

Details of CARE Facility

Name of CARE facility:

Virtually-Instrumented Polymerization Reactor with on-line Optimal Control Facility

Location:

Northern Lab-II (ChE Labs), Room 302

Total cost of equipment/facility:

Rs. 25 Lakhs

Year of CARE funding:

2001-02; operational since Mid 2004

Support provided by CARE:

Rs. 10 Lakhs (rest from DST Project)

Name of Principal Investigator:

Dr. Santosh K. Gupta (skgupta@iitk.ac.in; Tel: 7031/7127)

Participating departments:

Chemical Engineering

Brief description and capability of CARE facility: (Please add a photograph of the facility)

In the virtually instrumented, 1-liter Parr reactor set-up, the temperature and power-input to a *constant speed* agitator motor, are measured/recorded continuously as the polymerization (of methyl-methacrylate; MMA) takes place. The polymerization can be carried out at almost any desired set-point temperature history. The 'state' of the system (namely, the monomer conversion and the weight-average molecular weight) can be estimated on-line using the soft-sensors developed in the lab. On-line model adaptation and on-line optimal control for this system have also been carried out. Other systems can be/are being studied.



Technical Specifications:

1 liter SS Parr reactor with magnetic stirrer and motor-speed control, and relevant virtual instrumentation units

Utilization of the facility:

- a) PI: As described above, for on-line optimal control of MMA polymerization
- b) Others: Dr. Sanjay Gupta (ACMS) and Professor D. N. Saraf (now retired): same as above (as co-thesis supervisors)

Mechanism of time sharing:

Not applicable yet, since it was being used full-time for a PhD thesis. The reactor may be made available to others for about 10 % of the time, for research (since a lot of peripheral units are also involved). The unit is not meant for testing.

Charging mechanisms (for testing):

Not applicable

Any difficulties that you faced in running the CARE facility:

Not relevant. My PhD students developed this unit as part of their PhD thesis.

Link to the website for the CARE facility, if any:

Not relevant