

COURSE FAB3140: PRECISION MILLING 2**Level:** Advanced**Theme:** Production Systems and Processes**Prerequisite:** FAB2140 Precision Milling 1**Description:** Students develop specialized skills to use vertical and/or horizontal milling machines.**Parameters:** Students have access to a fabrication facility complete with horizontal mill plus accessories and to instruction from an individual with specialized training in advanced level machining practices.**Curriculum and Assessment Standards**

General Outcomes	Assessment Criteria and Conditions	Suggested Emphasis
<i>The student will:</i> <ul style="list-style-type: none"> • demonstrate print reading and job sequencing competencies • perform safe vertical and/or horizontal mill set-up procedures • perform groove keyway and gear cutting operations 	<i>Assessment of student achievement should be based on:</i> <ul style="list-style-type: none"> • application of print reading and sequencing skills to prepare a safe and efficient sequence of milling operations 	20
	<ul style="list-style-type: none"> • demonstrate approved practices to set up a vertical or horizontal mill to cut: <ul style="list-style-type: none"> – grooves – keyways – gear teeth 	10
	<ul style="list-style-type: none"> • completion of one or more of the following milling operations: <ul style="list-style-type: none"> – groove/slot – keyway – gear. <p><i>Assessment Tool</i> <i>Assessment Framework: Fabrication Process, FABPRS</i></p> <p><i>Standard</i> <i>Dimensions and levels of fit are to be within the stated tolerances and specifications</i> <i>Performance rating of 3 for each applicable task</i></p>	70

COURSE FAB3140: PRECISION MILLING 2 (continued)

General Outcomes	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> demonstrate basic competencies. 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> observations of individual effort and interpersonal interaction during the learning process. <p><i>Assessment Tool</i> <i>Basic Competencies Reference Guide and any assessment tools noted above</i></p>	<p>Integrated throughout</p>

Concept	Specific Outcomes	Notes
<p>Orientation</p> <ul style="list-style-type: none"> Health and Safety Milling Operations Cutters Indexing 	<p><i>The student should:</i></p> <ul style="list-style-type: none"> describe the hazards associated with manual milling operations describe a safety plan in case of accident describe safe set-up procedures to mill grooves, keyways and gear teeth identify and describe the types of cutters that are available for cutting common grooves/slots, keyways and gear teeth explain the difference between a high speed steel and a tungsten carbide cutter identify the conditions that produce cutter failure such as: <ul style="list-style-type: none"> excessive heat clogging work hardening identify common machine parts that require indexing describe how an indexing head is used when cutting a spur gear. 	<p>Teacher should be prepared to demonstrate each of these processes.</p> <p>Consider cutting and feed rates; material harness and condition of the cutters.</p>

COURSE FAB3140: PRECISION MILLING 2 (continued)

Concept	Specific Outcomes	Notes
<p>Planning and Management</p> <ul style="list-style-type: none"> • Print Reading • Work Sequencing 	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • use a machine drawing to determine: <ul style="list-style-type: none"> – overall size and shape of a machine part – specific types and sizes of grooves/slots, keyways and gear teeth • list and describe the machining operations for a given machine part and/or feature in a logical sequence • identify the appropriate type of milling machine and cutters for each operation • select work piece holding device • calculate the appropriate cutting speeds, feed rates and recommended depths of cut for a given operation • select appropriate cutting fluids. 	<p>Student calculations should be checked prior to their use.</p>
<p>Implementation</p>	<ul style="list-style-type: none"> • demonstrate skills in milling: <ul style="list-style-type: none"> – grooves/slots – keyways – gear teeth. 	
<p>Assessment</p> <ul style="list-style-type: none"> • Career Information • Career Preparation 	<ul style="list-style-type: none"> • identify career and further training opportunities related to precision milling • prepare a record of completed activities within a portfolio. 	<p>Remind students that conventional machining processes will remain; however, new methods such as laser, electric and electrochemical processes are emerging as alternative ways of machining.</p>

