FEEDEX HD V, VS, and VS–Spot feeder sleeve types

The development of Foseco feeding technology in response to market demands

Figure 1: On the left side KALPUR insert filter feeder units are illustrated, and left centre KALMINEX 2000 insert sleeves with breaker cores.

It would be unbelievable if Foseco were to still be offering foundries the same feeding support products as those supplied 50 years ago. At that time the requirement was for sacks of FEEDEX powder from which foundries themselves produced feeder sleeves and exothermic pads. During this period this basic technique has been supplemented by numerous Foseco innovations which have been instrumental in assisting foundries to steadily improve and rationalise their casting production operations. This article describes the increasing speed with which feeding technology has changed in Germany and the neighbouring west European countries.

In the 60's Foseco developed a vacuum production technique for the manufacture of an insulating sleeve KALMIN and a combination exothermic-insulating feeding sleeve KALMINEX. Of particular importance here was the creation of standardised cylindrical and oval feeder sleeve types which brought a degree of order to the myriad shapes and sizes of home made sleeves in the foundries. This made possible the large scale production of feeder sleeves with consistent reproducible properties and dimensions.

Mainly for size reasons the products KALMIN and KALMINEX were primarily used in jobbing foundries. Improved product recipes combined with the creation of suitable feeder breaker cores resulted in these products becoming state-of-the-art production technology for iron and more especially steel jobbing foundries. Examples of such large cylindrical and oval KALMINEX sleeves can be seen in the background of figure 1.

At the end of the 60's, for the same reasons and in a similar manner Foseco developed KALMINEX S, a highly exothermic-insulating standard feeder sleeve for application on high production moulding machines. Whilst this sleeve was used as a top feeder the main application was as a side feeder, placed on the patternplate and rammed up. Largely as a consequence of the special needs of steel casting producers these foundries became major Foseco customers. They recognised very quickly that use of KALMINEX S improved process security and increased yield as well as enabling finishing and fettling costs to be reduced. In mass production iron foundries very few feeder sleeves were consumed, as they were regarded as unnecessary and too expensive.

This situation changed in the 70's, for the following reasons:

- Increasing numbers of foundries began to produce ductile iron castings which progressively displaced grey iron with its much lower feed requirement.
- The application of induction melting has increased; charge material selection, melting technique and in particular wider use of inoculation has increased the problem of secondary shrinkage.
- More foundries have installed modern high speed moulding lines, the pattern plates of which could not be accessed by the machine operators. This meant that placing of any type of cores, chills or sleeves on the pattern plate was not possible. Foseco responded to this by developing the insert sleeve technology, which meant that mass production iron foundries were still able to apply cost effective feeder sleeves by inserting them in the cope mould before it is turned for closing.

Foseco created a standard range of parallel conical insert sleeves and the associated insert sleeve patterns required to apply this process which was patented world-wide and in fact it still belongs to state-of-the-art production technology in many mass production iron foundries.

The insert sleeve concept also made possible the broader application of breaker cores for the production of mass produced castings. By applying insert sleeve technology even the lightest insulating feeder sleeves with breaker core can be used on high pressure moulding lines without breakage occurring. Today more than 60% of all insert sleeves supplied by Foseco have breaker cores.

In the 80´s the insert sleeve technology had become state-of-the-art in many mass production foundries.

At this time however, changes in the mass production of castings meant that a completely new generation of feeding products became necessary:

- New high pressure moulding machines were equipped with a match plate pattern or pattern turntable. Once again the pattern plate became accessible to the operator and foundries with these machines demanded high strength feeder sleeves which could be positioned on the pattern plate.
- The trend was to lighter castings with increasing fine detail and thinner wall sections combined with the use of iron specifications with higher mechanical properties and increased feed requirements. Often, conventional feeder sleeves could not be applied to the thinner casting wall sections. Foundry solutions often required the application of more expensive side feeders or the use of customised profiled breaker cores. Therefore Foseco developed:

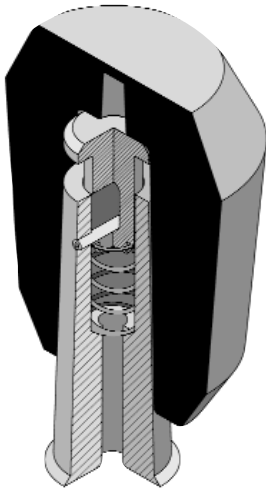

Figure 2: Sectioned spring loaded steel location pin for ram-up of a V-sleeve without a breaker core.

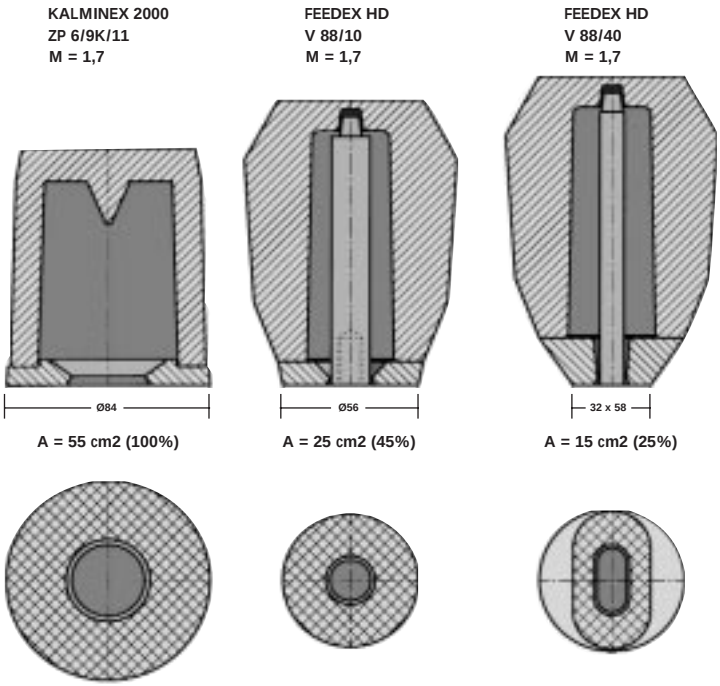

Figure 3: The reduction of the feeder contact area which is possible when using the V-sleeve with a suitable breaker core.

FEEDEX HD V-sleeves, a new technology to meet changing foundry practice

FEEDEX is a rapid igniting, highly exothermic, high strength material suitable for both iron and steel castings.

FEEDEX HD V-sleeves have a small feeder volume. The high modulus value is achieved by the very thick sleeve wall, which is tapered conically towards the sleeve base. This product is particularly suitable for application on castings which offer only a limited feeder application area, since the contact

surface of the V-sleeve is approximately 50% smaller than the contact area of cylindrical sleeves with the same modulus.

In the 90´s the V-sleeve technology had been introduced into most mass production iron foundries because the practical and economic advantages were so convincing. Today many foundries combine the insert and V-sleeve technologies. This means that in the case of fast moulding machines the production of castings requiring a large number of feeders can be achieved within the short moulding cycle available.

FEEDEX VS-sleeves, self-centering sleeves for high speed moulding machines

It was to be expected that in time the V-sleeve technology would also have to meet new market demands:

- Foundries used more and more V-sleeves fitted with breaker cores to reduce cleaning costs.

- Cost reduction combined with the need to increase productivity in the foundries using faster moulding lines and optimised pattern plate layouts. This resulted in restrictions and operator stress associated the with the need for accurate location of the feeder sleeves. This situation was often made worse by the need to correctly centre more than one sleeve on the pattern plate, which cost valuable production time.

VS-sleeves are a further development of the V-sleeves. They have a conical inner contour at the top of the feeder cavity as shown in figure 4. When placed on the special steel location pin, the sleeve slides automatically into a stable, vertical, correctly centred moulding position.

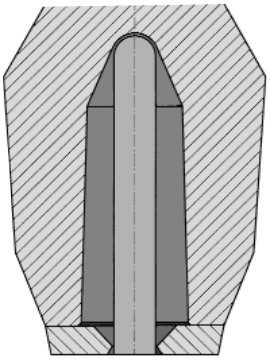

Figure 4: Self-centering VS-feeder sleeve system

This additional practical advantage has proven important enough for many foundries to progressively change from ram-up V-sleeves with breaker cores to the newer self-centering VS-sleeves with breaker cores. At the same time, more and more conical neck down breaker cores are being used, as the trend to even smaller available feeder application area continues and for cost reasons, foundries are obliged to use top feeders and avoid the use of side feeders.

In the mid 90´s a new situation was encountered:-

- The demands of the market for ram-up, high strength feeder sleeves with substantially reduced feeder contact area had been for the great part met with FEEDEX HDV and the improved VS sleeve types. These ram-up feeder sleeve techniques had developed into an ideal supplement to insert sleeve technology and both techniques were increasingly used in the foundry industry.

Figure 5: Measuring the compression strength of a VS sleeve.

Figure 6 :Automatic gluing of breaker cores to VS sleeves.

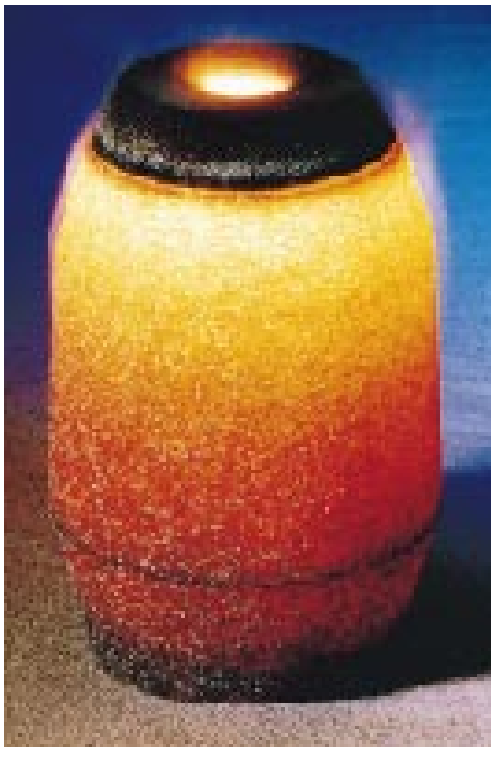

Figure 7: Evaluation of the exothermic reaction properties of a VS sleeve.

- At the same time the market demanded even smaller feeder contact areas. For many newly designed castings, even the small contact area of a neck down conical shaped breaker core was still too large and because of the risk of breakage during mould compaction this approach had also reached its limits.

VS-Spot feeder, a new way for the next decade of feeding technology

Considering the problem described above in another way contributes to the solution, essentially:

- Foundries wanted exothermic sleeves with an extended modulus factor.

- Because of application limitations the original feeder had to effectively disappear, leaving only a small feeder neck.

This market requirement was met by the VS-Spot feeder sleeve, a further development of the VS sleeve.

VS-Spot feeder sleeves are rammed up with the help of the special spring loaded steel location pin. The moulding machine pressure squeezes the VS-Spot feeder sleeve down the pin shaft, which compacts the moulding sand under the sleeve. The special exothermic 'compaction' breaker core prevents moulding sand entering the feeder cavity during mould compaction. This special exothermic compaction core also heats the small sand feeder neck and prevents early solidification of the neck. The VS-Spot feeder which is only connected to the casting by means of a very small feeder neck then truly functions as a spot feeder. The feeder residue can usually be removed with a hammer blow leaving only a small iron stub to be ground and a clean casting surface with little or no trace of the feeder location.

With the development of the spot feeding technology Foseco has laid yet another milestone on the road to improving and rationalising casting production. VS-Spot feeder technology is already being widely applied in a number of leading foundries.

Innovation has the same high value to Foseco as quality and productivity because customer demands can create new market opportunities and Foseco's research and development is directed to meeting the needs of customers.

This approach supports foundries which need to be in a position to react to the world wide trend of more complex castings, improved productivity, reduced energy consumption, lower production costs and the drive to improve working conditions.

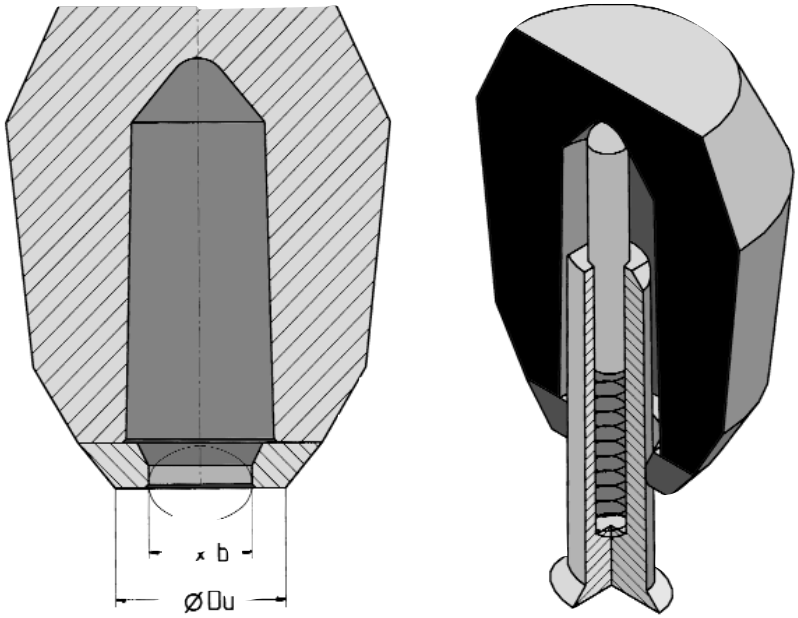

Figure 8: A VS-Spot feeder sleeve and its associated special steel location pin

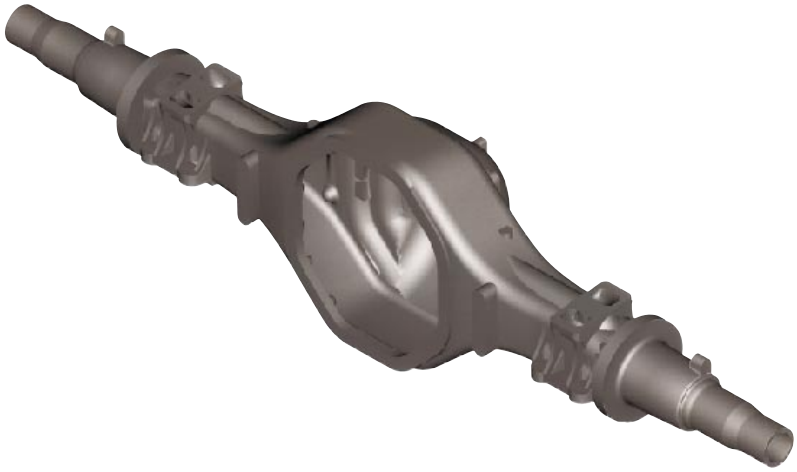

Figure 9: A modern ductile iron axle bridge casting. The sections which require spot feeding include; the suspension saddle, the brake mounting flanges and the axle arms.

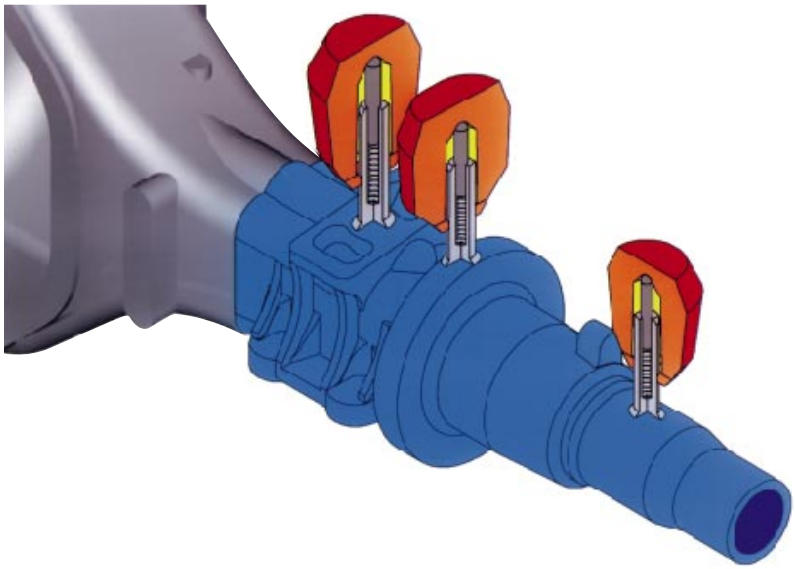

Figure 10: VS-Spot feeder practice. The point feeding technique with highly exothermic feeder sleeves makes possible the production of a new generation of high value, lightweight castings in the foundry.