Forbes Marshall Technical Challenge

IANC 2026, Vellore Institute of Technology

1. Background

In solid fired boilers in the process industry that use biomass as a fuel, the biomass is typically transported to the boiler furnace via a conveyor (e.g. belt conveyor, screw conveyor etc). This biomass is subsequently burned in the furnace to generate heat which is transferred to the water to convert it to steam.

This biomass can be in the form of -

- Raw biomass such as rice husk
- Briquettes or pellets
- Crushed, pulverised or as received (such as uncrushed briquettes)

There are significant variations in parameters like the bulk density of the biomass and moisture content in the biomass- both in terms of type of biomass as well as within the same stream of biomass (such as in the crushed briquettes due to uneven crushing process).

The instantaneous biomass flow rate also depends on the boiler load fluctuations. If the steam demand increases, biomass flow rate is increased and vice versa.

Both the mass flow rate of this biomass and its moisture content are important parameters to determine the boiler performance parameters such as the combustion efficiency or the boiler efficiency etc.

Typically, the biomass flow rate is measured in batches - e.g. one batch intended for 4-8 hours of combustion is weighed and the boiler performance parameters are also calculated based on the steam demand within that batch time. This is an averaged approach for that batch time and does not account for instantaneous operating conditions.

The moisture content is often measured in lab settings which are not always readily available.

2. Problem Statement

Prepare a concept design for system that can measure both biomass flow-rate (kg/hr or tons/hr) as well as moisture content (% kg/kg) such that -

- The system can measure the biomass flow rate (kg/hr or tons/hr) in real-time - for a maximum of 1 minute time window, ideally instantaneously.
- It can parallely measure moisture content (% kg/kg) in any type of biomass with the same timeframe as above.
- It is non-invasive - your proposed system / equipment can be added next to the flow path (the biomass conveyor) without disturbing the biomass flow.
- Relative error does not exceed above +/- 3% for the flow & moisture content values.

Submission is expected in the form of a 1-2 page report (pdf) of your solution that should include the following -

- Your understanding of the problem statement (1 paragraph)
- Your concept description including design details, images of solid modelling (if any), proposed system architecture, preliminary details of sensors used etc.

3. Who can participate?

Undergraduate / postgraduate student groups (1-4 members per group) from any engineering discipline from Vellore Institute of Technology.

Last date of submission - Midnight (IST) on March 22, 2026. Please contact the event coordinators from Vellore Institute for further details.

4. Evaluation Process

- The submitted entries will be evaluated and possibly shortlisted by Forbes Marshall.
- The shortlisted entries will need to present their solution to judge(s) from Forbes Marshall on March 23 or 24, 2026 at IANC event.

5. Prizes

- Winning team - INR 75,000/-
- Runner-up team - INR 25,000/-

6. Futurescope

Forbes Marshall may decide to convert the winning, runner-up or any other project(s) into a funded project to be taken up by the same group of students with a faculty guide. If this pathway is chosen -

- This subsequent project will be taken up in collaboration with mentors from Forbes Marshall.
- This will NOT be run in the form of an internship -
    - Students will need to complete their work at the institute itself.
    - Prototyping, testing etc. may be done at the Institute / Forbes Marshall Facilities.

7. Terms and conditions

- The decision by the judge(s) from Forbes Marshall will be final and binding on all participants for the entirety of this collaboration including the futurescope.
- By participating in this technical challenge, you agree to abide by the terms and conditions of the MoU between Vellore Institute of Technology and Forbes Marshall including Forbes Marshall's exclusive right to Intellectual Property subsisting in the submissions and results of this technical challenge.
- Forbes Marshall reserves the right to modify any and all aspects of this competition depending on the need of the hour.