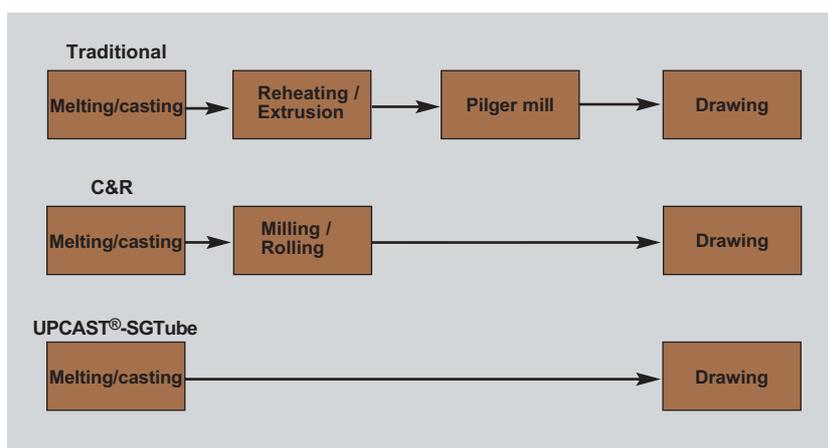


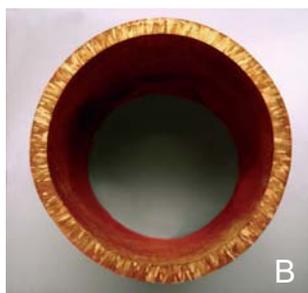
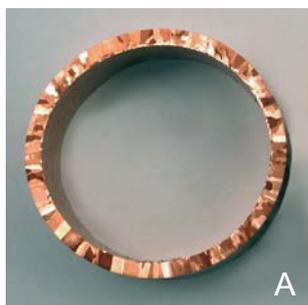
Finland's UPCAST OY continues to make news – now with UPCAST®-SGTube an exciting new technology for casting fine grain copper DHP tubes suited to both sanitary and ACR tube production. According to the company UPCAST®-SGTube builds on the advantages inherent in the UPCAST upward continuous casting method namely low investment and production costs, near net shape casting as well as GREENerCAST features to continuously cast thin-walled tube ready for direct drawing using conventional methods. At the moment of writing equipment for the first UPCAST®-SGTube customer are just being readied for shipment.

## New UPCAST® Developments Target Copper Tube Production and Environmental Benefits

Readers familiar with UPCAST® will already know this casting method was developed by Finland's Outokumpu Group in 1968 with the first production line for wire rod commissioned in 1971 at Outokumpu's production facility in Pori, Finland. That line, modernized and upgraded, is still in operation now under LUVATA, a new company formed after Outokumpu divested its copper business in 2005. Altogether more than



Alternative ways of producing tubes.



### Cross sections of cast tubes:

The sample casts, both otherwise identical in terms of chemistry, illustrate the advantages of UPCAST®-SGTube. In sample "B" – cast with UPCAST®-SGTube technology – grain distribution is small and uniform. Grains are on average three to four times smaller than those in sample "A", and in no instance do grains extend all the way across the wall thickness.

180 UPCAST® lines have been delivered during the past 40 years.

UPCAST® technology is based on the submerged die casting technique and has evolved into a sophisticated continuous casting system for non-ferrous materials. In essence, the casting begins with the insertion of a steel "fishing" rod with detachable copper or steel "bait" at the tip. Upon its insertion into the cooler-die assembly, melt solidifies against the bait and the fishing rod is pulled upwards in strokes by a traction shaft and pinch roller. When the cast rod or tube passes

the traction shaft level the fishing rod is removed and the bait is cut away. The process is self maintained and the cast product is coiled in racks or on pallets.

UPCAST® lines are available in both single- and double-furnace configurations. Single-furnace lines are compact units built around a combined melting/holding furnace while double-furnace UPCAST® lines comprise of separate melting and holding furnaces connected with a launder. Maximum outputs are 12,000 TPA and 40,000 TPA respectively. Single-furnace lines can easily be ex-

panded into double-furnace configuration.

UPCAST OY's R&D team spent several months testing new tool designs and new casting stroke forms before reaching the point where it was possible to cast thin-walled tube with the desired grain size in a consistent manner. Our photo block shows two sample casts, both otherwise identical in terms of chemistry, that illustrate the advantages of UPCAST®-SGTube.

In sample "A" – cast with the conventional UPCAST® system – the grain size is mostly large and non-uniform and extends across the wall thickness, making the structure rather vulnerable during drawing and bending. Any intergranular crack would easily propagate between the inner and outer surfaces of the tube, ultimately resulting in rejection due to quality reasons.

In sample "B" – cast with UPCAST®-SGTube technology – grain distribution is small and uniform. Grains are on average three to four times smaller than those in sample "A", and in no instance do grains extend all the way across the wall thickness. At the micro level, it was also noticed that the dendritic structure was finer in sample "B" – key characteristics that are predictors of good drawing performance.

The drawability of the cast tube has been verified during extensive production scale testing in three tube mills on two continents. UPCAST®-SGTube with as cast dimensions of 38x2,5mm has been drawn down to 9,54x0,4mm size with excellent results. Drawing was performed in nine passes – including one "sink pass" – using standard



**UPCAST® technology is available in both single- and double-furnace configurations. Single-furnace lines are compact units built around a combined melting/holding furnace while double-furnace UPCAST® lines comprise of separate melting and holding furnaces connected with a launder. Shown here is a double-furnace UPCAST® unit with a production capacity of 24,000 TPA.**

spinner blocks. There was one intermediate inductive annealing at 25mm diameter for recrystallization of the cast grain structure. Eddy current testing was performed during final coiling, followed by bright annealing as the final process step. Inner-grooving tests of drawn tubes are currently under way.

As seen by comparing process steps needed by alternate tube manufacturing routes, the potential for great savings both in investment and production costs is obvious when using UPCAST®-SGTube as the first step. An important by-product of UPCAST®-SGTube technology is the significantly reduced environmental impact compared to other technologies currently in use. This reflects UPCAST OY's commitment to what it calls GREENerCAST technology, an approach that leverages the inherently green character of UPCAST® technology while simultaneously tackling indirect issues.

While UPCAST® is in itself a green technology – just electricity, compressed air

and cooling water are needed to run the process producing no harmful emissions – UPCAST OY has focused on making this casting technology even greener by concentrating on indirect environmental effects, especially energy consumption. Thus GREENerCAST technology adds also a decidedly economic dimension to the overall technology equation.

Recent examples include:

- 1. Improved insulation for furnaces.** Furnace linings have been redesigned to reduce heat losses.
- 2. Use of fast-switching power transistors.** Stepless power supply systems utilizing state-of-the-art power transistor technology have replaced conventional stepped designs – a move that has significantly lowered energy consumption.
- 3. Use of double loop inductors with special channel design** that lead to markedly improved magnetically-driven convection within the inductor channel and lowered energy consumption.

Our final photo illustrates the potential for the new GREENerCAST technology in the form of an UPCAST® production line that embodies all of the above mentioned features. The photo shows a double-furnace UPCAST® unit with a production capacity of 24,000 TPA.

Readers interested in learning more about UPCAST®, UPCAST®-SGTube and GREENerCAST technologies are invited to contact UPCAST OY directly for more information or to visit the UPCAST OY website at [www.upcast.com](http://www.upcast.com). ■

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