THE INSTITUTE OF INDIAN FOUNDRYMEN

WESTERN REGION

FOUNDRY TALKS

Foundry E-Magazine

For The Foundrymen By The Foundrymen

Edition : November 2022
By : IIF - Western Region

INNOVATE TO ELEVATE

IIF-WESTERN REGION 2022-23

Innovation Article By

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MESSAGE FROM CHAIRPERSON

Go Global

Anuja Sharma
Chairperson, IIF-Western Region
Dir.-Mrkt.-Shamlax MetaChem Pvt. Ltd.

The Go Global project is an initiative taken by IIF western Region wherein webinars are organized by foreign speakers. The purpose of this project is to share knowledge and ideas from and around the globe.

In November Mr. Mike Swartzlander USA shared his views on Success factor for exporting castings to North America. He emphasized on following points.

1. Understand American market by attending various official events.
2. Be ready to invest 20% of your sales target.
3. Competition is high as many Indian companies are exporting to America so being cost effective along with quality is very much needed.

It was a very successful seminar attended by 120 participants also Mr. Mike received many mails related to export enquiries.

India is the second largest producer of casting in the world and its time to go Global and left the world feel the trumpet of Indian Foundries in every corner of the globe.

LETTER TO EDITOR

Greetings!,

I just had a review of the WR E magazine Oct 2022. Foundry Talk

This edition is dedicated to Wescon 22 & innovation related articles mainly on Industry 4.0 suitable to Foundry Industry.

All the topics covered under innovative articles are very much needed to those Foundries who are keen to embrace the change & adopt digitalization where ever possible.

A small correction (refer page 6) digitization repeated twice – I feel it should have been Digitisation, Digitalisation & Digital Transformation.

Thanks for bringing out a very useful magazine.

Thanks & Regards,

From
Mr. D. S. Chandrashekar
Vice Chairman, IIF

MESSAGE FROM THE EDITOR

Anant Bam
Editor Foundry Talk
Foundry Consultant
& Energy Auditor

Dear Readers,

It gives me great pleasure in handing over this fifth issue of "Foundry Talks". Within very short time, our e-magazine has sustained and gained popularity. Under able leadership of Chairperson Anujaji; our Hon. Secretary Prayut is taking great efforts in organizing events, coordinating region's activities and he is the key person in this e-magazine as well. I owe a big thanks to him.

This issue of Foundry Talks is dedicated to "Methoding" or what we call as Gating and Riser designing.

To get a sound casting, proper designing of gating and feeding system is very necessary. Recognised senior foundrymen Mr. Arvind Deshpande from Kolhapur and Mr. Bharat Vyas from Vadodara have put their heart and soul in their articles. These articles are really "Collector's Items' and will prove to be Gems of Foundry talks.

Awaiting your feedback,

With best regards,

We truly welcome your feedback or suggestions for WR E-magazine. Please feel free to write to us at **wr@indianfoundry.org** with subject "Letter to Editor".

FOUNDRY TIPS

Basics of Methoding – Gating Design & Risering

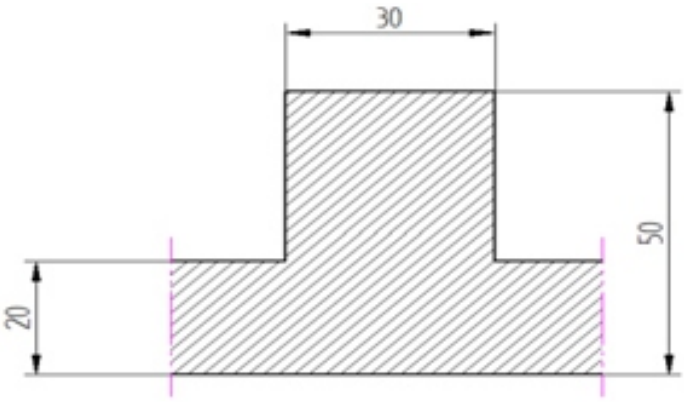
By Mr. A M Deshpande

Methoding for Ductile Iron

1) Design of Gating system should be Non-Pressurized, it is to be Done considering similar job history in our Foundry. Proper Metal Distribution Is must to avoid Pinholes & to get hot metal for sleeves & risers. It is now preferred to be decided with the help of simulation report
2) Modulus of thick section to be calculated by using casting model. And sleeve selection to be done by using standard sleeve charts. (For Eg. Foseco)
3) Use of ceramic foam filter in vertical position is more effective & filtration capacity table must be used for selecting size of filter.
4) Classification of sleeves are based on its MEF values and while selecting sleeves these MEF values should be considered:

   a) Insulating Sleeves - MEF of 1.4 TO 1.5
   b) Exothermic Sleeves – MEF of 1.5 to 1.7
   c) High Density Sleeves – MEF of about 2.5

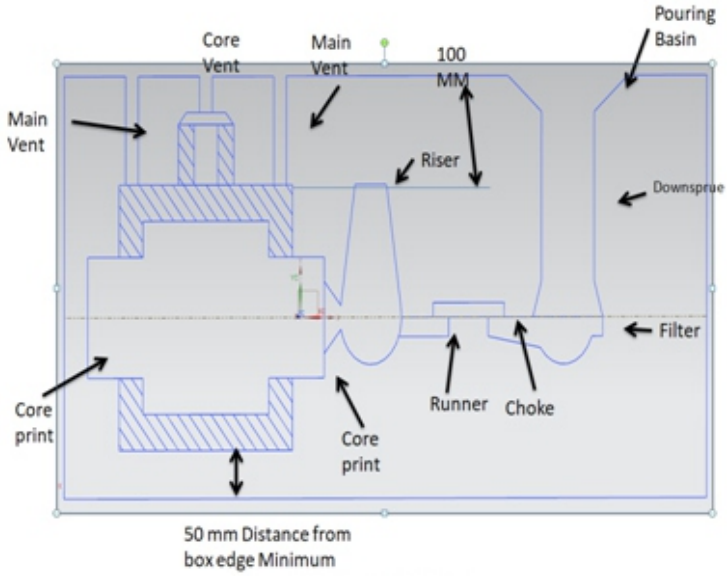
5) Riser neck are one of the trickiest sections to design for iron casting. Solidification of the riser neck depend on various factors. Distance of the riser casting should be 20 mm ideally. Generally, a factor of 0.6 to 0.4 work well to begin with judgement based on experience
6) Modulus of Sleeve must be more about 25-30% than that of Casting Modulus in case of Ductile Iron.



Modulus = Section Area/ Perimeter
Modulus = a x b/2(a + b)- c)
= 30 x50 /2((30 +50)-20)
= 12.5 mm is Modulus

Methodingfor Cast Iron

1) Design of Gating system should be Pressurized, to be done again considering similar job history in our Foundry.
2) Choke area, Pouring time to be decided as per A. F. S Handbook.
3) No. Of ingates, Riser Diameter, Riser Height, Neck, Use of Sleeves these are preferable to be decided with the help of Simulation.
4) Mold vents, sizes are selected based on the suitability to geometry of casting. But pad below flow off is must. Area of vents should be double the choke area for heavily cored castings e. g. Cylinder blocks, heads.
5) Chaplet pads to be kept integral to pattern & core box.
6) Core venting &Sealing of vents to avoid metal entry is must.
7) Mould gas flow off to be kept away 3" From pouring basin diameter to avoid metal entry while pouring from flow off.



With respect to Dimensional Consideration

1) Length, Width, Height including print sizes must be carefully examined.
2) General wall and tolerance suitable to the molding practice need to be selected.
3) Need to study & look for chunkey or thick section for feeding. Preferably it is to be taken in Drag box.
4) Height of Cope box to get 3" to 4" Pouring head above highest point of casting to avoid rejection of Blow holes, Cold shut.
5) Height of drag box to be decided considering weight of casting & Sand cores 70/100/125mm below lowest point of casting.
6) Print should be design such that it should be suitable for core weight, height of core, balancing of core weight.
7) Dimensional consideration needs to be taken while selection of core manufacturing Process too.
8) Study the sample casting for following points: Machining references, Dimension Plus - minus than Drawing or model kept purposely to avoid assembly fouling, to get minimum wall around bosses.
9) Hold, rest, locate points study to be done. Parting line, flow off location Core shooting, to kept considering above.
10) Machining references preferably in Drag box to avoid Dimension Issues to be considered.
11) P. D. I. report Dimension to be checked &must decided mutually.

Mahesh Date

Raw Material Price Index

Movement In Foundry Raw Material Prices

As per IIF data, there are nearly 7,000 foundries across India. The Indian foundry industry is ranked second globally with a production of 10 million tons per annum. It is catering to the automotive, tractor, power train, railways, energy and engineering sectors in domestic as well as overseas markets - Directly and indirectly.

There was sudden spike observed in April 2022 and continued due to various reasons. Prices got declined-stabilized thereafter but these fluctuations led us to establish the common reference point where we can study the actual raw material prices variations.

Now prices ruling in Kolhapur during second week of November 2022 are given in column 14 in the Table below. Also, given in table are the prices since June 2022. These prices are collected from Kolhapur market. These are approximate, ruling during the month and week as indicated in the table.

In the prices indicated below, transportation cost is included in most items. Only applicable GST is to be added. Prices of many materials are on the basis of "Immediate Payment"

Movement Of Prices of Raw Materials over a Period of 6 Months

(A) Major Ferrous Metallic Raw Materials, Low Ash Metallurgical Coke, and Electro-Graphite Fines {Rs / Tonne}														
	Jun-22	Jun'22	July'22	July'22	Aug'22	Aug'22	Sep'22	Sep'22	Oct'22	Oct'22	Oct'22	Oct'22	Nov'22	Nov'22
	1st Week	3rd Week	2nd Week	4th Week	2nd Week	2nd Week	2nd Week	4th Week	1st Week	2nd Week	3rd Week	4th Week	1st Week	2nd Week
Foundry Grade Piglron	61000	61000	60000	58850	57850	57850	57350	56850	56850	55850	54666	54666	54666	53666
MS Scrap (good quality)	49000	49000	53000	53000	53000	52000	51000	50500	50500	50500	50000	49000	47500	45500
Low Mn Steel Scrap	52000	52000	56000	56000	55000	55000	55000	55000	53000	53000	52500	52000	51500	50000
Si Steel Stamping Scrap	52000	52000	56000	56000	55000	52800	52800	52300	52000	52000	51500	51000	51000	49500
Low Ash Met. Coke	62500	62500	61000	60000	60000	59250	58500	57500	57000	56500	55000	53500	52500	51000
Electro-Graphite Fines	110000	110000	110000	110000	105000	105000	102000	102000	102000	102000	101000	101000	101000	100000
(B) Major Ferro-Alloys {Rs./Kg}														
Fe-Si (70-75% Si)	210	210	200	215	152	152	152	152	150	150	145	145	142	142
Fe-Si-Mg (5-7%< Mg)	155±5	155	165	280	250±5	230±5	230±5	230±5	230±5	230±5	210±5	205±5	205±5	205±5
Fe-Si-Mg (8-10% Mg)	160±5	160±5	170±5	286±5	265±5	240±5	240±5	240±5	240±5	240±5	230±5	220±5	210±5	210±5
High C Fe-Cr (60% Cr)	102	102	110	140	130	130	130	130	120	120	115	115	110	100
High C Fe-Mn (60% Mn)	128	128	110	130	125	110	99	99	95	95	92	92	90	90
Ferro-Moly (60% Mo)	2095	2095	2000	2150	2150	2160	2160	2450	2400	2400	2200	2200	2200	2350

1. Above Prices are Excluding Taxes, GST Extra as Applicable
2. Phenol Price: Rs. 130/Kg during 2nd week of November 2022

(Info collected during November 2022, Reader are requested to check the market prices)

Disclaimer: Rates represented here are as per the data collected from the reliable sources based in Kolhapur and it may vary based on the supplier, location, payment terms & other conditions.

Innovation Article

By Dipl.-Ing. Georg Grassl and Dipl.-Ing. Markus Effmert
M/s. GARGI HUTTENES-ALBERTUS PRIVATE LIMITED.

Surviving in international competition with optimized feeder technology

Due to geopolitical conflicts and ever scarcer resources, foundries worldwide are coming under increasing cost pressure. In addition, more and more technically sophisticated castings are being demanded, so that the existing feeder and gating systems are being called into question and new feeder concepts are required.

Previous feeder systems

As we all know, a metal expands during heating and liquefaction and, conversely, contracts again during solidification and cooling. When cooling down from the liquid temperature range to room temperature, 3 phases Fig. 1 are passed through. We can influence two of these phases, liquid and solidification shrinkage, by using of feeders and risers, whereas solidification shrinkage, as the third phase, must be taken into account by pattern off-set.

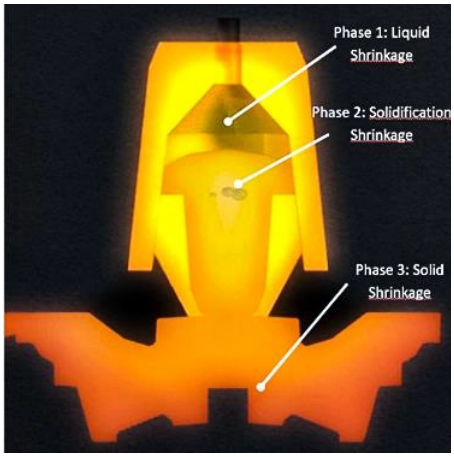


Fig. 1: 3 Phases of shrinkage

Since it was often not possible to mould the exothermic or insulating blind sleeves with the first generation of automatic moulding lines, the parallel conical blind sleeves had to be placed into the mould in a further step. The demands on the blind sleeves, also called insert sleeves, in terms of stability and strength were low as long as they remained in position during the following process steps. The challenge for riser manufacturers was simply to produce dimensionally accurate blind sleeves, e.g. from slurry or water glass bonded material, so that they could be inserted into the mould easily and with an accurate fit. Then as now, insert blind sleeves with a breaker core are used in many cases. The breaker core, which should have the smallest possible feeder neck diameter, can thus contribute to the reduction of cutting and fettling costs. Nevertheless, there is a correspondingly large space requirement for this type of feeder.

Fig. 2: Insert sleeve and compact feeder

With the further development of automatic moulding lines, it is now also possible to place blind feeders on the pattern plate before the actual moulding process. Since this also made it possible to use different feeder geometries, it was also the starting point of the compact feeder. If a certain amount of liquid metal was needed for a certain module in the parallel conical insert blind sleeves, this amount can be now reduced by using compact feeders. Since the breaker core diameter can also be smaller, the fettling effort can also be reduced. Unfortunately, this effect is put into perspective by the common feeder materials: most of today's feeder materials contain a not insignificant amount of fluorine, which can cause surface defects or graphite degeneration under the feeders. Many foundries have applied up to 4 mm of grinding allowance in these areas, which subsequently had to be removed laboriously and expensively. As modern moulding plants generate ever higher pressures, problems with destroyed breaker cores and blind sleeves are being observed more and more frequently in foundries. To solve this problem, Chemex Foundry Solutions has developed a flexible feeder system that consists of at least two components and enables foundries to run their moulding lines at the highest possible pressure without the problem of broken blind sleeves and breaker cores. In addition, foundries are given more freedom to implement more complex castings.

The Tele-Feeder

As already mentioned, the Tele-Feeder developed by Chemex is a flexible feeder system. The standard version consists of an exothermic or insulating upper part and an exothermic lower part.

During the sand compaction process Fig. 3, the upper part moves like a closing telescope downwards and covers the bottom part, so that the latter is almost without pressure, even at high compaction pressures. During the downward movement of the upper part, the sand underneath the Tele-Feeder is additionally compacted and achieves a higher mould strength in this area. In addition, the maintenance-free center pin pierces the upper part so that any gases that arise can better escape from the feeder cavity and manual venting is no longer necessary.

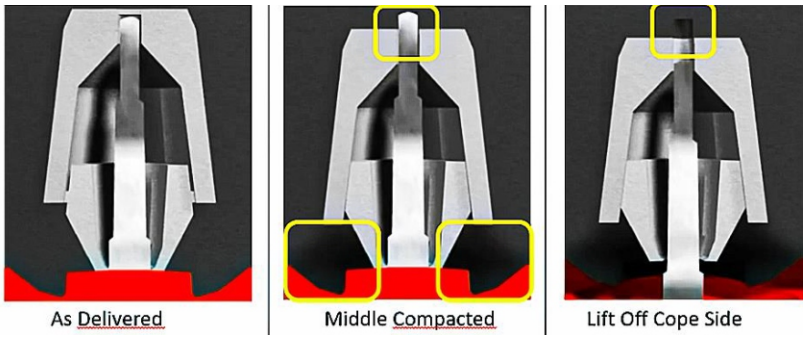


Fig. 3: Scheme Mould Compaction with Tele Feeder

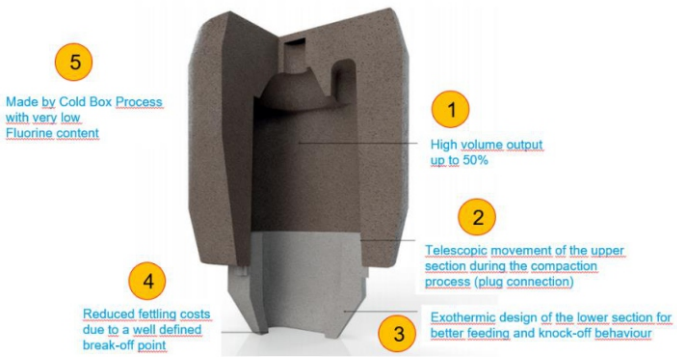


Fig 4: Cut through an oval Tele-Feeder

Due to the Cold-Box bound exothermic lower part, in combination with the corresponding upper part, a volume release of up to 50 % can be achieved. In addition, the bottom part made of "fluorine-free" exothermic feeder material is characterized by a well-defined breaking edge and a small footprint. All these features result in easy separation of the remaining feeders from the castings and low grinding effort. Fig. 4

Summary

The use of fluorine-free Cold-Box bonded feeder types can save costs. To reduce liquid metal, exothermic insert sleeves and compact feeders, especially in combination with crushing cores, are a good alternative to natural feeders. Due to a very small contact area and a well-defined breaking edge, Tele-feeders from Chemex can significantly reduce fettling costs. Similarly, the use of a customized Tele-Feeder concept opens up the possibility for foundries to produce more complex casting geometries with increased yield.

All this can reduce operating costs and thus lead to a competitive advantage.

SPECIAL INSIGHTS

Gateway to Gating System for Sand Casting.

By: Bharat Vyas, Proprietor M/s. Noudle Cast

Gating system or designing is very important part in methoding of casting. Most of casting defects (about 90%) may be attributed to gating system is formulating (Analyzing) Cause-Effect analysis (Diagram) Main scientific principles involved are :

i) Free Fall (under gravity) mechanic motion equation,
ii) Continuity Theorem,
iii) Bernoulli'sTheorem ,
iv) Turbulence-Lamellar liquid flow-Reynold'snumber ,
v) Cheverinov's equation (for time of solidification) Thermal/ Thermodynamic science including solidification time, volumetric shrinkages during hot liquid metal to solidifying liquid.
vi) Freezing mechanism of given material composition, crystal growth morphology etc.,
vii) External factors : mold type, permeability etc.

All of above can well be studied from following references:
i) Publications of 'The Gating & Risering committee of the AFS.
ii) Wldower's 'Directional solidification of Steel Castings + many other Books.

Gating System: Comprises of important parts each having its importance, starting with: Pouring basin (cup), Downward Sprue, Sprue base, Runners, Ingates, Flow offs, Feeders, Risers, Chills & Few others.

Pouring Basin (cup) : Provided on the top of down sprue to minimize splash & Turbulence & Promotes the entry of clean metal. It may contain SKIM Core, or Strainer or delay Screen/Plug. In case of large casting, Splash core/ceramic plate/ five brick pieces can be placed at the bottom of basin to prevent erosion of sand while pouring liquid metal at a speed & Weight. These can be placed wherever following metal impinges.

Downward Sprue: These are generally in round cross section with preferably parabolic or tapered shape.Parabolic shape is as observed white liquid takes when pouring through a lip of a containers. This contoured sprue will prevent ingress of air / gas around the Stream sprue base known as CHOKE area is considered as UNIT (ONE) in deciding gating ratio for a given metal.

Sprue Base: Sprue Base is always preferable with diameter as double the sprue base dia & depth equal to the dia of sprue.This will slowdown the speed of liquid metal & make entry to the next part of Runner for heavy castings, refracting base can be provided with strainer, if required.

Runners: Runners should be Trapezoidal Shaped with height double to its width. This will allow the slag, sand inclusions to flow up, enabling clean metal into the ingate which are normally kept at the bottom of runner. Runner should have runner extension with Flow off at the end. Runners should have smooth carves to prevent turbulence due to sudden change (abrupt) in direction. Length of runners should be decided in such a way that liquid metal can go through ingates to reach all position of castings. Runner should be stepped that is reducing areas after each ingate.This will allow metal entry to castings through ingates in equal flow manner. Runners may also have Skim bob or relief sprues to collect slag or dross or relieving pouring pressure. Height of runners can benefit in feeding of few metals without expensive feeders.

INGATES: Ingrates are shorter in lengths & can have CHOKE are equal to sprue base area or higher (Greater) Area to reduce velocity of metal entry, into the casting. This calculation is decided by Gating Ratio & There by creating Pressurized & Non-Pressurizedsystem. Shapes are normally square, rectangular or wedge type Kept below runners in most metals but at top in Al-Mg alloys.

Feeders: Feeders are kept either at top or side of castings. They can be open to our or blind. Mostly Cylindrical feeder are preferred with height = 1.5 times its diameter, size/Dimension are to be decided as accurately as possible to increase YIELD of castings (Economical benefit).Although,SPHERICALfeeders are most effective but not used normally due to mold ability problem.

Please Note: There are feeders & **NOT RISERS.** Risers are like flow offs or for reverse feeding in case of S.G.C.I. Feeders are very important & Necessary (with Correct size) calculations will depend upon type /characters of metal composition & it is solidification mechanism.Feeder should have enough liquid metal temperature gradient 8 pressure with reference to casting part volume to be fed to eliminate shrinkage. One has to know liquid metal's volumetric shrinkage and MODULUS of casting part to be fed

Mc = Modulus of Casting= V/S.A= m^3/m^2

Where, V = Volume of cast part to be fed.
S.A = Surface area of cast portion subtracting Non cooling Area

e.g., A cube has 6 surface areas but top area where feeder is kept has no cooling. So, consider only 5 cooling areas.

Hence, Mf = Modulus of Feeder should be at least 1.2 times Mc with this considering modulus of feeder (Mf) by considering bottom of cylindrical feeder as Non cooling areas. If you select h/d of feeder = 1.5 Mf=0.214 d.

Now, Consider weight of liquid & 6 % volumetric steel (Plain Carbon). Also consider : 10% volume of liquid available from sand feeders-Calculate volume of cylindrical Feeder with h/d>1.5.

Please note higher size of feeders with reduce YIELD and involve extra cutting & Grinding (Fettling) Charges.

So, Foundryman has to think & apply various techniques of reducing SIZE & type of Feeders available. To name a few of tips :

i) Insulating feeder,
ii) Exothermic Feeder
iii) Hot topping metal of exothermic fluxes at top of feeder.

Also Known as Anti piping Compounds.
Materials like Paper pulp, Dry, Coconut shell powder, Dry paddy husk, wollastonite etc.

Exothermic Compounds: Namely Red oxide(As used in thermite welding),Alum Powder, Potassium, Nitrate, wollastonite etc.

Other Techniques: Grain Refinement, Using chills, Beatercores, William core, Proper placement of feeders, Use of software's, Covering of Feeders, Use of feeder with inside surface with protruding triangular spikes to keep hot metal due to sharp corner heat zone, Using Certain alloying elements like W, Ni, Mn, Cr etc.

Now coming to the end of this article following useful tips :

I) Avoid keeping Ingates, Feeder necks at circular/ carved surfaces.
ii) Avoid hand (Manual) cutting of gating, Use wooden/aluminum gating.
iii) Bottom gating i.e. Metal entering the casting at the bottom but providing ingate to feeders at top allow hottest metal to enter into feeder. Bottom gating has excellent advantage of reducing turbulence there by gas entrapment.

Above information's have been compiled from various sources for your quick refresh of Knowledge, Suggestions, Corrections, Modification, Addition, Compliments are WELCOME.

Innovation Article

By Mr. Sushil Sharma,
Technical Director Shamlax Metachem P. Ltd. Nagpur

Developments in Exothermic Sleeve Technology for Ductile Iron Castings

FACING NODULARITY ISSUES BELOW THE FEEDING RISER ?

USE SHAMLAX MODIFIED SLEEVES FOR S. G. IRON CASTINGS

Helps in achieving 90% nodularity below the feeding riser.

KNOW MORE ABOUT THIS INNOVATION IN THE FOLLOWING ARTICLE.

ABSTRACT

Ductile iron castings have unique riser requirements compared to the feeding of other metals. Foundries are trying to find ways to reduce their overall cost to produce a casting. One way to reduce costs is to incorporate the use of exothermic sleeves around the risers. But the use of conventional Exothermic Sleeves results in certain defects that appears on the surface of the casting as a round depression with a raised center. The other defect is a degradation of the graphite nodule from spherical to flake form. This flake structure can potentially extend into the casting, resulting in severe reductions in the physical properties of the casting and its subsequent performance.

The defect is noted during the micro structure analysis of the surface. To solve this, a special, fast-igniting exothermic sleeve is needed so that the energy taken out of the metal in the cold riser is minimized. It has been found that cold ductile iron risers exhibit improved performance when their formulation has been optimized so that they ignite at lower temperature and energy levels, have a faster ignition time, and burn at higher temperatures with more energy. The result is a flatter feed pattern in the riser removing surface defects in ductile iron castings.

INTRODUCTION

To produce a metal casting, metal is poured into the pouring cup of the casting assembly and passes through the gating system to the mold and/or core assembly where it cools and solidifies. The metal part is then removed by separating it from the core and/or mold assembly.

Risers or feeders are reservoirs that contain excess molten metal. The excess molten metal is needed to compensate for contractions or voids of metal that occur during the casting process.

In order to serve their function, sleeves have exothermic and/or insulating properties. Exothermic sleeves function by liberating heat. This liberated heat satisfies some or all of the specific heat requirements of the riser and limits the temperature loss of the molten metal in the riser, thereby keeping the metal hotter and liquid longer. Insulating sleeves, on the other hand, maintain the heat of the molten metal in the riser by insulating it from the surrounding mold assembly.

The exothermic sleeve compositions normally comprises of an oxidizable metal which is now-a-days normally aluminum dross, and an oxidizing agents capable of generating an exothermic reaction. This study relates to sleeve mixes prepared with the sleeve compositions, the use of the sleeve composition to prepare sleeves, the sleeves prepared with the sleeve compositions and the use of the sleeves to prepare metal castings.

BASICS OF EXOTHERMIC FEEDER SLEEVES

The basic of exothermic feeder sleeves is to generate sufficient heat to keep the riser metal in liquid condition and feed the casting during the solidification process.

The heat generating source happens to be Aluminium powder which on oxidation generates heat, which in turn is retained by the sleeve. The exothermic sleeves are so designed that the heat generated during the burning process is retained and not lost and mostly utilized to keep riser metal in liquid state. It is known to use oxidizing agents singly or in combinations to generate heat with aluminum. following Equation

$$Al + \text{Oxidising agent} = Al\,\text{Oxide} + \text{Heat}$$

All exothermic feeders contain various oxidizing agents which destroy the aluminum oxide layer on the aluminum powder. Depending on the binder, the aluminum used and the oxidant, it is possible to work with different amounts of oxidants.

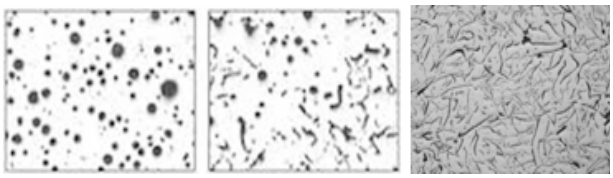
The most common fuel material is aluminum. When mixed with an oxidizer and an initiator/fluxing material and exposed to extreme heat, the aluminum is oxidized, giving off heat as the reaction proceeds.

The heat generated in case of feeder mix with certain oxidizing agents normally generates more heat as compared to other oxidizers as in case of certain oxidizers it is like a chain reaction in which the products of reaction again reacts with Al to produce further compounds & so on.

GRAPHITE DEGRADATION IN CASE OF DUCTILE IRON CASTINGS

It has been observed in case of ductile iron castings that there is complete degradation of graphite nodules into flakes graphite below the riser, while the nodularity on the rest of the casting surface is above 90%.

It was also observed that the degeneration pattern was observed in the metal in the riser also as shown in Figure-1.



90% nodularity *60% nodularity*

Fig.1 Graphite degradation in case of Ductile Iron castings

In Fig.2 Test result shows the following specification requirement 90% Form VI nodularity according to ISO945.

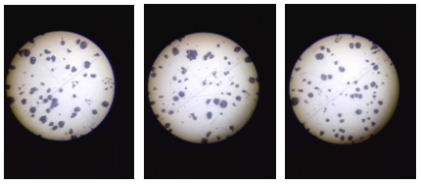


Fig 3 : 90% Nodularity below sleeve riser as per ISO945

Different test were conducted with various levels of Exothermic property of the Exothermic Riser Sleeves and changing the oxidizers as per Figure-2 & 3 and following results as shown in Table-1 were obtained

Table : 1 Variation in nodularity with different oxidizers in the Exothermic Sleeve.

Sr. No	Type of Exothermic sleeves	Type of Oxidizer	Nodularity %
1	Highly Exothermic	Oxidizer-1	67 %
2	Mild Exothermic	Oxidizer-2	75 %
3	Highly Exothermic	Modified-1	85 %
4	Mild Exothermic	Modified-2	>90 %

EXOTHERM - 500 - Shamlax Product

ANALYSIS

One of the oxidant is the major constituent of Sleeve formulation and is in fact responsible for the degradation of graphite flakes. In most of the cases Aluminum dross is also used to manufacture Exothermic Feeder sleeves. Aluminum dross is normally generated during either primary melting of aluminum or secondary melting of aluminum. During this melting drossing fluxes are generally used which normally contains certain chemicals as one of the major components .

The Aluminum dross generated has as one of the major impurity and hence is one of the major source of contamination in the exothermic riser sleeves.

CONCLUSION

It is concluded that the Exothermic Feeder sleeves should be free from certain oxidants which can be a source of contamination either by way of addition in the exothermic sleeve mix.

Another source of contamination can be due to the impurity in the Aluminum dross and hence the Exothermic sleeves based on aluminum dross should be free from certain impurities. The aluminum used in the exothermic sleeve formulations should have oxidizers as the best oxidizing agents for generating heat.

The exothermic property of the Riser sleeves should be mildly exothermic instead of highly exothermic as in the case of steel castings in view of avoiding un-burnt aluminum in the sleeve residue which can also affect the nodularity.

By controlling the above factors during the manufacture of exothermic riser sleeves the foundry can be sure that there won't be any graphite degradation below the riser and the chances of achieving nodularity of 90% and above will be very high provided all other factors during the ductile iron production are taken care off.

IIF WR FOUNDRY LEADERS MEET

Theme: Present Global Scenario and Road Ahead

Key Takeaways

By: Prayut Bhamawat, Hon. Secretary, IIF Western Region

IIF Western Region, jointly with IIF PUNE Chapter organized Foundry Leaders Meet on 29th November 2022, the theme being **Present Global Scenario and Road Ahead.** The objective of the meet was to have the Foundry Leaders of the Region to **discusson a common platform the global market outlook, various challenges / opportunities & to pave a common path for being ready for future.** Around 50 top management delegates from various leading organizations related to Foundry Industry participated in the meeting **covering diverse yet united view.**

The event Triggered with the motivation video on the life of an Eagle Bird giving the message **"Change to Adapt or Die"**which set the tune of the event. IIF WR Chairperson Mrs. Anuja Sharma delivered the opening address giving an overview on the present global foundry scenario &share details on the rising demand of casting in commercial vehicles, mechanical engineering, wind energy, construction machinery, railway & agriculture machinery in Europe. She described the negative impacts due to Ukraine-Russia war on the automotive industry and causing disruptive effects supply chain. She also highlighted that Foundries need to stay cautioned due to recession effects showing in Europe, UK where inflation is at 40 years high and economy is sliding.

Various pressing issues were discussed during this meet in length. Few key takeaways from various topics are captured here under.

Ferrous Foundry Scenario- Mr. Sachin Shirgaonkar, Director, Synergy Green Industries Ltd:

Mr. Shirgaonkar, also IIF Kolhapur Chapter Chairman, shared outlook on the Ferrous Foundry Industry. He narrated India's position at global level and opportunities for foundries in other than Automotive industry like in Pump &Valves, Indian Railways, Renewable Energy, Sugar Industries which are among the prime growing sectors. He stressed on even diversifying the manufacturing portfolio apart from the foundry in these sectors. In Automotive sector there is an immediate threat for grey cast iron which covers about 65% of casting production in India due to increase in Aluminium castings, whereas other sectors like renewable energy, infrastructures, defence& modernization of Railways are expected to grow due to various Govt Initiatives. It is expected to have a growth of about 6% for next 5 years. After pandemic threat, various countries have started adopting the "China+1" policy &India found to be more suitable opens a huge potential to look at it. Also, he suggested apart from US & Europe foundry should explore Asia-Pacific & African markets as there is good potential and are the best market for certain sectors.

Non-Ferrous Foundry Scenario by Mr. Jitendra Lakhotia, CEO, Aakar Founders:

Mr Lakhotia, started his talk with the line **"This is Best Time for India".** He gave the short-term and long-term scenario for the non-ferrous foundry. As per data from FADA, in automotive sector, foundries have reached to Pre-covid levels and with still 8 Lakhs cars yet to deliver the requirement is huge but at the same time we are living in the permanent crisis era which is still going to be there for next 2-3 years. To overcome this, in short term foundries would do well to adopt Flexibility, Adaptability & Agility. He suggested to have product mix of Domestic – Export market, Automotive – Non-Automotive market, Existing Business – New Business & Regular (Simple) Parts – Complex Parts to survive in uncertain times. For Long-term scenario, it is expected by 2030, India should be 3rd Largest economy. Due to Demography of India, having youngest population & various other factors, our economy is resilient. For non-Ferrous foundries, Electric Vehicle (EV) will be "Tsunami", in Pune itself in Oct 22, 12% 2-wheelers sold were EV & it will come in Tractors as well eventually hence there is a good opportunity growing. There is increase in requirement of non-ferrous parts in telecommunication due to 4G to 5G transformation, Military & Defence & in medical devices but next 2-3 years will be disruptive and with market segmentation foundry can plan to prosper.

After the outlook on the foundry scenario, few topics were put up for the open discussion for all the delegates. On the **Factors to drive the foundry market,** it was discussed that foundries need to look apart from the Automobile as well & adapt the strategy to be in the complex castings / alloy casting as automobiles companies are curtailing down the inventory due to lack of clarity on the policy of shifting from BS 6.1 to 6.2, hence low orders for the foundries till then. One of the strategies that was discussed was also to focus on the individual component rather than having a mix bucket to be a cost competitive for growth of the foundry. Also, to be cost-competitive, foundry need to have capacity utilization of more than 70 – 80%.

On the **Opportunities and challenges for Foundries,** it was mentioned that energy crisis in Europe & lack of trust in China has given big opportunity to Indian Foundries and one should tap on it. With respect to challenges, the mind-set of the companies abroad about delay in delivery, sub-standard quality of product from India is required to be changed. Secondly, there is a scarcity of the foundrymen with practical technical knowledge which can possess a big challenge in future for the foundries. It was also mentioned that there are some hurdles faced in Tier-2 cities specially with slow clearances and late decisions by banks due to which foundries are not able to tap the potential at right time.

Discussion took place on the **Next competitive area & competition in global market** on which it was highlighted that there is a cultural change coming in the manufacturing industry. Now equipments are required to be more smart with IOT & other digitalization integration for casting production. In Indian competition other countries like Vietnam, Taiwan is also coming up and to compete with them one has to improve the operational efficiency, adopt to more custom built along with upgrading the human resources and increasing the skill level.

Cost competitiveness was one of the common points mentioned by all hence the discussion then finally came on the Optimization of the Cost for which it was of the **common view that automation be adopted.** Foundry being highly labour oriented unit is much dependent on the skilled labour, **with automation we can reduce the human factor** and in turn reduce the rejection, increase the productivity and hence improved profitability.

Based on the interactive discussion, would like to **summarize** that as of now due to various international factors, India has been provided with big opportunity to enter the global market. It is on Indian Foundries how quick they are ready to adapt the new technology & bring innovation to increase the manufacturing capabilities. India being the largest pool of talented work-force, with appropriate training we can achieve high global standards and build global foot-print. Message shown in the beginning “Change to Adapt or Die” seems to be nicely understood by all after this meet.

Disclaimer: Though I have tried to maintain utmost accuracy, this summing up includes my understanding and interpretation from the discussion and could be deviates from individuals perspective.

Ask The Expert

Q 1: What is Yield? Can it be 100%?

Ans: Every casting comes in a bunch consisting of castings, pouring basin, down sprue, runner bar(s), gates, feeders/risers, vents etc. The total weight of all these components is called as bunch weight.

The ratio of Castings Weight : Bunch Weight is called as "Yield"

Apart from castings, all these elements are necessary for proper filling and shrinkage free solidification. Hence "Yield" can never be 100%.

Q 2: Why do we get sand erosion? What is role of Methoding in this defect?

Ans: Every sand – binder system has certain strength by which the binder holds sand particles together. During pouring and mould filling, running metal exerts frictional force on sand particles due to "rubbing action". Also, the heat of metal quickly evaporates or burns the binder material.

The moment this "Frictional Force" exceeds binder strength; the sand particles lose their bond and start flowing along with metal. This is "Sand Erosion". One gets rough surface and excess metal at the location where sand is eroded. This sand moves and settles at some other location in the mould, where we get "Sand Inclusion".

The frictional force is directly proportional to "Velocity" of the metal stream. This velocity depends on "Metalostatic Head" and "Gate/ Neck area". Higher the head, higher is velocity; and larger the area, slower is velocity. The velocity at which sand starts eroding OR when the metal stream becomes turbulent is called as "Critical Velocity". As a thumb rule, we take critical velocity as 0.5 m/s. During Methoding, one has to design the gate area sufficient enough to keep metal velocity below the critical velocity.

Q 3: How does "Simulation" help in Methoding?

Ans: The gating and risering formulae for various metals are derived out of thermodynamics, fluid mechanics and physical properties of metals. By experience, the foundrymen use most appropriate formula for the given stet of parameters. Such formulae may need some minor alterations after trials to get flawless castings. Casting trials are costly affair and also it consumes a lot of time.

Simulation is a handy tool for adopting various combinations of methoding in Virtual Trials. These trials or Iterations are quite fast compared to actual field trials, and also it does not consume resources apart from capital cost and operator salary. Hence by using simulation software, one can make "First Time Right" and "Always Right" castings. Any reduction in development time has additional benefits in building goodwill as well.

To ask your question or get the suggestions, please write your problem with detailed description to **wr@indianfoundry.org** with subject "Ask the Experts". Identity of the Questioner will be kept confidential.

Message from IIF Nagpur Chapter Chairman

Mr. Sourabh Mohta
Chairman, IIF, Nagpur Chapter

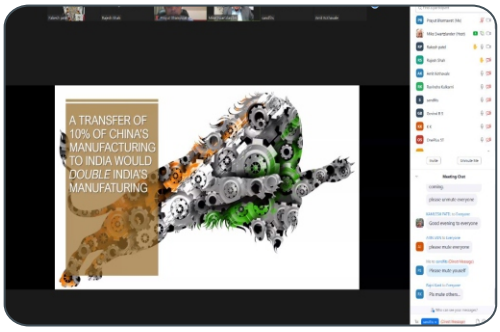
Dear Fellow Foundrymen,

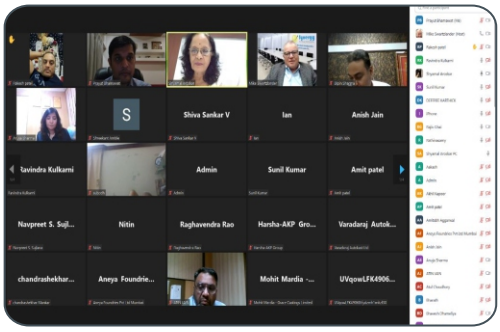
I am glad to express myself through"Foundry Talks". The post covid scenario has brought about many opportunities and new challenges to us. The diverfication of global casting procurement from China to India is a very big opportunity for the fraternity. However, getting into a mature market also brings a host of commonly known challenges like matching and exceeding the established quality, lower cost price and on time delivery. Countries like China got a decade or more to establish the quality, government support with common infrastructure and skill development. The market would now expect us to get the same quality without giving much of time. Here democracy and IT pose a challenge to us. we find it pretty difficult to get people to work in foundries, pay them at per and also ensure accountability. Now a days, We need to be at par with the IT, or the services industry, in pay and infrastructure to attract talents. In the Wescon at Kolhapur, it was rightly pointed out, that now foundry also has to change from a blue collared industry to a white collared one. Yet ensuring accountability and output stands a challenge.

Productivity and Performance management systems coupled with performance linked pay / incentives, have now become a very important tool to ensure. The consistency of output and attach accountability on employer and employees. When people get pad for their efforts, they work for themselves and start appreciating their profession. Recognition by proactively having a system of rewards and recognition helps employees to see that their company values them and their contributions to the success of their team and the company overall. This is particularly key aspect when organizations grow or change. It helps employees build a sense of security in their value to the company, motivating them to continue to do great work.

Now a days companies have started adopting various means of training and development for upskilling of employees, for being prepared for unexplained attrition, by creating a bench strength. It is high time for foundries who are scaling customers globally to also take HR as a strategic domain, not a statutory one.

Western Region Activities





Webinar on Export Castings to North America

IIF WR Foundry Leaders Meet @ Pune

FCON with Work Visits @ Pune