

ASK Chemicals L.P., Dublin, Ohio, USA

# ASK Chemicals Ground-Breaking Mini-Riser Technology Leads to Significant Cost Savings

## Introduction

ASK Chemicals is a recognized leader in metal feeding technologies including their patented EXACTCAST™ riser sleeve technology. They also have a full complement of highly efficient and novel mini-risers to fill out their feeding product portfolio. Mini-riser technology is far from new; having been developed in the early 1970's at the Rexroth Foundry in Lohr, Germany. However, recent new advances in mini-riser products have been developed through global innovation and synergies of the newly formed ASK Chemicals joint venture.

## Mini-Riser Technology

Mini-riser technology provides a significant step forward on the continuous improvement path of feeding systems. This technology can provide an incredible 70% feeding efficiency compared to more traditional cylindrical sleeves which are roughly 30% efficient. This improved feeding efficiency provides an opportunity to greatly reduce the overall size of the riser, significantly increasing the casting yield and reducing the space needed to apply them.

Following initial mini-riser development, the technology has been continually improved. The first step was the introduction of the spring pin which supports the mini-riser on green sand patterns and creates a sand layer between the riser and casting in order to avoid contact of the exothermic material and the sand. The purpose was to increase the surface quality of the casting that can be compromised by the reactions of the exotherm during solidification. The introduction of breaker cores made in Croning (shell) sand, which are in direct contact with the casting, reduces the cleaning costs even more. However, as more modern, high pressure molding lines with higher compaction of the molding sand became more popular, the risers with breaker cores had achieved their limit. The breaker cores can be destroyed by the pressure of the molding sand which can create sand inclusion defects in the casting. The use of breaker cores also can wear down the pattern surface, which can be seen clearly on the casting



Fig.1. This photo shows the footprint of the breaker core on a casting coming from the pattern.

Another important improvement in mini-riser development was the merging of ASK Chemicals' EXACTCAST cold box technology into the mini-riser. The first mini-risers were developed using a sand-based exothermic formulation as opposed to the traditional fiber slurry-based riser sleeves. The sand based exothermic sleeves provided higher compressive strengths which was needed to withstand the high molding pressures used to ram the sleeves up in the mold. They were also heavier in weight and reacted more violently with the casting surface. Replacing the sand with low density refractory materials allowed a weight reduction of nearly 75% and replaced the sand with an insulating mix which gave the mini-riser improved performance. Since the mini-risers are lower in weight, less exothermic material was needed to get the sleeve to the same temperature. This helped reduce the potential for aluminum contamination and graphite nodularity degradation in the metal. Fluoride free formulations were also developed by ASK Chemicals for use in ductile iron applications which eliminated the potential for Fish-Eye defects in ductile iron castings made in green sand molding and for graphite flake formation.

**ASKCHEMICALS**  
We advance your casting



# ASK Chemicals Ground-Breaking Mini-Riser Technology Leads to Significant Cost Savings

## Mini-Riser with Neck Breaker

To use the advantages of these principles and to exploit the potential to its fullest, the mini-riser with a metal breaker neck was developed. This riser is positioned on a pin with a conical metal tube. When the green sand falls into the mold it builds up around the metal neck and during compaction of the mold the riser moves down and slides over the metal tube while the sand between the sleeve and the pattern is compacted. The result is a very small riser neck with an optimal breaker edge designed to make knock off and cleaning of the casting much easier. Many foundries eliminated grinding completely after knocking off the riser due to this advancement in feeding technology. As a result of the downward-moving riser, the molding sand under the riser is very well compacted and the casting has a perfect contact surface (See Fig. 2).



Fig. 2. The left most picture shows a cross-section of the mini-riser with metal neck breaker, followed by the finished mold with breaker contact area (middle), and lastly the casting results with the reduced riser contact area (right).

The low contact area of the new mini-risers allows for proper feeding of some very difficult casting geometries. This is especially beneficial on castings that have a contoured geometry where the riser meets the casting and where a reduction in the contact area is needed. One example shown below (Fig. 3) is a wear part casting produced in manganese steel. The low shrinkage rate of a standard manganese steel allows for the use of mini-risers which can lead to a reduction in required feed metal of up to 3-5 times what a normal cylindrical riser sleeve can provide with little difference in feeding performance. This was first tested using solidification modeling and then validated in a steel foundry (Figs. 3 & 4). This also achieved a significant reduction in surface contact with the casting, leading to the possibility of simply knocking off the risers instead of the more costly method of arc-air cutting (see



Fig. 3. The photo on the left shows a manganese steel casting fed with a standard cylindrical sleeve. The photo on the right shows the use of an EXACTCAST mini-riser on a similar casting, highlighting the significant reduction in feed metal.



Fig. 4. The photo on the left shows a manganese steel casting fed with an EXACTCAST mini-riser, taking advantage of the reduced contact area on a particularly difficult casting geometry to feed.

Even more recent improvements in EXACTCAST riser design has led to new mini riser products that combine several optimal benefits into a single product. Now, the metal caster is able to reduce not only the size and weight of the riser but also the risers "footprint" left on the casting. Today's advancements in mini-riser technology developed by ASK Chemicals considerably improves casting yield through better feeding performance. In some cases the result is more room in the mold for more castings to be placed, significantly increasing the metal caster's productivity.

Through a perfect blend of functionality, performance, and cost reduction; ASK Chemicals' new mini-risers have raised the expectations of metal feeding performance to an all new level. It is this type of novel solution to several issues facing foundries today that allows the metal caster to produce world class castings at a much lower cost.



## ASK Chemicals Ground-Breaking Mini-Riser Technology Leads to Significant Cost Savings

### **ASK Chemicals L. P.**

495 Metro Place South | Suite 250 | Dublin, OH 43017  
Phone: +1 800 848 7485 | Fax: +1 614 761 1741  
info.usa@ask-chemicals.com | www.ask-chemicals.com

**ASKCHEMICALS**  
We advance your casting

