inclusions in the iron casting

