



Blue Power.

INDUTHERM PRESENTS:

# One step ahead in faultless silver casting

As the overall casting production of silver jewelry has increased in recent years, so have casting defect rates. However, reducing defect rates and improving quality even for the most difficult-to-cast design, are crucial if the jewelry industry is to stay competitive.

Besides the quality of the raw materials, like alloy, wax and investment, a stable casting process realised by most flexible but well-controlled and easy-to-handle casting equipment is of high importance for consistently high quality outcome.



*Jewellery: Roland Scheube, RKS Germany / Sri Lanka*

## VC 450, the newest release

Indutherm's newest vacuum pressure casting equipment, the VC 450, is consequently developed with the focus on a maximum casting quality especially for silver jewellery productions with a minimum reject rate and reduced post-processing-work.

It is integrated in the successful line of existing machines VC 400 - VC 500 - VC 600 V, which cover the most desired range of production capacity and process automatics. Although at a very economical prize level, the VC 450 is equipped with a new generation of induction generators and with a comfortable LCD display and control system. 20 casting programs allow for the individual setting of relevant process parameters before casting and their storage for recurrent castings – which is important for quality certified processes, high process reproducibility and for an economical production with fast casting cycles.



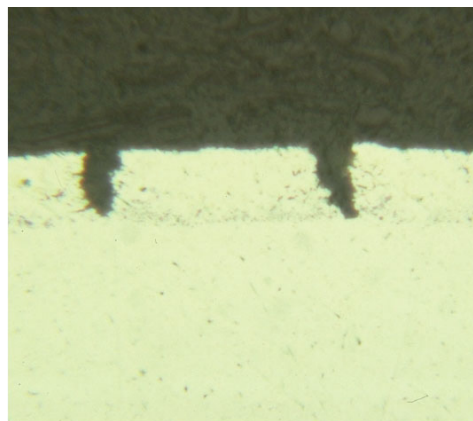
Like its predecessors, the VC 450 uses induction technology for melting the metal, automatic inert gas (usually Argon or Nitrogen) or vacuum in the melting chamber, fast overpressure to assist form-filling as well as the so-called "Oxidation Reduced Casting"-system.

### **Equipment features especially important for high quality silver casting**

Some of these features are of particular importance for high quality casting of silver jewelry and probably require further explanation. The prevailing problem is, that molten silver and silver alloys (unlike gold or gold alloys) can absorb huge quantities of oxygen, which is released during solidification, leading to gas porosity. Raw and recycling material can contain significant levels of oxygen that can lead to porosity if no proper degassing of the material is carried out during remelting or pre-alloying before casting. Furthermore inadequate process parameters can lead to uptake of oxygen either during melting or after pouring, i.e. inside the flask when the metal is still partially liquid. The Indutherm casting equipment therefore allows evacuation of the closed melting chamber immediately after loading the metal into the crucible, so that any oxygen is removed from the environment before the metal eventually starts to melt. Optionally the vacuum can be maintained also during the melting process to effectively remove all the oxygen also from the molten material. This 'degassing' process step is of tremendous importance for remelting of scrap, even if it has been properly cleaned before.

### **"Oxidation Reduced Casting" for reduced formation of firestain**

Also 'firestain' (or 'firescale') is related to uptake of oxygen by the as-cast material during the cooling process after pouring. Even if the metal is already solidified, oxygen can penetrate deep into the surface. Once there it can oxidise copper, the primary alloying element of sterling silver alloys and then it forms a thick gray oxide layer covered on the surface by a thin and dark, sometimes almost black, oxide layer. While the thin dark layers are easily removed by pickling, the thick grey layers can hardly be removed completely even during the subsequent surface finishing process and eventually lead to the bad surface phenomenon known as 'firescale'. The Indutherm casting equipment therefore allows for backfilling the flask chamber with inert gas after pouring. The flask is then kept for several minutes in the protected atmosphere, so that the as-cast material is protected from oxygen during the cooling-down process. In the meantime the new casting cycle can already be started with melting of the metal for the next flask. This 'overlapping' mode has proved to be especially effective in improving the quality of as-cast silver jewelry even in a high-throughput production process with short casting cycle times. This holds also for those casters using one of the firescale-free silver alloys since the "Oxidation Reduced Casting"-system increases also their performance.



*Firestain in microscope view*

## Training and technical support

### **"Only a truly satisfied customer is a good customer"**

(Peter Hofmann)

Further sources for typical casting defects and recommendations for their avoidance have been continuously researched. Indutherm is spending a lot of efforts on transferring this knowledge to their customers and partners, for example in the framework of training seminars. The seminar series 'Same Same But Different', held in Bangkok in 2008 and now continued in 2009 with a technical workshop, attracted over 100 participants per seminar. It is organised by Indutherm's partner ProTech Transfer [www.protech-transfer.com](http://www.protech-transfer.com) in cooperation with Legor Group S.E.Asia [www.legor.com](http://www.legor.com), both seated in Bangkok.

Besides investment casting equipment, Indutherm also develops and produces equipment for open melting and casting, scrap re-melting, ingot casting, production of granules, continuous casting, sintering of multi-coloured rings and further specialty applications. All equipment is available in different sizes to suit the needs of different industries: from jewellery over arts, dental and medical applications to components for the automotive and aerospace industry, from rapid prototyping over small batch to large capacity production. The metals and alloys that can be processed range from copper, silver and gold, over palladium and platinum, to steel, nickel, cobalt as well as light metals like aluminium and magnesium.

#### **Continuous improvement of equipment by dedication to R&D**

*The German company Indutherm, seated near to Pforzheim, the centre of the German jewellery industry, is developing and producing vacuum investment casting equipment for gold and silver jewellery production since 1996. Considerable research and development efforts, carried out in close cooperation with customers, external specialists as well as universities and institutions within international research projects, have led to continuous optimisation of their equipment. Particular focus has been given to avoidance of the prevailing silver casting defects like bad surface quality due to porosity, inclusions and firestain as well as fracturing or hot-cracking, therewith responding to the growing demands and expectations of the jewellery manufacturing companies.*

Indutherm equipment is available world-wide through a network of well-trained sales representatives. The possibility for remote servicing by GSM modem and the simple replacement of all important modular components guarantee a fast and easy service, minimise the risk for production steps and ensure long term reliability.

GSM modem

