



MINIMIZE CASTINGS DEFECTS WITH AN EFFECTIVE AND PROVEN TECHNIQUE

C. Natarajan

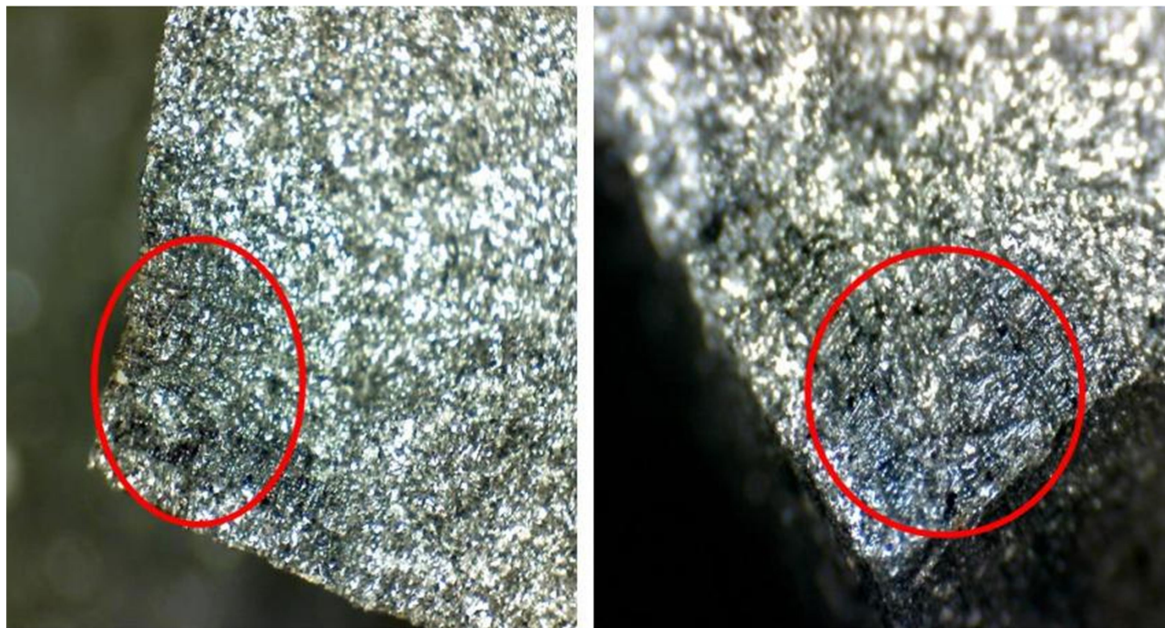
Managing Director, NC Innovations Pvt Ltd, Bengaluru
cn@metgroup.co.in | 98864.94441

In recent times, many Indian foundries, manufacturing Gray and Ductile iron castings, face problems in meeting the quality requirements of end users(domestic and international) such as:

1. **pressure leakages/ porosity**
2. **poor machinability**
3. **metallic slag inclusions**
5. **Chilling & carbide issue**
5. **Un-desired micro structures and graphite distribution.**

To address the above problems, foundries have adopted many controls, Q/A systems, advanced raw materials, improved processes and methods. However even after implementations of such systems, there still seem to be a **% of rejections which could NOT be controlled**

Case#1. Solutions provided to leading Engine block and engine components producing foundries across India, facing issues with leakages, inclusions in bore and machinability related rejections



Micro shrinkage defects observed before

NO micro Shrinkage after MI Metallurgy+ addition

0.2% to the weight of the metal is the recommended addition. When the metal is prepared and ready, the initial slag is removed and MI Metallurgy+ is added into the furnace 5 -10 mins. before tapping. In the above cases, metal treated with MI Metallurgy+ has resolved

leakages and bore inclusions. This is because, MI Metallurgy+ when comes in contact with liquid metal, the elements "C" and "Si" are in highly reactive state.

These reactive elements, refines the liquid metal by reducing the metallic oxides present in the

liquid metal thereby eliminating the slag defects. Further MI Metallurgy+ alters/modifies the solidification pattern during cooling in the mould and narrows the secondary arm spacing of austenitic dendrite tree; thus, leading to solid sound castings free from micro porosity and pressure leakages

Feedback from our customers – Engine Block manufacturer’s

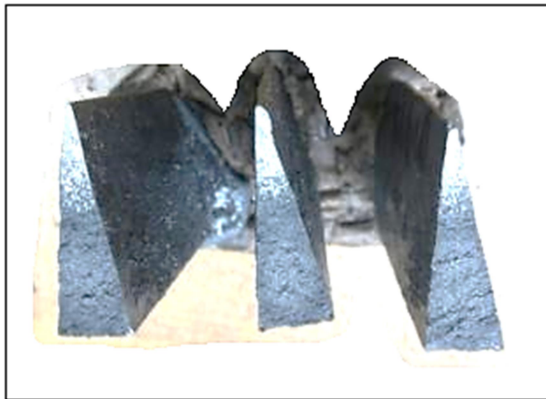
“Improvements noticed in

1. *Machinability Improvements*
2. *Reduced Porosity*
3. *Improved Type “A” Graphite Flake Distribution*
4. *Minimize Carbides*
5. *Improve overall Quality of Castings”*

“Most of the customer are satisfied in machinability, no chilling issue and their tool life also increased by 30%”

“Noticed: Graphite distribution >95% A-type, D& E type graphite are in traces, Flake length 3-6, Very fine graphite flake are formed. The matrix is full of Pearlitic. Carbides & ferrite are absent. Hardness : 192–197 BHN”

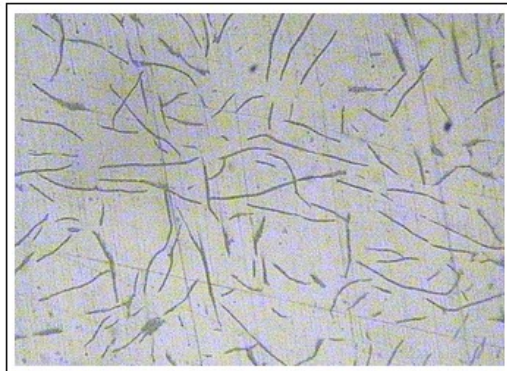
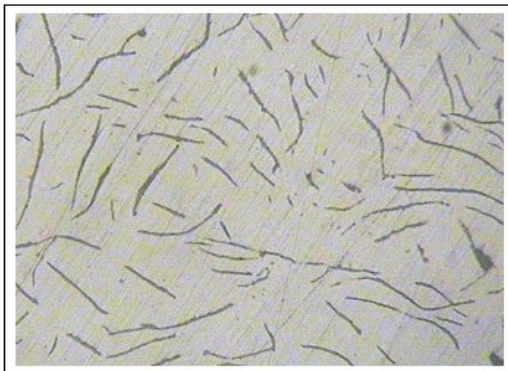
Case #2. Majority of piston ring manufacturers across India, were facing free carbides, poor graphite flake distribution low nodule count and nodularity.



BEFORE



**AFTER MI Metallurgy+ ADDITION
Found Chill reduction**



Micro structure after usage of MI Metallurgy, Observed reduction in flake size

MI Metallurgy+ addition at final stages of melting establishes more number of ‘C’ crystals and helps the formation of desired microstructure and graphite flake distribution/nodule count in gray/ductile iron respectively free from carbides. In this case, of thin walled castings (piston ring), we were able to attain carbide free

casting in As-Cast condition only!

Feedback from customers – Piston ring manufacturer’s

“It helps in improving nucleation and helps in promoting directional solidification”

“We have noticed improvements in:

1. *Increased Nodularity and Nodule Count*
2. *Minimize Carbides–good chill reduction”*

“Improves nucleation and hence reduces inoculant addition%”

Case# 3. Mid-size foundries producing around 500 to 2000 MT/month of auto components, Pump and motor components, machine tool castings face common problems with section sensitivity (hardness variation),poor machinability, carbides issue in impeller areas

Feedback from our customers - producing pump castings

"I strongly recommend this product. I have using it for the last 1 year and am delighted to tell that it has lowered my rejection by as much as 3 % overall. It is a boon in disguise to the foundry (ferrous) I wish Mr Natarajan all the best"

Case # 4. Heavy casting manufactures such as rollers and windmill castings with casting weight upwards of 3MT, faced issues with micro-structures, and machinability (hotspots)

In heavy castings, where there is an issue of poor nodularity and nodule count due to slow rate of cooling, with use of MI Metallurgy+ we were able to achieve better nodularity and higher nodule count because MI Metallurgy+ creates more number of 'C' crystals and helps the formation of desired microstructure. Further prevents loss of 'Mg' during 'Mg' treatment in ductile iron production, thus, assures consistent quality castings with improved nodularity and increased nodule count

MI Metallurgy+ has consistently performed, has helped foundries bring down their overall rejections, improve their vendor rating!