# Supercritical $CO_2$ Textile Dyeing Technology (SCFTD)

Textile dyeing in supercritical $CO_2$ fluid offers multiple advantages as it provides an effective replacement of the traditional water based process which typically results in generation of large volumes of effluents and therefore an environmental stress. Additionally, SCFTD allows relatively lesser consumption of energy and solvents. Research carried out at IIT Bombay as well as by other groups internationally has shown that supercritical fluid (SCF) also provides an excellent medium for dye dissolution and fastening to fabrics.

Based on its R&D experience, IIT Bombay has recently developed fully the supercritical fluid based textile dyeing (SCFTD) technology that can be effectively harnessed by the textile industries. The SCFTD technology uses supercritical carbon dioxide as a solvent and can be used for dyeing the fabrics and fibres of polyester and cotton.

The figure shows a state-of-the-art SCFTD prototype plant – embodying innovative features – that has been designed and developed by IIT Bombay (in association with industry partners). The setup is currently housed in the Mumbai based textile research organisation Synthetic and Art Silk Mills Research Association (SASMIRA) and is being used for explorative research on SCF based textile dyeing.

A number of successful trials have been conducted using dyes of various colours to check the properties such as dye solubility, dye fixation and uniformity of deposition on fabric as well as fibre. The results of such studies are expected to help optimise processing conditions and establish the economic viability of this innovative technology. This information will also enable design a commercial plant for textile industries.


SCFTD prototype developed

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