

Design of micro-mesh filter for Turbine of Indigenous helium plant of IPR

Abstract

Project definition and objectives: LCPC Division of IPR is engaged in the development of high speed cryogenic helium turbine required for the Indigenous helium plant. The rotational speed of turbine of this plant is in the range of few lakhs of RPM. These turbines are used to produce cryogenic temperature, which further helps to produce liquid helium at about 4.5 K. Helium gas entering this turbine should be free from particles of size 10 micron or bigger. As the rotational speed is very high, small particles can also disturb the stable operations of turbine and thereby can damage the turbine. In the inlet process pipe, a filter has to be installed, so that, it can filter particles of size 10 micron or bigger and should have pressure drop less than 50 mbar. The filter cartridge, its housing, inlet and outlet pipe sizes should be designed accordingly. The nominal helium flow rate for turbine-1 of the Indigenous helium plant of IPR is 45 g/s at 13 bar and 35 K. The design pressure of the filter is 20 bar.

Scope of work:

1. Study the existing indigenous HRL plant of the IPR and functioning of helium turbines of this plant.
2. Study the literature for filter design.
3. Study different types of filter media and decide the suitable filter media.
4. Design the filter cartridge and housing.
5. Make the drawings and fabrication plan.
6. Write a report

Expected Project Outcome: A report for methodology to design a micro-mesh filter

Academic Project Requirements:

1) Required No. of student(s) for academic project: 1

2) Name of course with branch/discipline: B.E./B.Tech. Mechanical Engineering

3) Academic Project duration:

(a) Total academic project duration: 6 Weeks

(b) Student's presence at IPR for academic project work: 5 Full working Days per week

Email to: aksahu@ipr.res.in[Guide's e-mail address] and project_me@ipr.res.in [Academic Project Coordinator's e-mail address]

Phone Number: 079 -2182 [Guide's phone number]