Computer Integrated Manufacturing
At-A-Glance - Lamar CISD

Ongoing Skills Imbedded All Year	**Professional Standards/Employability Skills/Technical Skills**		
	Problem solving and Process Thinking; Technical Knowledge and Skills; and Professional Practices and Communication. The student will complete activities, projects, and problems that challenge them to explore concepts and improve upon these skills.		
Ongoing Ways to Show	The student analyzes open-ended questions, creates design brief, identifies tools and materials, constrains, designs, and builds the project. Proper documentation of all project phases in engineering notebook will be enforced and graded twice a month throughout the course.		
Grading Period	**Unit Name**	**Estimated Time Frame**	**TEKS**
Grading Period 1 29 Days	**History of Manufacturing**	**5 Days**	1.1A, 1.1B, 1.1C, 1.1D, 1.1E, 1.1F, 1.1G, 1.1H
	PFD 1.1(A) The student will describe why and how manufacturing evolved. PFD 1.1(B) The student will list common manufacturing techniques and processes. PFD 1.1(C) The student will identify components of a typical manufacturing system. PFD 1.1(D) The student will interpret how advances in techniques and technology impact modern manufacturing. PFD 1.1(E) The student will categorize how components of a typical manufacturing system such as customer, knowledge and processes represent manufacturing activities. PFD 1.1(F) The student will research common manufacturing techniques such as Kaizen and Flexible Manufacturing Systems and systems such as Computer Numerical Control and Automated Guided Vehicle. PFD 1.1(G) The student will summarize how manufacturing techniques and processes have evolved. PFD 1.1(H) The student will compare and contrast the advantages and disadvantages common manufacturing techniques and processes.		
	Control Systems	**10 Days**	1.2A, 1.2B, 1.2C, 1.2D, 1.2E, 1.2F, 1.2G, 1.2H, 1.2I, 1.2J
	PFD 1.2(A) The student will identify open and closed loop systems. PFD 1.2(B) The student will describe how input and output devices are part of an open and closed loop system. PFD 1.2(C) The student will explain the purpose of a flowchart or pseudocode. PFD 1.2(D) The student will describe functions of a computer program. PFD 1.2(E) The student will identify how functions of a computer program can be applied to perform a task. PFD 1.2(F) The student will operate output devices to perform a function. PFD 1.2(G) The student will relate sensor input to the environment being measured. PFD 1.2(H) The student will create a flowchart or pseudocode to perform a task. PFD 1.2(I) The student will construct a control program to accomplish an objective such as motor reacting to the environment. PFD 1.2(J) The student will modify an open loop system to be a closed loop system using sensors.		
	Cost of Manufacturing	**14 Days**	1.3A, 1.3B, 1.3C, 1.3D, 1.3E, 1.3E, 1.3F, 1.3G, 1.3H
	PFD 1.3(A) The student will recognize fixed and variable costs of manufacturing a product. PFD 1.3(B) The student will identify direct and indirect costs of manufacturing a product. PFD 1.3(C) The student will recognize costs of a manufacturing system. PFD 1.3(D) The student will classify typical costs of manufacturing a given product. PFD 1.3(E) The student will design a manufacturing system with consideration to time and cost to produce a product. PFD 1.3(F) The student will construct a model of a manufacturing system. PFD 1.3(G) The student will construct a control program to operate a model factory. PFD 1.3(H) The student will compare the efficiencies of multiple manufacturing systems.		
Grading Period 2 26 Days	**Design for Manufacturing**	**7 Days**	2.1A, 2.1B, 2.1C, 2.1D, 2.1E, 2.1F, 2.1G, 2.1H, 2.1I, 2.1J, 2.1K, 2.1L
	PFD 2.1(A) The student will describe steps in a design process. PFD 2.1(B) The student will describe factors which affect a design. PFD 2.1(C) The student will identify principles of engineering ethics. PFD 2.1(D) The student will outline how mass properties impact manufacturing decisions. PFD 2.1(E) The student will analyze how adequate product fulfills a function. PFD 2.1(F) The student will summarize how a product can be modified to fulfill of function. PFD 2.1(G) The student will apply the engineering code of ethics when considering a design. PFD 2.1(H) The student will model an object using a drawing. PFD 2.1(I) The student will show the volume, mass, surface area of a model. PFD 2.1(J) The student will create a mathematical model to describe a manufacturing function. PFD 2.1(K) The student will calculate costs and physical requirements impacted by product physical properties. PFD 2.1(L) The student will explain how ethics impact engineering decisions.		

	How We Make Things	**5 Days**	2.2A, 2.2B, 2.2C, 2.2D, 2.2E
	PFD 2.2(A) The student will describe common prototyping techniques. PFD 2.2(B) The student will explain the difference between primary and secondary manufacturing processes. PFD 2.2(C) The student will describe common manufacturing processes. PFD 2.2(D) The student will analyze common prototyping techniques. PFD 2.2(E) The student will identify how manufacturing processes can be used to produce a product.		
	Product Development	**14 Days**	2.3A,2.3B, 2.3C, 2.3D, 2.3E, 2.3F, 2.3G, 2.3H, 2.3I, 2.3J, 2.3K
	PFD 2.3(A) The student will list examples of common CNC machines. PFD 2.3(B) The student will list common robot applications used in manufacturing. PFD 2.3(C) The student will identify common cutting tools. PFD 2.3(D) The student will describe parts and functions of common machines used in manufacturing. PFD 2.3(E) The student will select formulas which are used to determine milling machine settings. PFD 2.3(F) The student will describe common G & M Codes. PFD 2.3(G) The student will describe a procedure to operate a milling machine. PFD 2.3(H) The student will identify a machine which can be used to perform a process. PFD 2.3(I) The student will calculate settings needed for a milling machine. PFD 2.3(J) The student will interpret the actions that will be performed given a sample of machine code. PFD 2.3(K) The student will manually create machine code required to manufacture a product.		
Grading Period 3 25 Days	**Product Development continues**	**19 Days**	2.3L, 2.3M, 2.3N, 2.3O
	PFD 2.3(L) The student will create machine code to manufacture a product using Computer Aided Manufacturing (CAM) program. PFD 2.3(M) The student will test machine code accuracy using simulation software. PFD 2.3(N) The student will create a model using Computer Aided Design (CAD) software. PFD 2.3(O) The student will create a product using a CNC milling machine.		
	Intro to Robotic Auto	**6 Days**	3.1A, 3.1B, 3.1C, 3.1D, 3.1E, 3.1F, 3.1G, 3.1H
	PFD 3.1(A) The student will identify common robot types. PFD 3.1(B) The student will define accuracy and repeatability. PFD 3.1(C) The student will describe components of a robotic work cell. PFD 3.1(D) The student will describe roll angle. PFD 3.1(E) The student will list characteristics of robots in a manufacturing environment. PFD 3.1(F) The student will describe methods for materials to be handled in a manufacturing environment. PFD 3.1(G) The student will distinguish between accuracy and repeatability. PFD 3.1(H) The student will describe the development of robot technology and application.		
Grading Period 4 32 Days	**Robotic Auto**	**12 Days**	3.1I, 3.1J, 3.1K, 3.1L, 3.1M
	PFD 3.1(I) The student will create a program to control a robotic arm. PFD 3.1(J) The student will calculate roll angle for robotic arm movement. PFD 3.1(K) The student will create a program for robotic arm to communicate with another device. PFD 3.1(L) The student will analyze factors that impact robots in a manufacturing environment. PFD 3.1(M) The student will explain how materials handling impacts a manufacturing environment.		
	Elements of Auto Power	**12 Days**	3.2A, 3.2B, 3.2C, 3.2D, 3.2E, 3.2F
	PFD 3.2(A) The student will define torque, pressure, work and power. PFD 3.2(B) The student will identify equations of torque, pressure, work and power. PFD 3.2(C) The student will apply torque, pressure, work and power equations to engineering problems. PFD 3.2(D) The student will design a system to perform a task using fluid power. PFD 3.2(E) The student will construct a fluid power system. PFD 3.2(F) The student will create a program to operate a fluid power system.		
	Robotic Program & Usage	**8 Days**	3.3A, 3.3B,3.3C, 3.3D, 3.3E
	PFD 3.3(A) The student will describe robot components including drive systems, electrical components. PFD 3.3(B) The student will describe the envelope of common robot types. PFD3.3(C) The student will describe how robot geometry affects robot motion. PFD 3.3(D) The student will identify elements of a robotic program. PFD 3.3(E) The student will match robot type to application.		

Computer Integrated Manufacturing - CIM
Lab Safety and Scientific Processes
Readiness Standards
Supporting Standards

Grading Period 5 32 Days	**Robotic Program & Usage continue**	**18 Days**	3.3F, 3.3G, 3.3H
	PFD 3.3(F) The student will predict robot motion resulting from movement of an actuator. PFD 3.3(G) The student will create a program to control a robotic arm. PFD 3.3(H) The student will create programs for a robotic arm to communicate with a related machine.		
	CIM Systems	**14 Days**	4.1A, 4.1B, 4.1C, 4.1D, 4.1E, 4.1F
	PFD 4.1(A) The student will describe common CIM systems. PFD 4.1(B) The student will recognize machines and processes in a manufacturing setting. PFD 4.1(C) The student will compare and contrast common CIM systems. PFD 4.1(D) The student will breakdown a manufacturing system into machines and processes. PFD 4.1(E) The student will organize and express thoughts and information in a clear and concise manner. PFD 4.1(F) The student will explain factors that effect a manufacturing career.		
Grading Period 6 29 Days	**Integration of Manufacturing**	**29 Days**	4.2A, 4.2B, 4.2C, 4.2D, 4.2E, 4.2F, 4.2G, 4.2H, 4.2I, 4.2J
	PFD 4.2(A) The student will recognize process symbols. PFD 4.2(B) The student will identify the potential safety issues with a CIM system. PFD 4.2(C) The student will identify how functions of a computer program can be applied to perform a task. PFD 4.2(D) The student will outline a process for a manufacturing process. PFD 4.2(E) The student will design a system to manufacture a part. PFD 4.2(F) The student will construct a system to manufacture a part. PFD 4.2(G) The student will create a flowchart or pseudocode to perform a task. PFD 4.2(H) The student will construct a control program to accomplish a goal. PFD 4.2(I) The student will evaluate the effectiveness of a system to accomplish a goal. PFD 4.2(J) The student will identify strategies to resolve team conflict.		