

### COMPOSITES CURRICULUM - Unit Information

This unit forms part of the Masters level Composites Curriculum developed by Bristol and Plymouth Universities.

<b>Taught block title</b>	Manufacturing Processes B	
<b>Unit title</b>	Thermoplastic matrix processes	
<b>Level (Credit points)</b>	H (2)	
<b>Unit director</b>	Vijay Kumar Thakur	
<b>Unit description</b>		
This unit forms part of the Masters level Composites Curriculum. It provides Learners with no prior experience with thermoplastic polymers with a general introduction to the basic aspects of polymers; their understanding and applying thermoplastics in engineering applications.		
<b>Core subjects to be covered</b>		
<ol style="list-style-type: none"> <li>1. Introduction</li> <li>2. Engineering Polymers and processing techniques</li> <li>3. Introduction to Thermoplastic Polymers</li> <li>4. Classification of different types of Thermoplastic Polymers</li> <li>5. Properties of Thermoplastics</li> <li>6. Performance of different types of thermoplastics e.g. rubber / elastomers</li> <li>7. Material selection of Thermoplastics</li> <li>8. Processing of Thermoplastics</li> <li>9. Compression molding: Basic concept; detail of the process, the details of the machine, the various operating parameters.</li> <li>10. Application areas of compression molding: Limitation and Advantages</li> <li>11. Injection Molding: Types &amp; Process</li> </ol>	<ol style="list-style-type: none"> <li>12. Rotational Molding: Steps in rotational molding process; Process Parameters: Amount; temperature; time; speed; cooling rates</li> <li>13. Blow Molding: Extrusion Blow Molding; Injection Blow Molding; Process Parameters</li> <li>14. Transfer molding: Materials and Process Parameters-Heating time; Melting temperature of the charge; Applied pressure; Cooling time</li> <li>15. Thermoforming: Vacuum forming; Pressure forming; Matched die forming</li> <li>16. Extrusion: Technique &amp; Types; Process parameters: Melting temperature of plastic; Speed of the screw; Extrusion pressure required; Types of die used; Cooling medium</li> <li>17. Casting</li> </ol>	
<b>Statement of unit aims</b>		
The aims of this unit are to:		
<ol style="list-style-type: none"> <li>1. Provide Learners with an overview of the development of thermoplastic polymers</li> <li>2. Differentiate between thermoplastics and thermosets</li> <li>3. Identify the advantages and limitations of thermoplastics</li> <li>4. Give learners an understanding of the range of processing techniques</li> </ol>		

<b>Statement of learning outcomes</b>	
Learners will be able to:	
<ol style="list-style-type: none"> <li>1. Provide a basic overview of the different types of polymers</li> <li>2. Understand different aspects of thermoplastic polymers and their processing</li> <li>3. Understand different properties and their selection for applications in domestic as well as industrial appliances.</li> </ol>	
<b>Methods of teaching</b>	7 lectures, 2 lab classes and demonstrations, 1 class exercise
<b>Assessment details if required</b>	Written assignment (85%), 20 minute assessed presentation (15%)
<b>Timetable information</b>	2 days of teaching in a block