ASKCHEMICALS
We advance your casting

ANKIROS 2016

Special Mini Risers EXACTCAST™ KMV
Less material and fettling cost in Steel Casting

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Introduction - Mini-Risers for Steel Castings

Mini Risers for Steel Castings

Conventional risers, used for to compensate solidification shrinkage, increase the amount of material required and can cause casting defects depending on their composition

To prevent these problems and improve process efficiency in steel castings, ASK Chemicals has developed a **unique riser solution especially for steel casting**

During the pouring-process with natural risers and conventional exothermic riser caps, a high volume of melt is normally used to keep the metal in the reservoir fluid for long enough time to compensate the shrinkage deficit during solidification of the casting.

On average, only approximately 30 percent of the riser content is used for this adjustment; however; the remaining approximately 70 percent serves as a heat source and remains on the workpiece as residual riser after removal of the mold.

As a result, the foundry faces higher material and fettling costs per casting.

Mini Risers for Steel Castings

EXACTCAST™ KMV mini-risers produce sufficient heat to maintain the molten metal liquid throughout the entire pouring process

Efficient combination of formulation and geometry **increases the casting capacity** and **improves the quality**

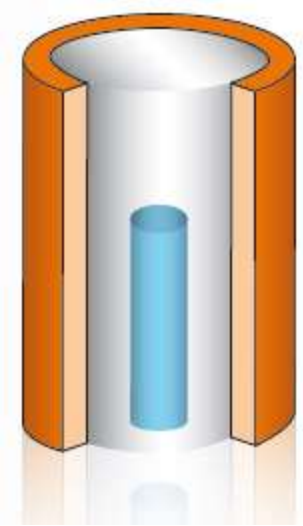
Thus only a fraction of the molten metal volume of conventional risers is required

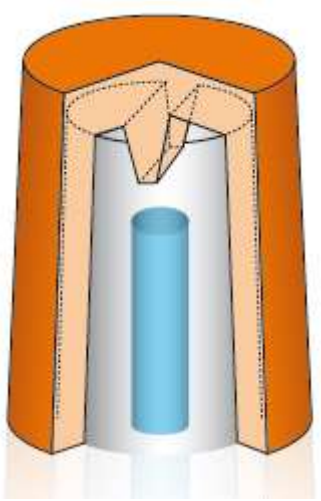
While riser variants with added fibers or rice husks may improve the yield rate slightly, they frequently lead to surface defects such as inclusions, porosities and unwanted foreign substances in the casting.

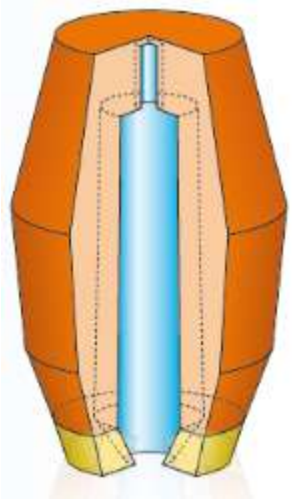
Such residuals can also find their way into the new charge when the riser residue is melted down and spoil the charge's quality as a whole.

Feeding Performance of Riser

cylinder 30%	sleeve 30%	mini 70%
exothermic	*exothermic*	*exothermic*







(When the liquid metal flows through the risers during the filling of the mold, the feeding performance of the riser increases about 1 - 2%)

Mini Risers for Steel Castings

With the innovative Mini - Riser technology, a **highly efficient and environmentally friendly** exothermic/ insulating feeding design has been developed.

This technology is capable of **improving steel foundry yields** by 20-25%.

The reduced contact area of **EXACTCAST™ KMV** mini-risers simplifies reworking of the casting

In addition to yield improvement and **increasing of maximum casting size without investment** in additional melting or ladle capacity, the technology also offers many benefits to the casting process, enabling the foundries to **avoid casting defects** and to **reduce production- and finishing costs.**

Moreover, the experts from ASK Chemicals fine-tune each mini-riser to the specific casting project and will advise. if necessary, on optimizing the gating system and realize **process improvements.**

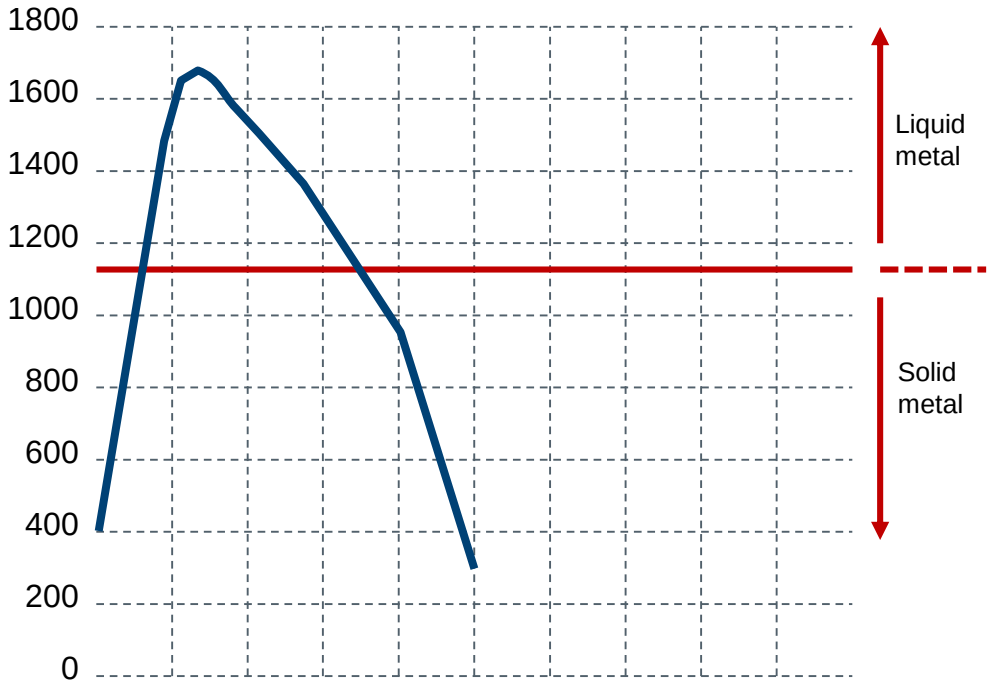
Fettling and reworking costs

One crucial factor affecting the productivity of a foundry is the fettling needed on the finished cast part.
EXACTCAST™ mini-risers, which offer here clear advantages over natural sand and exothermic feeder caps.

Different Firing Curves for Common Exothermic Risers and Mini-Risers

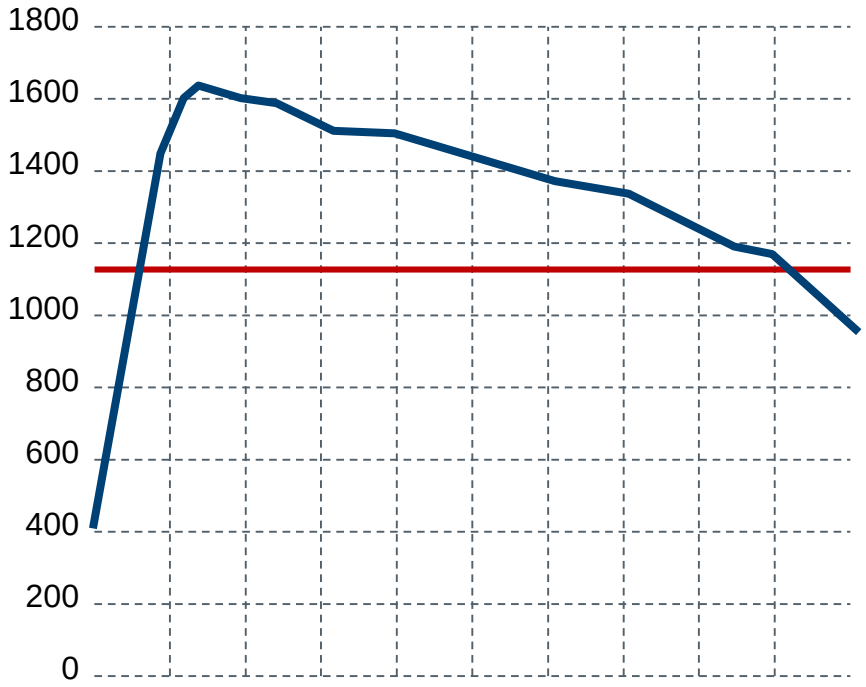
Burning curve of exothermic riser

Temperature [°C]



Burning curve of mini-riser

Temperature [°C]



Mini-Risers for Steel Castings

Regarding the net/gross weight ratio, new feeding technologies have been developed, allowing **yields well beyond used practice.**

With the innovation of **Mini-Risers** in Steel foundries, we expect **standard yields** of **42%-59%** to be replaced and improved by **new yield objectives in Steel Foundries**

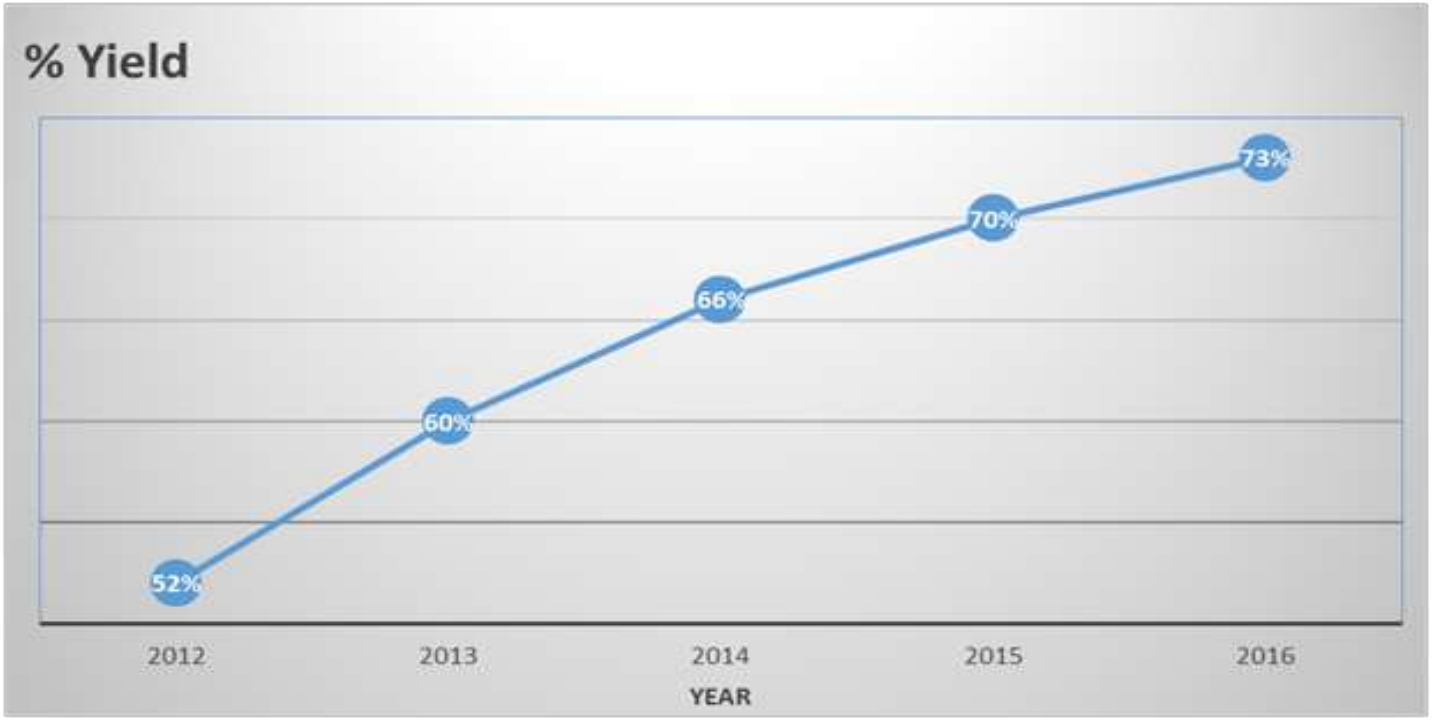
- **Stainless Steel, Duplex and Superduplex steel** foundries
- **Carbon Steel** foundries
- **Manganese Steel** foundries

Case studies yield improvement

Mini-Risers for Steel Castings

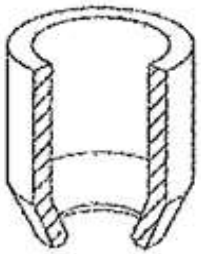
Actual Yield Development 2012-2015 in an European Foundry using EXACTCAST Mini-Risers producing **Stainless Steel, Duplex and Super Duplex Steels**

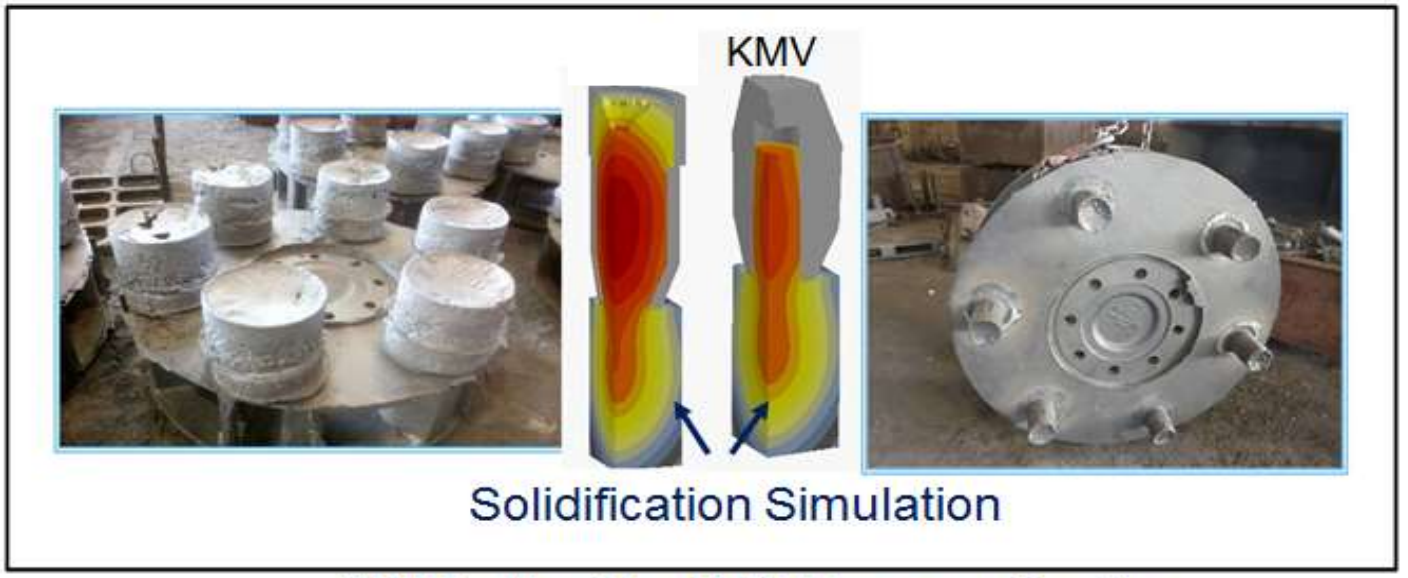
➡ **Target Yield for 2016 = 73%**



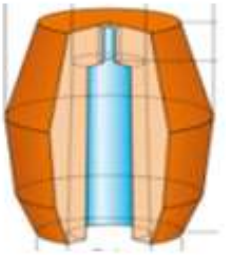
Mini-Risers for Steel Castings

Old Method





New Method



KMV 1650

800Kg Mn Steel Mill Hammer Casting
300Kg saved per casting

The foundry is now able to pour 4 castings from the ladle instead of 3

Mini-Risers for Steel Castings

Carbon Steel Chain Link of 540 kg
Yield improved from 59% to 73% and cleaning work reduced

ASK Chemicals UK Ltd

Mini-Risers for Steel Castings

Net Weight: 10.200 kg
Yield: 86%

Casting with cilindrical risers
70% yield

Mini Riser in Steel Castings

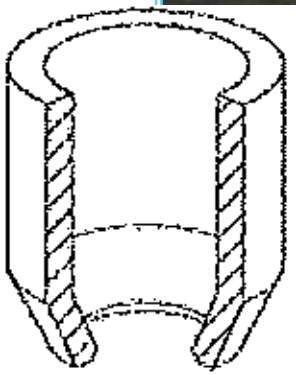
Riser with standard Cylindrical Sleeve

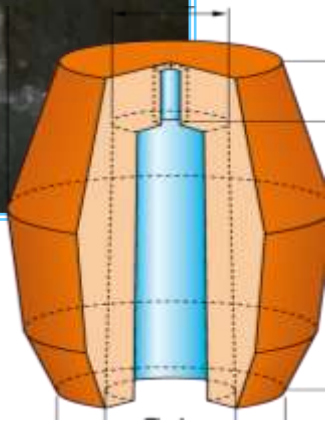
Mini - Riser with Insulating-Exothermic formulation

Mini-Risers for Steel Castings

Supplier	Sleeve Type	Thermal Modulus (catalogue)	Simulated Thermal Modulus	Modulus Ratio Riser/Casting	Riser Weight
Competitor	NECK DOWN 150/200	4,62 cm	4,35 cm	1,18	26 Kgs.
ASK	KMV 1650	4,80 cm	4,42 cm	1,22	13 Kgs.

Mini-Risers in Carbon Steel





Mini-Risers for Steel Castings

➢ **Improvement of Yield**

With the innovation of Mini-Risers in Steel foundries, we expect standard yields of 42 % -59 % to be replaced by the following new yield objectives in Steel Castings:

- Stainless Steel, Duplex and Superduplex foundries with standard quality: 65%
- Carbon Steel foundries with standard quality: 75%
- Manganese Steel foundries: 85%

➢ **Reduction of fettling and reworking costs**

➢ **Reduction of casting defects**

High efficient formulation of riser technology

Mini Risers for Steel Castings

EXACTCAST™ KMV mini-risers are based on a combination of an exothermic, insulating mixture and a tailored geometry

The steel casting with its very high temperatures and the correspondingly severe shrinkage deficit represents a challenge

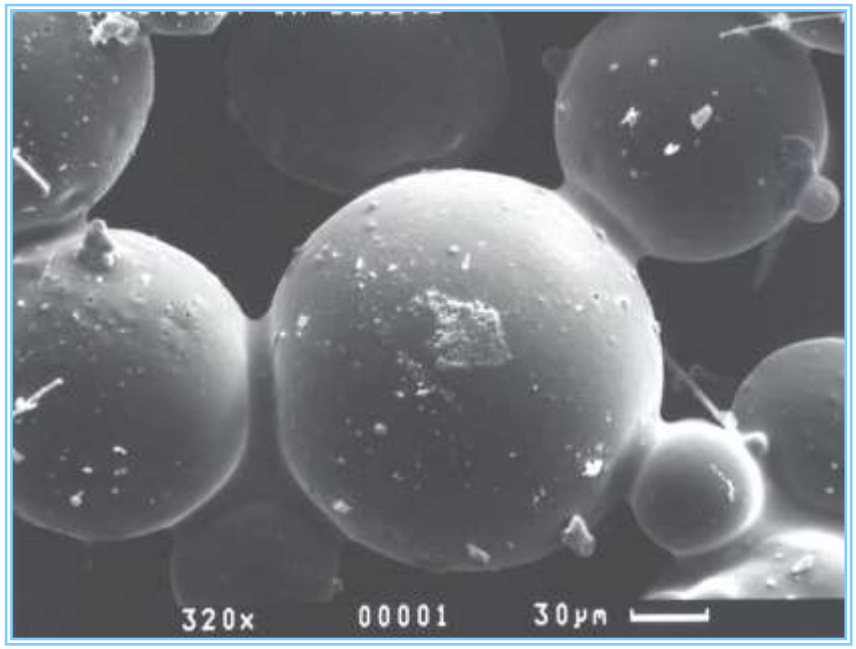
Sand based exothermics are not suitable for Steel as they do not provide any insulating effect.

The **EXACTCAST™ KMV** mini-risers from ASK Chemicals have been specifically adapted to this area of application

The riser's reaction releases heat in a controlled way in order to maintain the molten metal liquid and be used almost entirely to feed the casting

This can be achieved with the introduction of risers using the **patented** low density Alumina-Silicate **"Micro-spheres" and a Cold Box binder** system.

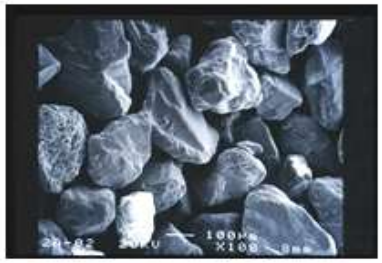
Microspheres - Feeding Technology patented by ASK



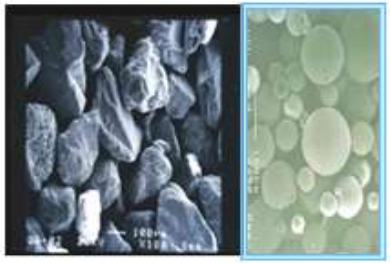
The mixture contains, among others, aluminum silicate ceramic and similar additives that have an insulating effect and keep the heat from the incorporated melt and from the exothermic process controlled within the riser.

Mini-Risers for Steel Castings

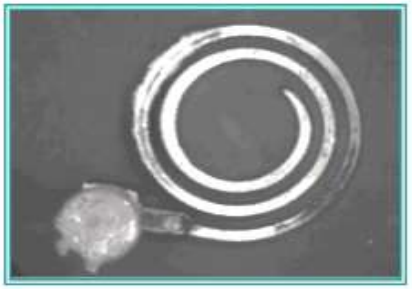
The **superior insulating properties of the "Micro-spheres"** compared to Silica Sand are illustrated by the results of the fluidity spiral tests shown below.

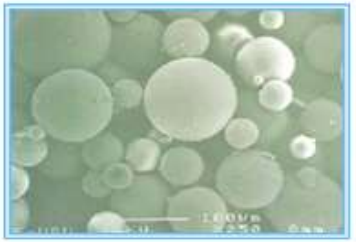


100% Sand

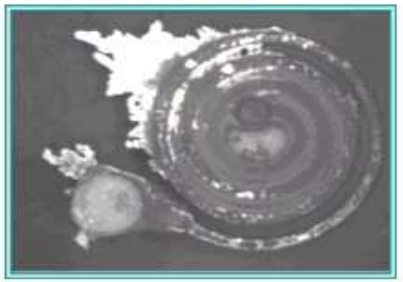


60% Sand / 40% Micro-spheres





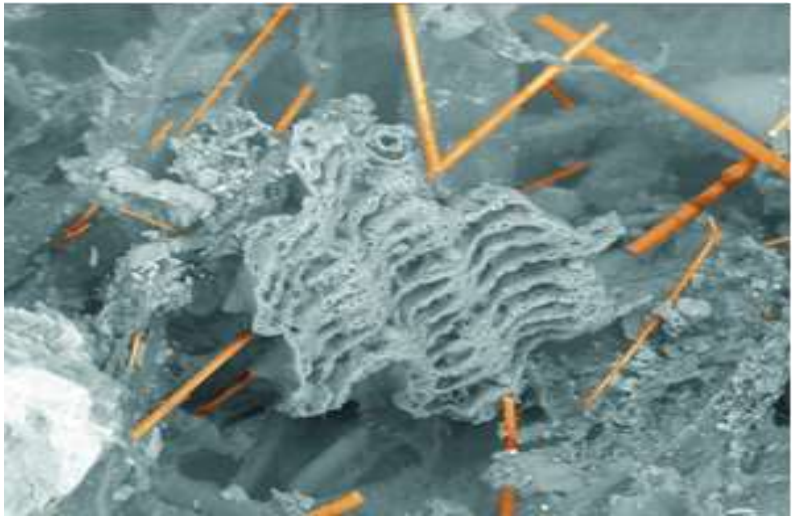
100% Micro-spheres



Fiber-free composition

- Conventional sleeves encountered mainly in steel casting contain fibers and rice husks which could cause casting defects and contaminate the casting with fibers through erosion.
- This could cause surface defects trough riser material inclusions.

Casting defects caused by fiber sleeves



Casting defects caused by rice husk and fibers (orange)

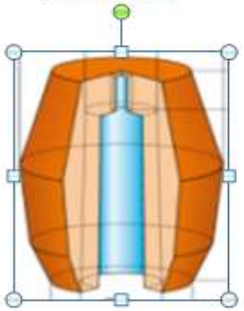
Process improvement and reduction of fettling costs

Mini-Risers for Steel Castings

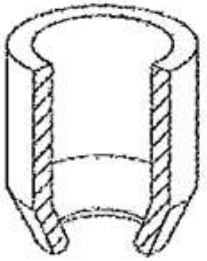
Process improvement

Superduplex Steel

New Method



Old Method



DUE TO THE SMALLER CONTACT AREA THERE WAS NO NEED FOR HEAT TREATMENT BEFORE CUTTING

Mini-Risers for Steel Castings

The new Mini - Riser technology offers considerable scope to achieve the following **additional benefits**:

- **Increase feeding distance**
- **Eliminate padding** completely
- **Reduce the number of risers** by using padding cores

Mini-Risers for Steel Castings

METAL PADDING (Eliminated)

Applied as a separate core

EXOTHERMIC PADDING

Applied as a separate core

30 HOURS OF REWORK SAVED

Mini Risers for Steel Castings

Mini Risers for Steel Castings

Mini Risers for Steel Castings

Thanks to the higher yield the foundry can either **pour more parts from one furnace** charge or manufacture larger castings

In some cases, the yield improvement even allows to offer **new products** even to new markets **without any need to invest in new furnaces**

In addition, the **fiber-free risers improve both the casting quality** and the **quality of the subsequent melt** to which the already small amount of riser residue from the EXACTCAST™ KMV riser is returned

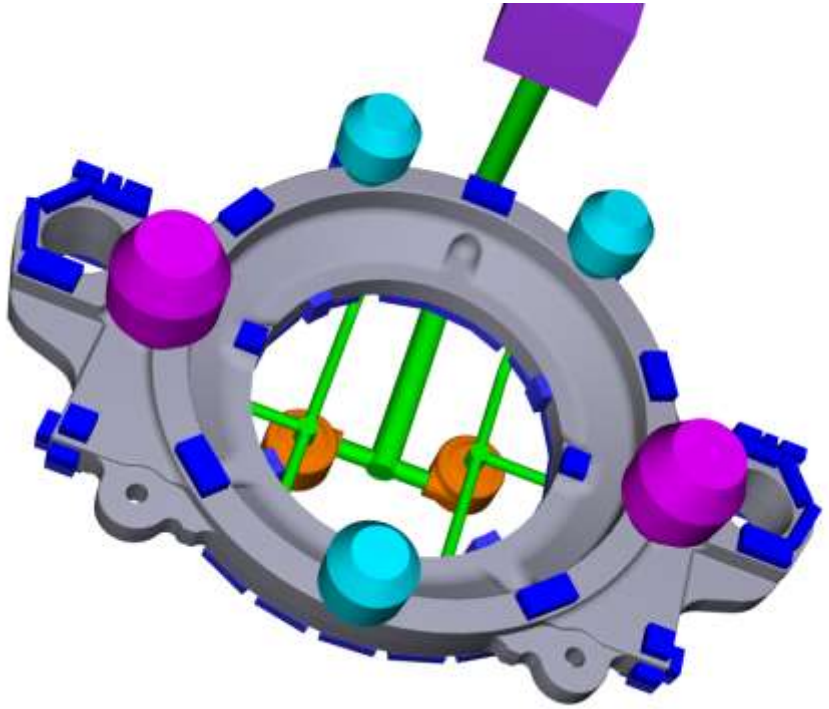
Thanks to their **improved yield** and **lower fettling costs**, EXACTCAST™ KMV mini-risers already prove **economical at low casting weights**, always depending on the geometry and alloy of the specific casting

ASK Chemicals not only **calibrates the risers to the specific casting** to achieve an optimum effect but also **determines the riser variant** suitable for any geometry as well as **the best number and positioning**

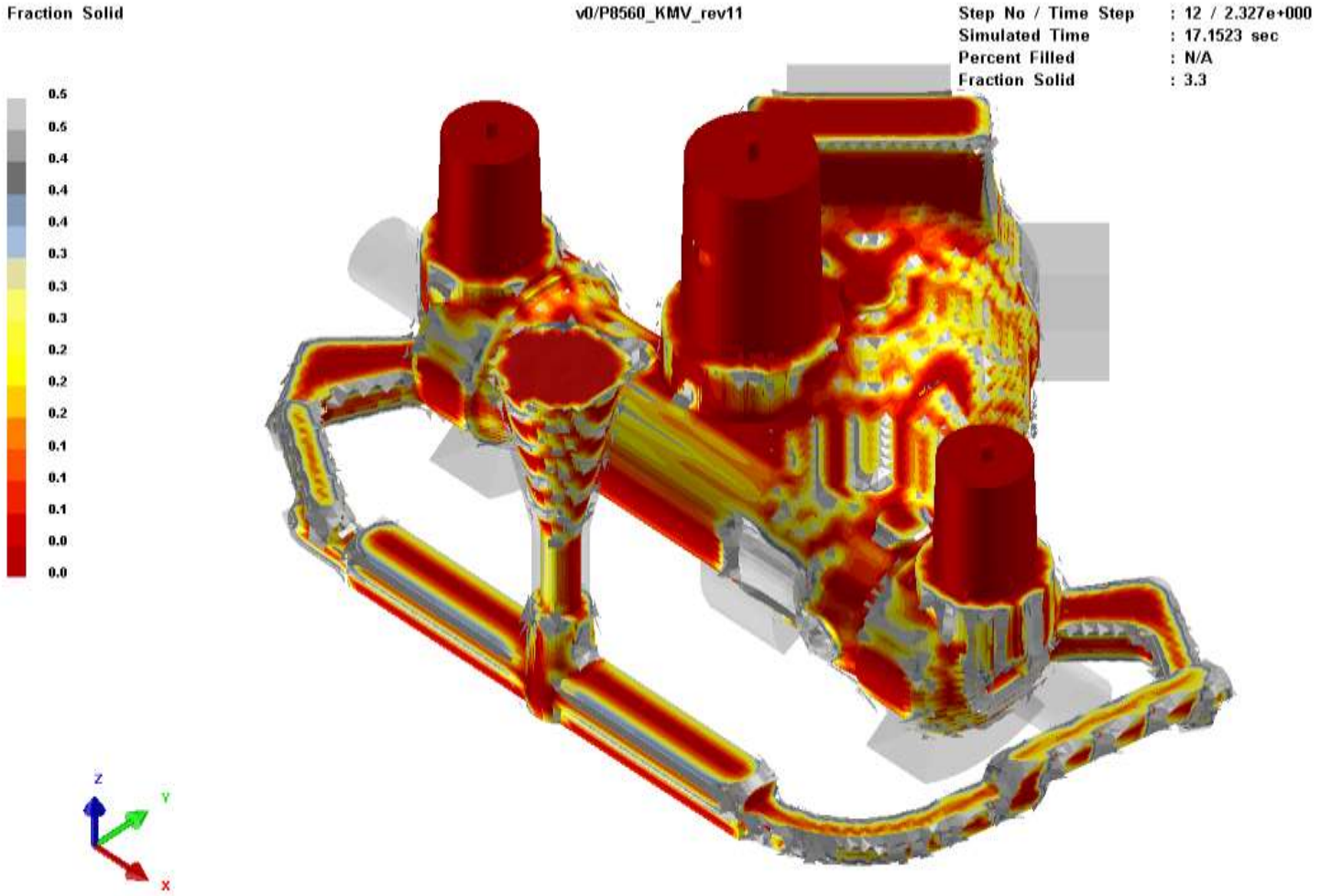
Simulation in Steel Castings

ASK Chemicals experts use **modern computer simulations** of flow and solidification behaviour to identify optimization potential in the general gating system.

- Simulation is an **important and essential tool** on the way to improvement of the casting process
- Especially in **big steel casting** simulation is an essential addition to identify the geometry of the risers and the optimal gating system and to verify the casting results
- If these **simulations** are done at a **very early development stage**, considerable improvements can be made without any difficulty.

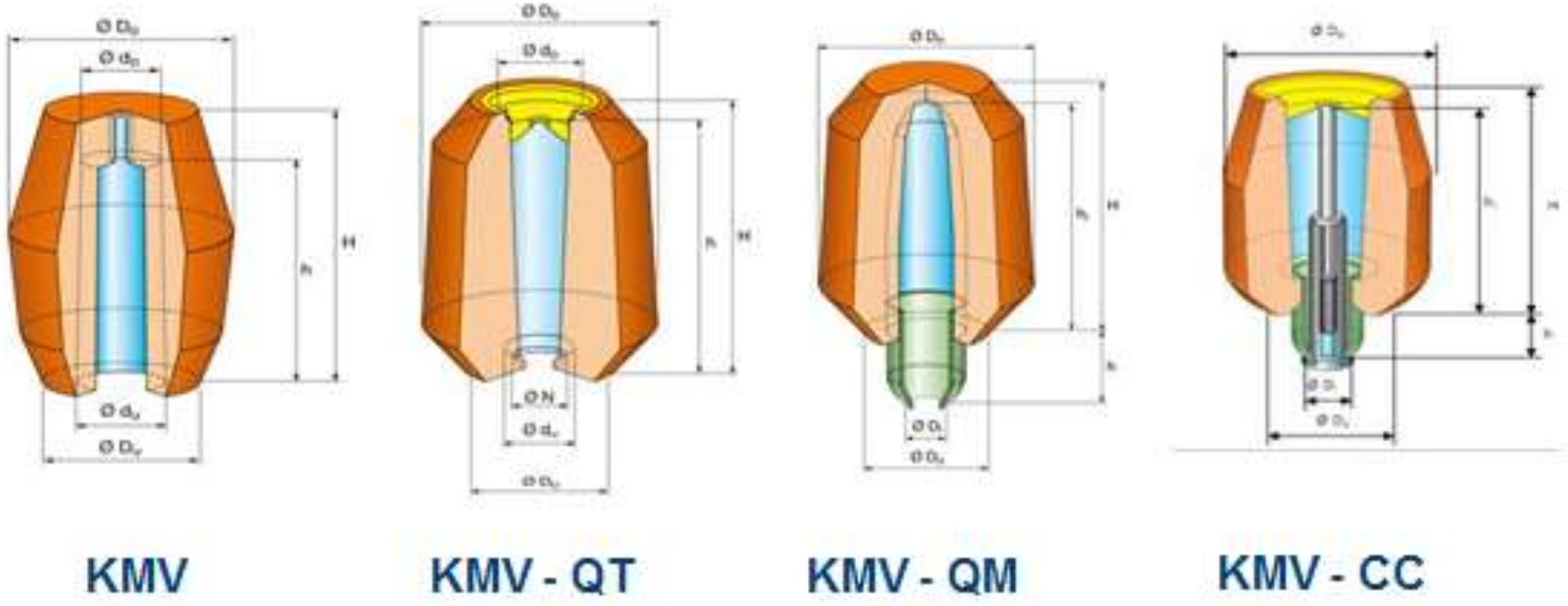


Mini Risers for Steel Castings



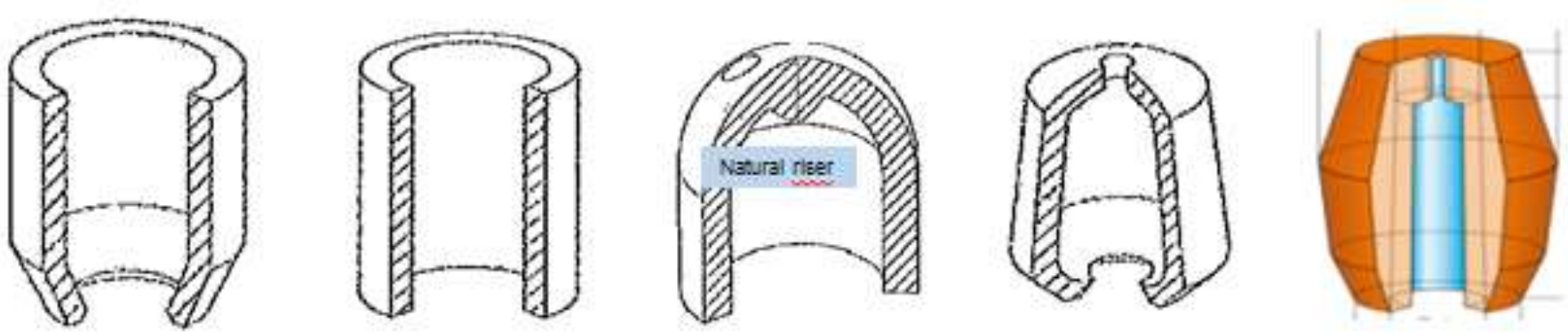
Mini-Risers for Steel Castings

New geometries and **new designs** and sizes for application in steel and big casting are available and are continuously developed.



Mini-Risers for Steel Castings

In Steel with Mini - Risers every fiber sleeve shape can be substituted.



The need for fillers such as fibers can thus be eliminated, as can the need for an over dimensioned riser volume.

Mini-Risers for Steel Castings - EXACTCAST™ KMV

- Utilize the maximum volume of the riser
- Create small contact area
- Reduced fettling costs
- Yield improvement
- Higher productivity
- Lower casting defects
- Consistent thermal properties and performance
- Highly efficient

Mini Riser for Steel Castings

Thank you very much for your attention!