

Super Alloy Steam Turbine Rotors

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India may soon manufacture its own **super alloy steam turbine rotors** for efficient coal based thermal power plants, due to a facility being set up by Bharat Heavy Electricals Limited (BHEL) to assess **low cycle fatigue effects in rotors** required for such power plants.

More About Super Alloy Steam Turbine Rotors

- Technologies to increase the efficiency of coal based thermal power plants require **use of nickel based super alloy materials as against chrome based steels widely used now.**
- The nickel based Alloy 617M has been selected by the **Indian Advanced Ultra Super Critical (AUSC) consortium.** The alloy is industrially available and the AUSC consortium has already expressed confidence in indigenous development of the alloy.
- However, lack of experimental data on performance of Alloy 617M rotors hinders effective usage of this alloy in the Indian AUSC power plant.
- To overcome this challenge, the **Department of Science & Technology** under **Clean Energy Research Initiative** has supported a project to BHEL (R&D), Hyderabad for establishment of High Temperature Spin Test Rig (HTSTR).
- It will be the first facility in India for **experimental validation** of the design of AUSC steam turbine rotor relating to **creep – fatigue damage (deterioration of metals and alloys subjected to a cyclic thermo mechanical load at elevated temperature)** and will also be the only one of its kind in India in terms of establishing a real size engineering experimental set-up.

- It will subject the turbine rotor segments of weight upto 9000 kilograms to various damage conditions similar to that in the plant operation, like high temperatures upto 800 degree celsius, high speed upto 3600 revolutions per minute (RPM), followed by long term steady state operation and controlled heating and cooling.
- This facility will enable design validation for certifying the long term performance of super alloy monometallic and bimetallic welded rotors.

Super alloys

- Super alloys are a group of **nickel, iron-nickel and cobalt alloys** that have excellent heat resistant properties and **retain their stiffness, strength, toughness and dimensional stability** at temperatures much higher than the other similar structural materials.
- Super alloys also have good **resistance against corrosion and oxidation** when used at high temperatures.
- The most important type of super alloy is the nickel-based material that contains a high concentration of chromium, iron, titanium, cobalt and other alloying elements.