



COURSE OUTLINE: MAC306 - CMPLX GRINDING TECH

Prepared: Peter Corbett

Approved: Corey Meunier, Chair, Technology and Skilled Trades

Course Code: Title	MAC306: COMPLEX GRINDING TECHNOLOGY
Program Number: Name	6347: GENERAL MACHINIST L3
Department:	MECHANICAL TECHNIQUES PS
Semesters/Terms:	20F, 21F, 22F
Course Description:	This course is designed to provide Level III General Machinist Apprentices the ability to demonstrate milling of complex geometric shapes.
Total Credits:	2
Hours/Week:	1
Total Hours:	18
Prerequisites:	There are no pre-requisites for this course.
Corequisites:	There are no co-requisites for this course.
Course Evaluation:	Passing Grade: 50%, D A minimum program GPA of 2.0 or higher where program specific standards exist is required for graduation.
Other Course Evaluation & Assessment Requirements:	Other Course Evaluation Requirements: Smart watches, smart phones and similar devices are not allowed during tests or quizzes and must be removed. Grade Definition Grade Point Equivalent A+ 90 - 100% 4.00 A 80 - 89% B 70 - 79% 3.00 C 60 - 69% 2.00 D 50 - 59% 1.00 F (Fail) 49% and below 0.00 CR (Credit) Credit for diploma requirements has been awarded. S Satisfactory achievement in field /clinical placement or non-graded subject area. U Unsatisfactory achievement in field/clinical placement or non-graded subject area. X A temporary grade limited to situations with extenuating circumstances giving a student additional time to complete the requirements for a course. NR Grade not reported to Registrar's office. W Student has withdrawn from the course without academic penalty.
Books and Required Resources:	Technology Of Machine Tools by Steve F. Krar, Arthur R. Gill, Peter Smid, Robert J. Gerritsen Publisher: McGraw - Hill Edition: 8 ISBN: 9781260565782

In response to public health requirements pertaining to the COVID19 pandemic, course delivery and assessment traditionally delivered in-class, may occur remotely either in whole or in part in the 2020-2021 academic year.



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Course Outcomes and Learning Objectives:

Course Outcome 1	Learning Objectives for Course Outcome 1
1. Describe safe working procedures when setting up and operating grinders.	1.1 Identify potential safety hazards which may occur during grinder set-up and operating procedures. Demonstrate safe working habits including: <ul style="list-style-type: none">- protective clothing and equipment- good housekeeping- start up and shut off procedures- securing and stabilizing of workpiece- guards and dust extraction system- dressing and inspection of grinding wheel- lock out procedure- maximum wheel RPM- ring test of wheel
Course Outcome 2	Learning Objectives for Course Outcome 2
2. Describe internal grinding techniques and processes. (1.5 hrs)	2.1 Identify machining processes and components of plain or universal cylindrical grinders: <ul style="list-style-type: none">- universal cylindrical grinding- tool post grinding- tool and cutter grinder- I/D grinder- jig grinder Describe cutting fluid applications.
Course Outcome 3	Learning Objectives for Course Outcome 3
3. Identify workholding devices and/or attachments used for internal grinding. (1.5 hrs)	3.1 Describe workholding devices, accessories, and attachments used in internal grinding techniques: <ul style="list-style-type: none">- wheel dressing attachment- radius and tangent wheel dresser- angular wheel dresser- radius dresser- three-jaw chuck- four-jaw chuck- magnetic chuck- collets chuck- crush roll forming- steady rest- arbors- universal work-head- internal grinding attachment
Course Outcome 4	Learning Objectives for Course Outcome 4
4. Describe grinding wheels used for internal grinding and sharpening of end mills. (2 hrs)	4.1 Identify grinding wheels: <ul style="list-style-type: none">- straight- recessed- cup- dish

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	<ul style="list-style-type: none"> - flared - cut-off - mounted <p>Describe mounting, truing, and dressing of grinding wheels.</p> <p>Identify cutting tool geometry on an end mill by determining:</p> <ul style="list-style-type: none"> - land - heel - flutes - helix angle - rake angle - tooth face - peripheral cutting edge - relief angles (clearance) - peripheral and end face clearance angles
Course Outcome 5	Learning Objectives for Course Outcome 5
5. Develop a plan for internal grinding and sharpening of end mills. (2 hrs)	<p>5.1 Interpret drawings, CAD data or process sheets to determine:</p> <ul style="list-style-type: none"> - workpiece material characteristics - form and shape of workpiece - surface finish - tolerance - machining operations and sequences <p>Identify grinding techniques:</p> <ul style="list-style-type: none"> - plunge grinding - I/D grinding - profile grinding - parallel grinding - internal taper grinding - centre gashing - form grinding - cut off grinding - grinding primary and secondary angles <p>Identify workholding devices and/or attachments:</p> <ul style="list-style-type: none"> - tooth rest and support - centre height gauge - wheel dressing attachment - collets chuck
Course Outcome 6	Learning Objectives for Course Outcome 6
6. Demonstrate internal grinding and end mill sharpening. (10 hrs)	<p>6.1 Demonstrate end mill sharpening.</p> <p>Demonstrate internal grinding.</p>
Course Outcome 7	Learning Objectives for Course Outcome 7
7. Perform routine maintenance. (1 hr)	<p>7.1 Demonstrate routine maintenance and cleaning procedures.</p> <p>Demonstrate lubrication procedures.</p>

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Demonstrate dismantling, handling, and storage of tools, tooling and workholding devices, and measuring equipment.

Evaluation Process and Grading System:

Evaluation Type	Evaluation Weight
Attendance, Participation and Attitude	5%
Final Test and Practical Project	50%
Mid term	25%
Quiz 1	10%
Quiz 2	10%

Date:

September 3, 2020

Addendum:

Please refer to the course outline addendum on the Learning Management System for further information.

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