WHAT TO CONSIDER WHEN TREATING NODULAR CASTING WITH CORED WIRE

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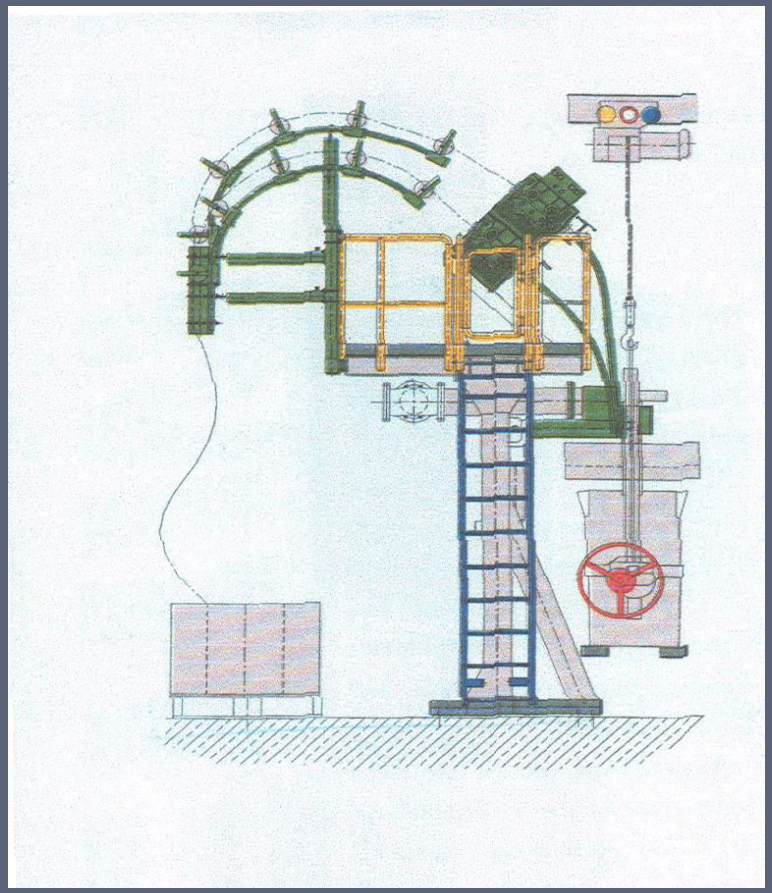
The cored wire process offers the following advantages:

- -production of nodular iron from cupola in one single stage
- - Less slag/dross formation (less cleaning and longer ladle refractory life)
- - Easy to automate and to keep track of data, better reproducibility (less human interventions)
- - Process capability better than that of other processes (means lower Mg concentration required)
- - Possible to Mg-treat and inoculate simultaneously (same wire, two wires or two injectors) for heavy section castings.

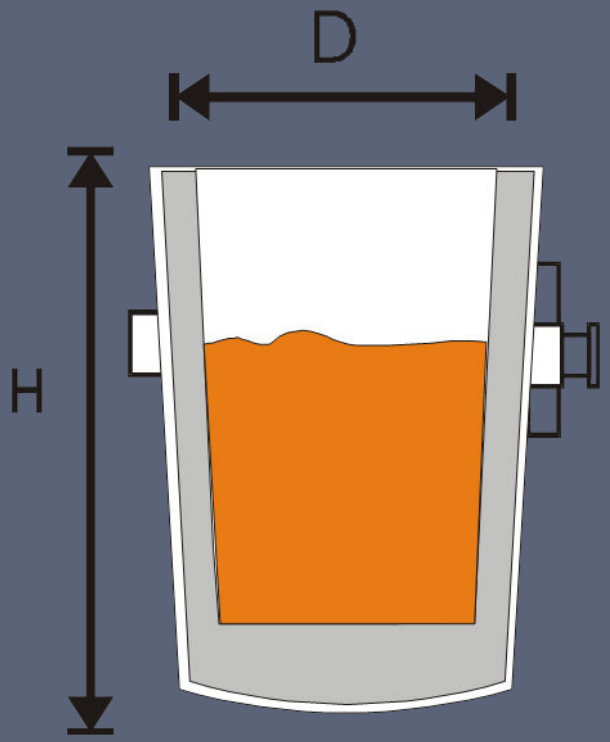
Mg treatment stations



- Motor power 2-3kw
- Two enines
- Pneumatic cilinder
- Tube diameter 5/4“
- Radius R = 1,5m min.
- 2 tube, nodulation, and inoculation
- Not to strog traction on wire
- Pot cover prevent injection material from the pot

Treatment stations for Trials

Ladle geometry



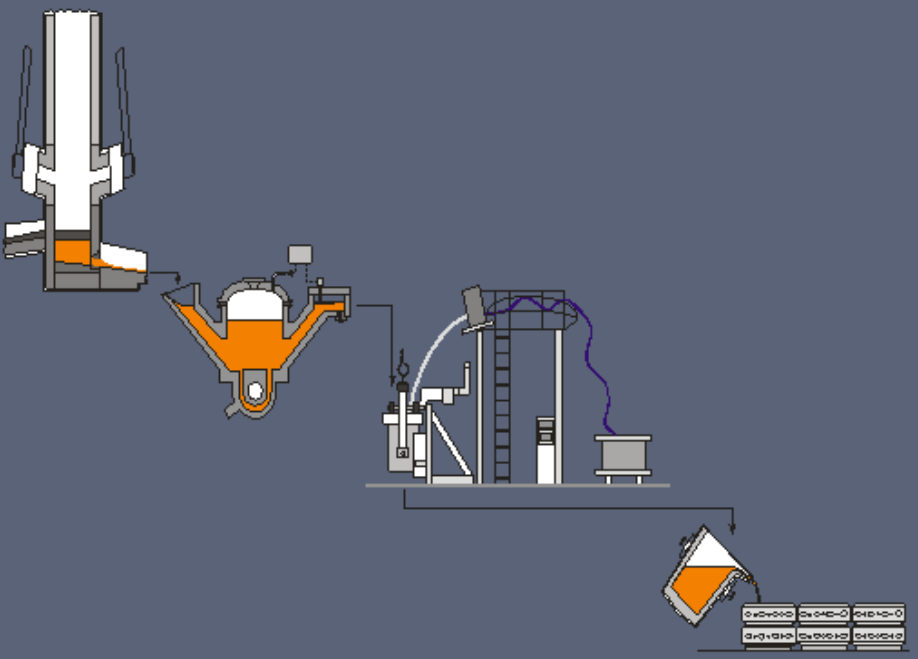
- H/D = min.2/1
- Height of material should be min. 700mm
- Pot should be filled to 2/3 volume

Selecting the diameter of cored wire

Metal quantity	Wire diameter (mm)
300 to 500kg	9 mm
500 to 1000 kg	9 or 13mm
1000 to 3000 kg	13 mm
Over 3000 kg	16 mm

- Steel thickness
  - 0,25mm
  - 0,35mm
  - 0,4mm
  - 0,5mm

Setting the type of the powder , S is high



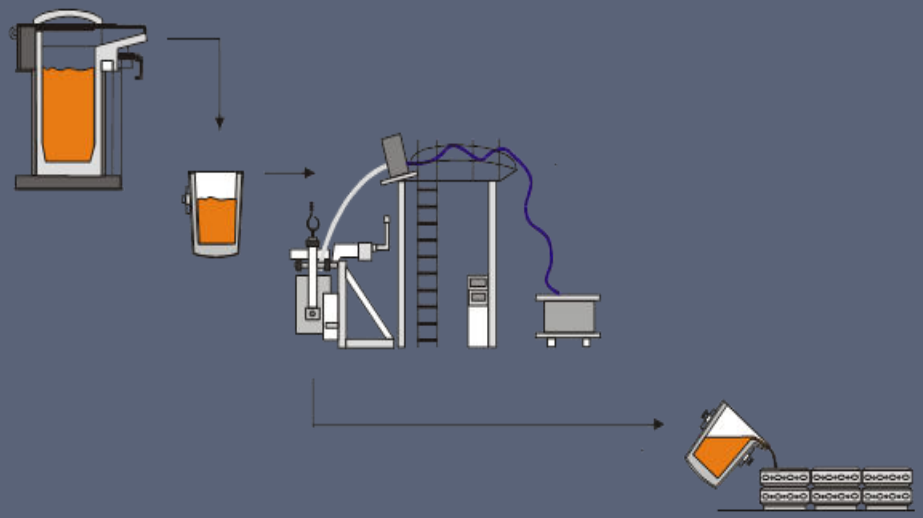
(S= 0,06%, 02=200 ppm.)

- Cupola furnace
- Cored wire should
  - dezoxidize
  - degas
  - desulphurize
  - Mg rest. Min.0,025-0,04%

Filler Types:

- FeSiMg (Ca)
- Mg mix.
- combinations

Setting the type of the powder , S is low

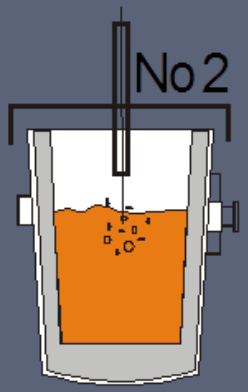


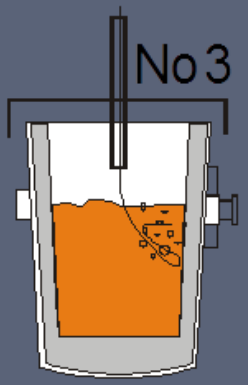
- Sulpur content is low
  (S=0,015%, 02=under 80ppm)
- Induction furnace
- Mg rest. Min.0,025-0,04%

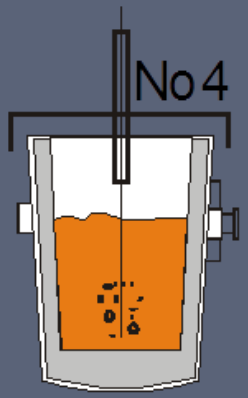
Filler Types:

- FeSiMg (Ca)
- Mg mix.
- combinations

Selecting the parameters – speed (m/min)







- No 1 – low metal temperature and too high speed of supplying.
- No 2 – high metal temperature and too low speed of supplying.
- No 3 – incorrect introduction of wire
- No 4 – optimum speed

Setting the wire quantity (m)

Wire quantity in (m) can be calculated according to *the equation* **

$$\mathbf{m = Fe * (T/1450)^2 * \{0,76*(S_{in} - S_{fin}) + Mg_{rest} + Mg_{fad}\} / (Mg_{rec} * Mg_{cw})}$$

m = Calculated wire quantity in (m /treatment)

Fe = Liquid iron (melt) quantity (kg)

T = Temperature in (°C)

S_{ini} = Initial sulphur content of basic metal in (%)

S_{fin} = Final Sulphur content in cast iron in (%)

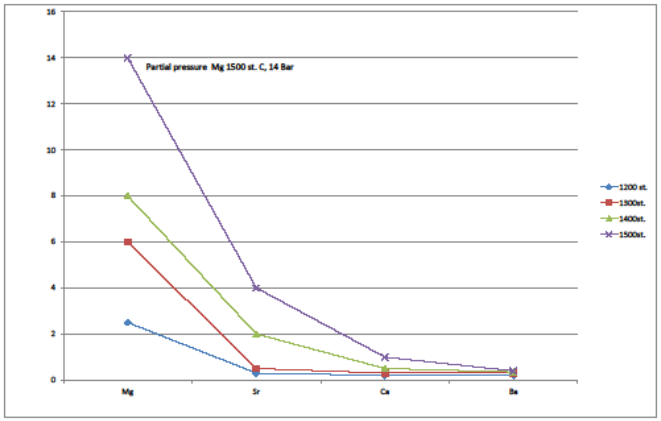
Mg_{rest} = Magnesium residual in castings in (%)

Mg_{fad} = Magnesium lost from treatment to pouring (%)

Mg_{rec} = Magnesium recovery (%)

Mg_{cw} = Magnesium quantity in cored wire (g/m)

Mg add. Not more than 20-25 gMg/sek



Setting the parameters in the mashine

- Wire data (g Mg /m)
- Metal quantity (kg)
- Initial sulphur (%)
- Final sulphur(%)
- Temperatur (St. C)
- Mg recovery (%)
- Mg residual (%)
- Wire speed (m/min)

Evaluation of the success of a treatment

Mg rec.(%)=Mg rest./Mg add. *100

Foundry	Wire Type	M. tretment (kg)	S_{ini} (%)	T (st.C)	Kg Mg/t	Mg.rest. (%)	Mg-Yield (%)	$ / 1000kg
P.A.M (FRANCE)	W Mg 9mm **	5000	0,009	1480	0,8	0,035	44	9
ORTRAND (GERMANY)	W Mg 1430 13mm	1500	0,012	1480	1,38	0,048	35	12
MAN (GERMANY)	WLS 3325 13mm	700	0,017	1480	1,4	0,055	40	13
SIEMENS-SACSENGUSS	WLS 0325 13mm	2000-6000	0,013	1480	1,25	0,050	40	16
Fond Stamp (ITALY)	WHS 1525 13mm***	12000	0,080	1380	2,1	0,056	33	19

** Injection of 2 wires at once
*** Injection of 3 wires at once
From the above table it is evident that it is possible to achieve with cored wire suitable lower treatment costs, if we were successful in finding the right system and selecting the right type of the wire for conditions in the foundry