

## Curriculum Framework – Computer Integrated Manufacturing

### Unit 1 Principles of Manufacturing – Lesson 1.1 History of Manufacturing

#### Desired Results (stage 1)

##### **ESTABLISHED GOALS**

*It is expected that students will...*

- G1 – Demonstrate an ability to identify, formulate, and solve engineering problems.
- G2 – Demonstrate an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
- G3 – Demonstrate an ability to design and conduct experiments, as well as to analyze and interpret data.
- G4 – Demonstrate an ability to apply knowledge of mathematics, science, and engineering.

##### Transfer

**TRANSFER:** *Students will be able to independently use their learning to ...*

- T1 – Research topics according to accepted academic standards and become a resource to others on a selected topic. (NGSS Engineering Practice 6)
- T2 – Develop and deliver an informative presentation for peers. (NGSS Engineering Practice 8 and ABET 2014-2015, criterion 3g)
- T3 – Develop a context for analyzing manufacturing systems.

##### Meaning

**UNDERSTANDINGS:** *Students will understand that ...*

- U1 – Manufacturing is a series of interrelated activities and operations that involve product design, planning, producing, materials control, quality assurance, management, and marketing of that product.
- U2 – Manufacturing is essential to a healthy economy..
- U3 – Manufacturing in the United States avoids health risks that are accepted in other countries.
- U4 – There are many any careers associated with manufacturing.
- U5 – A variety of processes are used in the creation of products.

**ESSENTIAL QUESTIONS:** *Students will keep considering ...*

- Q1 – How can a product be manufactured efficiently?
- Q2 – How does manufacturing impact the economy and society?

<ul style="list-style-type: none"> <li>• G5 – Demonstrate an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.</li> <li>• G6 – Pursue the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.</li> <li>• G7 – Demonstrate an understanding of professional and ethical responsibility.</li> <li>• G8 – Demonstrate an ability to function on multidisciplinary teams.</li> <li>• G9 – Demonstrate an ability to communicate effectively.</li> <li>• G10 – Gain knowledge of contemporary issues.</li> <li>• G11 – Recognize the need for, and develop an ability to engage in life-long learning.</li> </ul>	<p style="text-align: center;"><b>Acquisition</b></p> <p><b>KNOWLEDGE:</b> <i>Students will...</i></p> <ul style="list-style-type: none"> <li>• K1 – Describe why and how manufacturing evolved. U1, U2, U3, U4, U5</li> <li>• K2 – Identify components of a typical manufacturing system. U1, U2, U4, U5</li> <li>• K3 – List common manufacturing techniques and processes. U3, U5</li> </ul>	<p><b>SKILLS:</b> <i>Students will...</i></p> <ul style="list-style-type: none"> <li>• S1 – Interpret how advances in techniques and technology impact modern manufacturing. U1, U2, U3, U5</li> <li>• S2 – Categorize how components of a typical manufacturing system such as customer, knowledge and processes represent manufacturing activities. U1, U5</li> <li>• S3 – Research common manufacturing techniques such as Kaizen and Flexible Manufacturing Systems and systems such as Computer Numerical Control and Automated Guided Vehicle. U1, U5</li> <li>• S4 – Summarize how manufacturing techniques and processes have evolved. U1, U2, U4, U5</li> <li>• S5 – Compare and contrast the advantages and disadvantages common manufacturing techniques and processes. U1, U2, U4, U5</li> </ul>
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Evidence <i>(stage 2)</i>		
Activities (A) Projects (P) Problems(B)	Assessment FOR Learning	Assessment OF Learning
1.1.1.A History Manufacturing	<ul style="list-style-type: none"> <li>• Essential questions</li> <li>• Responses to questions based on the presentation</li> </ul>	<ul style="list-style-type: none"> <li>• Responses to questions based on the presentation</li> <li>• Conclusion questions</li> </ul>
1.1.2.A Enterprise Wheel	<ul style="list-style-type: none"> <li>• Essential questions</li> <li>• Responses to questions based on the presentation</li> </ul>	<ul style="list-style-type: none"> <li>• Responses to questions based on the presentation</li> <li>• Conclusion questions</li> </ul>
1.1.3.P Manufacturing Research	<ul style="list-style-type: none"> <li>• Essential questions</li> <li>• Research notes</li> <li>• Peer review organizer</li> </ul>	<ul style="list-style-type: none"> <li>• Research documentation</li> <li>• Presentation of research</li> </ul>

Learning Plan <i>(stage 3)</i>	
Activities (A) Projects (P) Problems(B)	Knowledge and Skills
1.1.1.A History Manufacturing	K1, S1
1.1.2_A Enterprise Wheel	K2, S2
1.1.3.P Manufacturing Research	K3, S3, S4, S5