



SEAM PARTNERS WITH COMPANY INVOLVED IN CHILEAN MINE RESCUE

Dr Ramesh Raghavendra & Dr Owen Clarkin analysing a 3D scan

Ever since its launch in early 2009, the SEAM (South Eastern Applied Materials) Research Centre, has been proactively engaged in assisting industries in the South Eastern region of Ireland and beyond.

SEAM, funded by Enterprise Ireland under the Applied Research Enhancement Programme, is providing technical and scientific support to industries on process and product development related issues utilising its niche technologies (X-ray microtomography, Finite Element Modelling & Microwave Processing) and materials research capabilities. SEAM is currently serving wide ranging sectors including medical devices, orthopaedics, pharmaceutical, precision engineering, electronics and construction and has forged strong collaborative links with several well established multinational and indigenous companies in Ireland.

Notable among the latest SEAM clients is Mincon, an indigenous Irish company, based in Shannon, Co. Clare. Mincon made headlines recently for their proud involvement in the 2010 Chilean miners' rescue. Founded in 1977, Mincon produces state-of-the-art engineered rock drills and associated parts. The company has grown in strength over the years through dedication to the highest design specifications and manufacturing methods and is now the world's third largest manufacturer of drill heads for down-the-hole percussive drilling operations. One of Mincon's hammer and drill bits (MX5053) (Figure 1) was used to establish the initial life line to the thirty three miners trapped 2,300 feet below ground in the San José gold and copper mine outside Copiapo, Chile.

Over the last four years Mincon has undertaken a million euro design project to develop superior drill heads (Figure 2) for the drilling of geothermal heating wells in countries like Sweden. This is an extremely challenging drilling environment and sometimes, the failure of the drill head occurs through a combination of operator inexperience and flaws in the drill head generated by the manufacturing process such as residual stresses. This failure is known as "chunking" and is characterised by having a large piece of the metallic head complete with tungsten carbide insert detached from the drill-head. This is a serious problem for drillers as it can result in the complete destruction of the drill head or possibly the drill hole and also the time penalty of having to recover the tool and replace the drill-head. Mincon was interested in minimising these kinds of failures in service so as to provide them with a strong competitive edge in the drilling industry.

SEAM's Finite Element Modelling (FEM) and metallurgical research capability enabled the group to establish links with Mincon. After understanding the company's needs, SEAM submitted an Innovation Partnership proposal to Enterprise Ireland and was successful. The project, which is of 18 months duration, aims to understand the drill head fracture mechanisms and to develop a design optimised drill head for down-the-hole drilling operations. The project work officially commenced in September 2010 and is making progress in solving this problem. SEAM takes pride in working with visionary indigenous companies like Mincon and endeavours to ensure that the project outcome will enable Mincon to have a greater understanding of the science behind drill head failures and the solutions to remedy the same.



Figure 1: Mincon's MX5053 hammer and drill bit used in Chilean Miner rescue



Figure 2: Typical Mincon 115 mm drill head

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