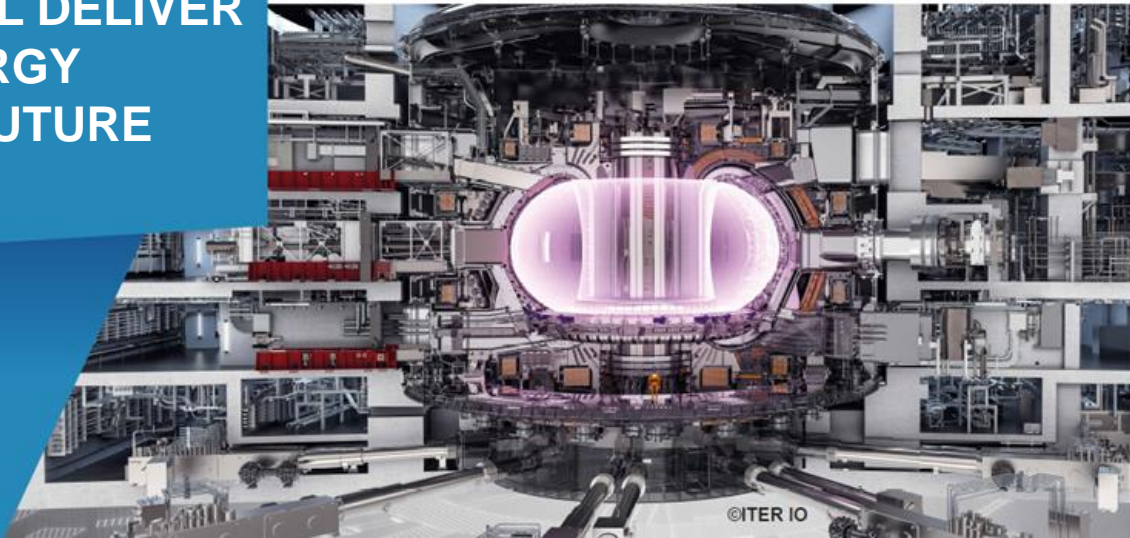
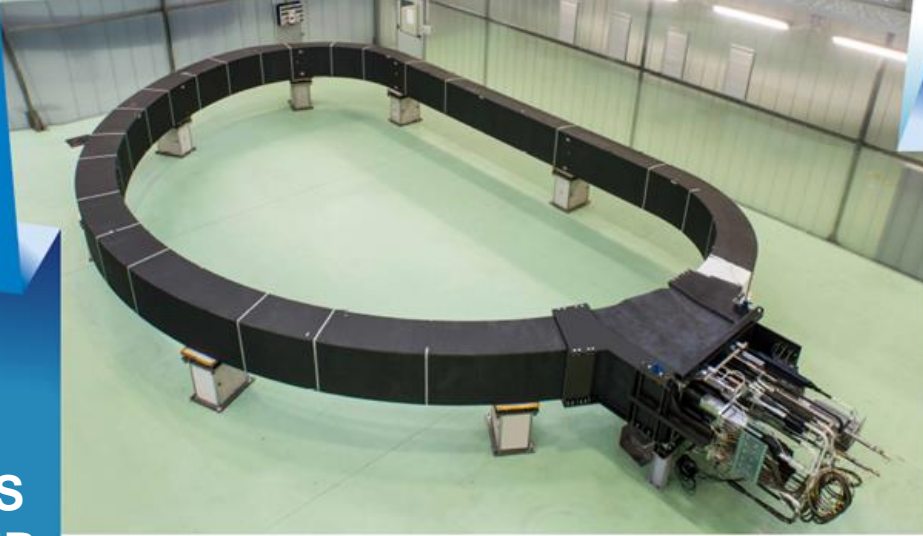


WORKING
TOGETHER
FOR THE MAGNETS
THAT WILL DELIVER
THE ENERGY
OF THE FUTURE



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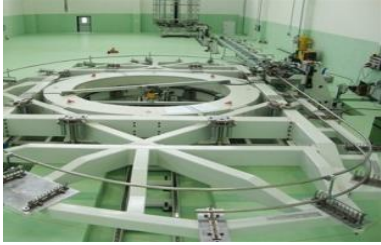
SINAC S.p.A.



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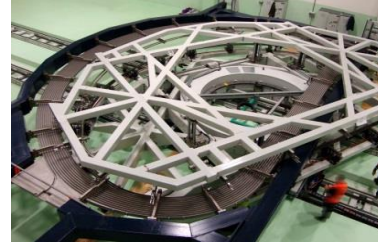
1. DP WINDING



2. CONDUCTOR HEAT TREATMENT



3. DP INSERTION INTO RP



4. TURN INSULATION



5. COVER WELDING



6. DP GROUND INSULATION



7. DP VPI



8. DP STACKING



9. WP GROUND INSULATION



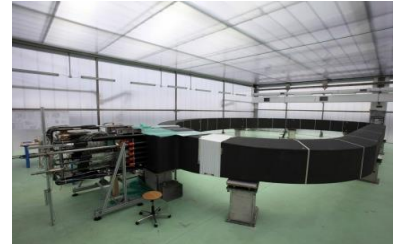
10. WP VPI



11. WP TEST



12. WP READY FOR SHIPPING



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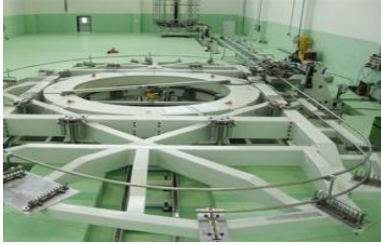


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1. DP WINDING



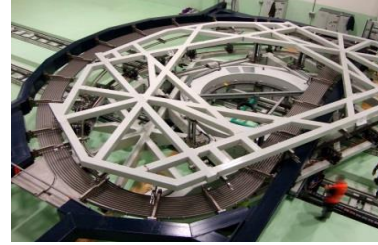
750 m of conductor are bent into a double-spiral trajectory to form a “Double-Pancake” (DP). During winding the length of the conductor is controlled with an accuracy of 0.05 mm/m

2. CONDUCTOR HEAT TREATMENT



To make the DP superconductive it needs to be heat treated at 650 °C in inert atmosphere

3. DP INSERTION INTO RP



The conductor of the DP will need to be inserted into a radial plate – a stainless steel structure with grooves on both sides in which the conductor will nestle. Its trajectory must match exactly that of the radial plate. For this reason, the conductor is formed to fit exactly the trajectory of the grooves of the radial plate

4. TURN INSULATION



The conductor of the DP is then wrapped and electrically insulated using several layers of glass Kapton tape



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5. COVER WELDING



Once the conductor of the DP is covered by the radial plate, then the structure is laser welded simultaneously by 3 robots. The total welded length is about 1.5 km

6. DP GROUND INSULATION



Each Double Pancake is wrapped, and electrically insulated with glass Kapton tape

7. DP VPI



The DP is transported to the vacuum pressure impregnation (VPI) station and lowered into a custom-fit mould. Epoxy resin is injected and hardened, filling all gaps and giving mechanical strength to the insulation

8. DP STACKING



The seven Double Pancakes are stacked and electrically jointed

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9. WP GROUND INSULATION



The seven Double Pancakes are wrapped, and electrically insulated with glass Kapton tape to form a Winding Pack- the core of the magnet!

10. WP VPI



A stainless steel impregnation mould is assembled around the winding pack. Then, it is heat-dried in vacuum at 110 °C to eliminate any humidity trapped and finally, resin is injected to fill in any gap in the electrical insulation. The winding pack is cured for five days at 155 °C to form a solid electrical insulation, and afterwards the magnet is extracted from the mould

11. WP TEST



Electrical tests are carried out in vacuum and in air. Dimensional checks using laser scans at 0.10 mm are performed and high pressure leak tests are done to reassure engineers that the component is in compliance

12. WP READY FOR SHIPPING



The magnet is assembled in a gigantic transportation steel frame to be shipped to SIMIC where cold tests will be performed and it will be inserted in its coil case