

Foundry Alloys



QS-9000 ISO 9001 ISO 14001

RESEED[®] INOCULANT



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RESEED[®] INOCULANT

- High potency inoculant for low sulphur grey irons and ductile irons
- Promotes good nodularity in thicker section ductile iron castings
- Effective on ductile irons produced from MgFeSi processes and pure Mg processes
- Helps to prevent graphite reversion to flake near to the mould surface in ductile irons.
- Helps to prevent micro-shrinkage in ductile cast irons

Reseed inoculant is a 75% ferrosilicon based alloy containing carefully controlled amounts of the active elements calcium and cerium. This potent combination can be used in most ductile irons promoting a good nodularity and high nodule number, particularly in thicker section castings. High nodule number, low chilling tendency and the promotion of a ferritic structure are the predominant features

of this inoculant. In grey irons of low to medium sulphur content, Reseed inoculant promotes the growth of 'A' type graphite, reduces chilling tendency and enhances the formation of a refined graphite morphology.

Reseed inoculant is produced by Elkem who recognised the need for a product which can be used as the sole inoculant in foundries making both

grey and ductile irons. By keeping the base sulphur content of the grey iron at the low end of the spectrum, this helps with the segregation of return metal.

It has been reported back to Elkem by foundries that Reseed inoculant can improve machine tool life for ferritic ductile and grey iron castings.

The Production of Reseed Inoculant

Reseed inoculant is made at the Bremanger plant of the Elkem Group in Norway.

Both this plant and its sister plant at Bjølvfossen, which produces MgFeSi alloys for the ductile iron foundry industry, are certified to ISO 9001, ISO 14001 and QS 9000, as is the Elkem plant in

Chicoutimi, Canada. This emphasis on quality and environment ensures that Reseed inoculant has a uniform chemistry, consistent grain size and performance. By using special production routes, the product is free from harmful trace elements and has a very low total oxide content. This is achieved by producing the alloy in a submerged

arc reduction furnace and applying thin casting techniques that ensures a rapid solidification and thus uniform distribution of the chemical phases throughout the product. Reseed inoculant is homogenous irrespective of the grain size supplied.

Reseed inoculant is produced to the following specifications;

Silicon:	70 - 76%
Calcium:	0.75 - 1.25%
Cerium:	1.5 - 2.0%
Aluminium:	0.75 - 1.25%

Advantages of Reseed Inoculant

1) Grey Cast Iron.

Sulphur contents in grey cast irons are generally becoming lower with more clean steel scrap being used in electrically melted charges. This is especially critical in certain areas of the world, particularly where pollution controls are most strict and where foundries do not want to resulphurise metal.

Elkem recognised that this low sulphur iron, which is notoriously difficult to inoculate, required the development of highly specialised products, hence the advent of Reseed inoculant. (Figure 1)

The combination of calcium and cerium provides a high number of nucleation sites and thus the precipitation of 'A' type graphite and the reduction of iron carbides. Traditionally, high inoculant addition rates have been used in low sulphur grey irons and it is now possible to generate a very satisfactory iron with conventional inoculation additions and practises. Reseed inoculant may be used both as a ladle addition and

Reseed inoculant is seen to go into solution quickly and cleanly. The fade rate of Reseed inoculant is slow compared to many conventional inoculants at this sulphur level thus allowing more flexibility in the casting process, whereas the tendency to remove chill (iron carbides) is high compared to much greater addition rates of other materials. As a late metal stream addition, Reseed inoculant is particularly effective at very low addition levels and, due to the cleanliness of the inoculant, does not generate inclusions within the mould cavity.

2) Ductile cast iron.

Most commercially available MgFeSi alloys contain a small percentage of rare earths which are included to neutralise the undesirable effects of some tramp elements from the melting charge. Of the rare earths, cerium in particular has a beneficial effect on nodularity and nodule count. Calcium is well known to be a powerful inoculant for ductile cast irons. Thus the combination of cerium and calcium

powerful basis for nucleation of graphite nodules.

It is well accepted in the industry that irons produced from pure magnesium processes are difficult to inoculate due to the formation of MgO as a nuclei which is very weak compared to the magnesium silicates generated during a conventional MgFeSi process. This leads to a high tendency towards chill or the use of excessive amounts of standard inoculant. Reseed inoculant has proven very effective in these difficult irons and provides an effective treatment at more conventional inoculant addition levels. Both in iron treated with pure Mg processes and with low RE containing MgFeSi alloys, Reseed inoculant will produce an exceptionally high nodule number and high proportions of ferrite in thinner section castings. In thicker sections, nodule numbers and nodule shapes will be improved compared to conventional inoculants. This leads to improved machinability and better mechanical properties. (Figure 2)

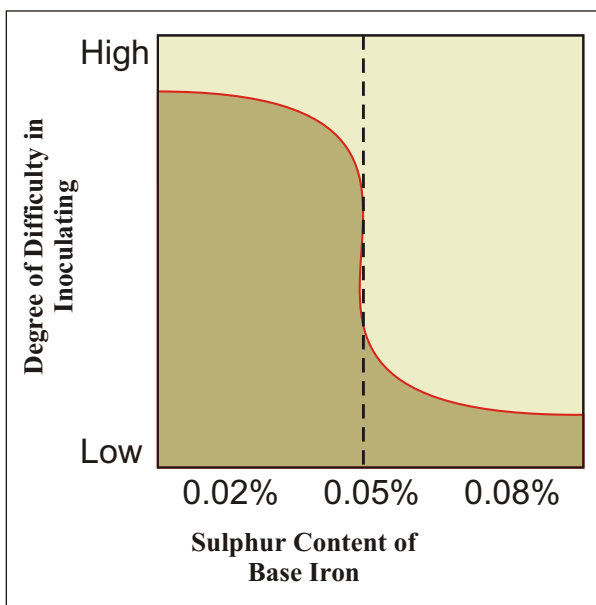


Figure 1: Low sulphur grey iron, is traditionally difficult to inoculate. Reseed inoculant can be used successfully in this area.

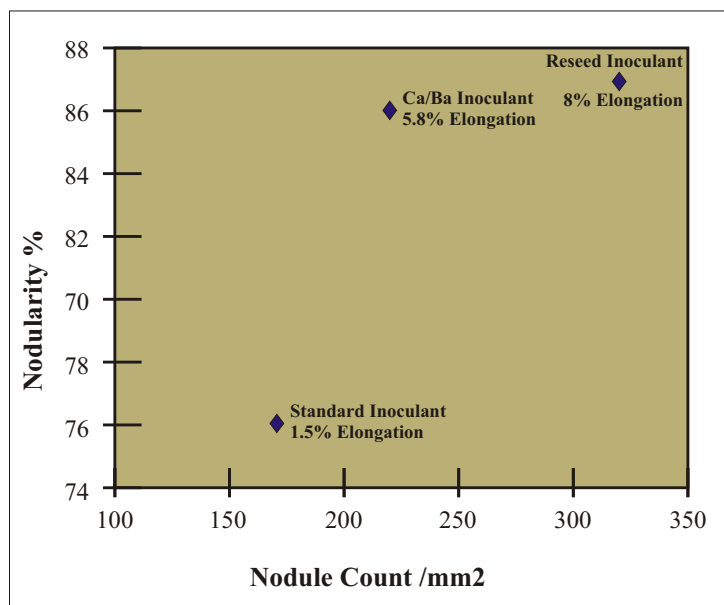


Figure 2: Showing increases in nodule count and elongation with Reseed inoculant compared to the foundry's previous material and a Ca/Ba inoculant.

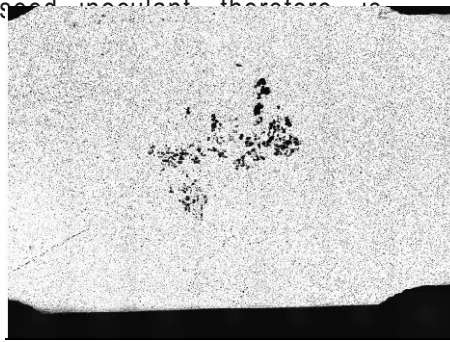
Reseed inoculant will often show a high number of small graphite nodules in the microstructure in conjunction with a smaller number of larger nodules. It is believed that small nodules are precipitated during the last stages of solidification

calcium/cerium system continues to create the particulates suitable for graphite nucleation. This late stage precipitation of graphite provides a positive volume increase as the risers and feeders lose their effectiveness.

particularly effective in minimizing shrinkage, particularly in the last-to-freeze areas of the casting. (Figure 3)



(A)



(B)

Figure 3. Shrinkage tendencies of Reseed (left) and a Ba/Ca inoculant (right) in a shrinkage prone area of a critical casting.

Reversion of sulphur from moulding systems can sometimes lead to the generation of a layer of flake graphite on the surface of some ductile iron castings. The use of Reseed inoculant will help to prevent this by tying up any liberated sulphur. (Figure 4)

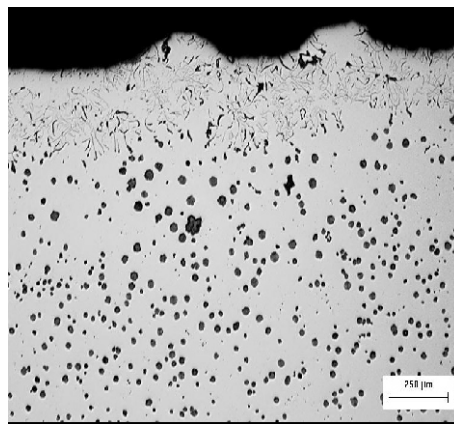


Figure 4. Reversion to flake graphite on the surface of a casting made in greensand. This is caused by a build up of sulphur in the moulding medium. Reseed inoculant helps to prevent this.

Examples of Case Studies with Reseed inoculant.

The following has been reported by foundries using Reseed inoculant;

- 1) Foundry A uses Reseed inoculant as a ladle addition following a MgFeSi treatment. They have reported improved nodule count, eliminated chill and increased ferrite contents. Their machine shop claims a 30% increase in tool life on high speed machining.
- 2) Foundry B changed to Reseed inoculant as an in-stream addition from an in-mould tablet. They make small thin section components. As a result of the change they have eliminated their heat treatment processes which was used to treat carbides on a locating lug.
- 3) Foundry C changed to Reseed inoculant from a calcium/barium system on grey iron automotive components. Their machine shop reports increases possible in machining speed and improved tool life.



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