

LEP Quadrupole Magnets



MAGNETS
FOR FUSION



MAGNETS FOR HIGH
ENERGY PHYSICS



MAGNETS FOR
MEDICAL
APPLICATIONS

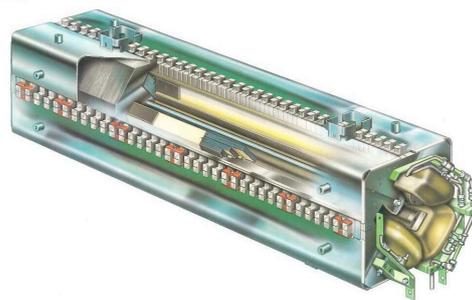


SYSTEMS
FOR ENERGY



SERVICES & REPAIRS

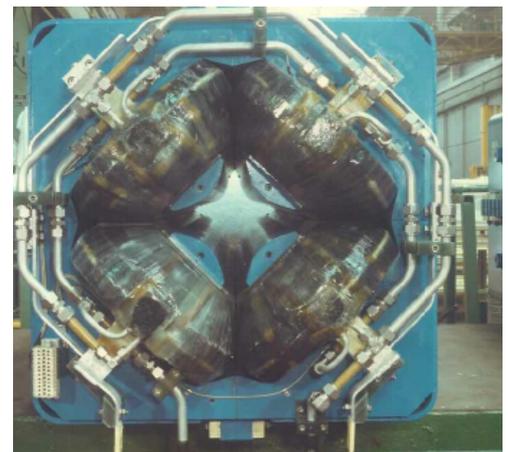
The MQA quadrupole magnets, completed in 1988, had the purpose to focalise the sub-atomic particle beam revolving under vacuum, inside a pipe laid underground in a 27 Km long tunnel forming the accelerator ring of the LEP Project (CERN, Geneva). The magnetic circuit of each quadrupole consists of four quadrants, formed by 1.5 mm thick pressed and welded laminations. Each quadrant terminates with an excitation coil obtained from an anodised aluminium conductor and impregnated under vacuum with radiation-proof epoxy resin. The full core mass weighs 3600 Kg, while the aluminium conductor has a weight of 240 Kg. The high precision of the polar profile (0.015 mm) is a particular feature of this magnetic circuit. The winding of the aluminium conductor is performed on a mandrel, determining the inner coil dimensions by means of a winding machine with horizontal axis and adjustable rotation speed. A photocell mounted on the line ensures correct overlapping of the coil turns, while insulation (anodising) defects of the conductor are revealed by a detector, so that they can be promptly repaired with 0.025 mm adhesive kapton film. Packing, pressing and welding of the core armature are performed automatically by a robot.



Type	Laminated Yoke Quadrupole
Yoke	Low carbon steel lamination
Conductor	Aluminium strip indirectly water cooled
Maximum Field in the Center	10.9 T/m
Current	300 Amp
Power	24 KW
Total Weight	3.7 t
Type of winding	58 turn spiral winding, 2 m long
Nominal current	300 A



Quadrupole assembly



LEP Quadrupole completed