**Melt Processing**

**Pillar Leaders**
Diran Apelian, Worcester Polytechnic Institute  
Alan Luo, The Ohio State University

Melt processing uses molten metal to make products. The melt is cast in either disposable, semi-permanent, or permanent molds. Sand casting is an example of a process where the mold is disposable, whereas die casting uses a permanent mold.

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**Thermo-Mechanical Processing (TMP)**

**Pillar Leaders**
David Matlock, Colorado School of Mines  
Alan Luo, The Ohio State University

TMP refers to precise control of heat and deforming processes, e.g. forging, rolling, and extrusion, to produce materials and components with enhanced properties and performance.

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**Powder Processing**

**Pillar Leaders**
William Peter & Sudarsanam Suresh Babu, The University of Tennessee, Knoxville

In powder processing, metal powder is generally squeezed, sintered, and/or sprayed to form parts, sheets, or plates. The process allows greater control over the final composition of end products, their properties, and yield.

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**Agile Low-Cost Tooling**

**Pillar Leader**
Glenn Daehn, The Ohio State University

Agile, low cost tools are machines controlled by computers that can heat, cool, and deform material precisely, location by location. They shape metal like a potter shapes clay – providing shape and strength. They have great potential because they can be programmed quickly at low cost to respond to changing production needs.
Coatings
Pillar Leader
Rudolph Buchheit, The Ohio State University

Coatings are more than paint. Emerging coating processes are modifying the surface of metals to enhance their performance in exciting new ways.

Joining
Pillar Leader
Jerry Gould, EWI

A key challenge in using lightweight metals in manufacturing is joining them – to other lightweight metals, traditional steel alloys, or non-metallic materials.

ICME
Method Leader
John Allison, University of Michigan

Integrated Computational Materials Engineering (ICME) has great promise in creating computer “super models” that combine a much wider array of materials information than were previously possible. Using these new computer models will speed up the development of manufacturing innovations.