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Cryogenics Engineering for Superconducting Magnets at DEMACO

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Cryogenic technology is extensively used at DESY, FERMILAB, ITER, CERN, FAIR and ESS to create and maintain low-temperature conditions for the magnets. In order to operate at high magnetic fields, magnets are cooled with supercritical helium at 4 K (-269°C). They are surrounded by a large cryostat and an actively-cooled thermal shield with a forced flow of helium. Efficient cryogenic infrastructures are needed for the transport and distribution of Liquid He to the cryo-modules and to return helium to the refrigerator plants. There are numerous cryogenic devices used for scientific and industrial application at low temperature. These include cryostats, cryogenic liquid helium transfer lines, valve boxes, cold boxes and others. Every piece of equipment has a function within the cryogenic loop. It is all about flow control and flow conditioning within a vacuum insulated device. Demaco design addresses a number of issues such as the choice of design parameters, design code, system configuration, layout, and safety system assessment. It starts with user technical specifications, piping and instrumentation diagrams, and layouts, and it ends with the design (PDR, FDR, MRR), manufacturing and installation of a functional equipment. In the past, Demaco designed, fabricated and installed the Feed Caps, End Caps and string connection Boxes for the European XFEL project at DESY (Hamburg, DE). Currently Demaco is in the process to deliver the Feed Caps and Transfer Lines for the LCLS-II project at FERMILAB/SLAC (California, USA). Both projects are characterized by complex thermal shields, beam pipe integration, vacuum barriers and many instruments for control of the cryogenic system.

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