



Program Details

NTMA's Mission Drives Our Focus on Workforce Development

NTMA's mission is to help members of the U.S. precision custom manufacturing industry achieve profitable growth and business success in a global economy through advocacy, advice, education, networking, information, programs, and services.

Apprenticeship programs combine on-the-job training with related instruction to develop highly skilled employees. Once established, programs reduce turnover rates, increase productivity, lower the cost of recruitment, and increase safety in the workplace.

NTMA has developed *NTMA-U* content to fulfill the related instruction component of apprenticeship programs for roles within precision machining. This online program consists of modules developed for precision machining and related occupations, by industry experts. Modules are available individually, in groups of three, or in totality (through the purchase of a portal).

Key features include:

- Available anytime, anywhere with an Internet connection
- Rich, narrated modules with practice problems and assessments
- Content relates to NIMS specifications, textbooks available
- Certificates available for download after each module
- College credit-earning potential, with a partnership with University of Akron's Mechanical Engineering Technology degree
- Federal Bureau of Apprenticeship Training approved

Assessing Potential and Ensuring Appropriate Placement

An important first step in hiring, training or promoting individuals is to assess current capabilities and knowledge.

NTMA has developed an online mechanical aptitude test (MAT) that covers:

- Mechanical and Spatial Relations
- Mechanical Reasoning
- Applied Mathematics
- Theoretical Reasoning

We recommend that potential hires achieve a score of 66% or higher, but each company can set its own standards. The test can also be used to accelerate a new student beyond the first semester of the program! Please contact NTMA for more details on using the assessment to place students beyond Series 1.

NTMA-U Module Descriptions and Details

The following pages describe the learning objectives, contact hours, and textbook requirements for all NTMA-U courses that are currently available.

NTMA-U 0-0960- Shop Safety (45 Contact Hours)

Textbook: None

This course covers basic shop safety practices, drill press safety, machine guarding, Lock-out Tag-out, MSDS-SDS, hazard communication standards, OSHA fact sheets, safe lifting, basic first aid and blood borne pathogens.

Apprenticeship Training (704 total contact hours) – grouped into semester-long Series

Series 1

NTMA-U 1: 1100-1A - Basic Blueprint (38 contact hours)

Textbook: The Technology of Manufacturing Blueprint Reading for Machinist Training

This course teaches the proper terminology, symbols, and guidelines for reading, sketching, and interpreting blueprints in a manufacturing environment. It includes dimensioning techniques, tolerancing, drafting lines using geometric equations, symbols, line types, orthographic views, isometric views, and offset, auxiliary and broken sections.

NTMA-U 1: 1120-1A - Basic Math (42 contact hours)

Textbook: New Practical Mathematics for Metalworking Trainees

This course teaches shop math concepts such as fractions, fraction to decimal conversions, and calculating angles.

NTMA-U 1: 1200-1A - Precision Machining Technology (42 contact hours)

Textbook: Precision Machining Technology - NIMS

This course introduces metal cutting operations – basic metallurgy, types of machines and their safe operation and set-up, terminology, quality measurement devices and methods, cutting tools, layouts, print reading, hand tools, and cutting tools.

Series 2

NTMA-U 2: 1200-2A - Precision Machine Technology 2 (42 contact hours)

Textbook: Precision Machining Technology - NIMS

This course focuses on metal removal processes and proper set-up and use of workholding devices on machines including the drill press, engine lathe, milling machine, and surface grinder, with a continued emphasis on shop safety and quality measurement devices. It also reviews the applications of the coordinate measuring machine (CMM), the optical comparator, and the electro-discharge machine (EDM).

NTMA-U 2: 1100-2 - Intermediate Blueprint Module 2 (38 contact hours)

Textbook: The Technology of Manufacturing Blueprint Reading for Machinist Training

This course improves efficiency in blueprint reading, building on the foundations of Basic Blueprint. It covers dimensioning, fraction to decimal conversion, drafting lines using geometric equations, line types, orthographic and isometric views, symbols, and offset, auxiliary, and broken sections.

NTMA-U 2: 1120-2A - Applied Mathematics (42 contact hours)

Textbook: New Practical Mathematics for Metalworking Trainees

This course is designed to increase your efficiencies in math skills and concepts that are necessary in shop activities. Emphasis on the relationship of math required for manufacturing of parts as viewed on blueprint drawings and how the concepts apply to manufacturing parts and machining processes.

Series 3

NTMA-U 3: 2300-3 - CNC-With Simulator (38 contact hours)

No Textbook

This course introduces tools and technology for computer numeric control (CNC) machining, teaches G&M Codes, and principles and applications of the Cartesian Coordinate System. It reviews the use of metal cutting tools as they relate to CNC programming, and the process for creating CNC programs, including safety precautions, proper machine set up and operational skills, and controlling part sizes with wear offsets.

NTMA-U 3: 2500-3 - Intermediate Applied Math (42 contact hours)

Textbook: New Practical Mathematics for Metalworking Trainees

This course builds upon the previous math courses. It explains the proper use of the Pythagorean theory and trigonometric function, right triangle problems, and the use sine bars and gage blocks.

NTMA-U 3: 1500-3 - Intermediate Blue Print Reading with Basic Essentials for GDT (38 contact hours)

Textbook: Intro to Geometric Tolerancing and Dimensioning (note: this book is also used in Semester 5)

This course introduces symbols and concepts of geometric dimensioning and tolerancing for engineering drawings.

Series 4

NTMA-U 4: 2720-4 - Metallurgy (38 contact hours)

Textbook: Material Science

This course introduces the nature, properties, and characteristics of materials, with a focus on metals. Chemical reactions, thermodynamics, and processing of iron and steel are covered, as well as how metals are alloyed and formed to achieve desired mechanical properties.

NTMA-U 4: 2800-4 - Advanced Math (38 contact hours)

Handouts that begin with 272-14

This course builds on the previous courses, and includes more complex applications, such as the use of the law of sines and the law of cosines.

NTMA-U 4: 2900-4 - Quality Control / SPC / Inspection (38 contact hours)

No Textbook

This course introduces quality control practices for machining operations. It teaches proper inspection techniques such as verifying part dimensions, location, and orientation, using the appropriate tools. This course also touches on the applications of statistics in process and quality control.

Series 5

NTMA-U 5: 2420-5 - Manufacturing Technology (38 contact hours)

No Textbook

This course focuses on the machining of various metals, including differing speeds and feed rates, as well as the use of different cutting tools.

NTMA-U 5: 2500-5 - GDT (38 contact hours)

Textbook: Intro to Geometric Tolerancing and Dimensioning (same textbook as Series 3 NTMA-U 1500)

This course focuses on how to interpret and apply the concepts of geometric dimensioning and tolerancing to engineering drawings. Topics include fundamentals of symbols, terms, positional tolerance applications, data frames, and conversion tables.

NTMA-U 5: 2800-5 - Advanced Applied Math (38 contact hours)**Handouts begin with Problem 297-74**

This course builds on previous courses and teaches applied mathematics needed to solve for unknown surfaces found on advanced blueprints.

Series 6

NTMA-U 6: 2420 - 6 Jig and Fixture (38 contact hours)**Textbook: Basic Jig & Fixture**

This course covers the designs of jigs, fixtures and dies. It includes the use and application of bushings, locating devices and work holding devices used in jigs, fixtures and dies.

NTMA-U 6: 2410-6 – Moldmaking (38 contact hours)**Textbook – Moldmaking**

This course covers the principles of injection molding, including the molding press and how it works, the basics of an injection mold, and mold components. It explains the heating of cooling of molds and the runners, gates, venting and hot runner systems. It also describes the various methods of producing cavities, cores and various mold components.

NTMA-U 6: 2800-6 - Advanced Math (38 contact hours)**Handouts begin with Problem 275-22**

This course builds on previous courses, and goes into more depth on applied mathematics required to solve for unknown surfaces found on more advanced blueprints.

NTMA-U 6: 1300-6 – Diemaking (38 contact hours)**Textbook: Basic Diemaking**

This course covers metal stamping die construction, materials, components, processes, and types related to automated manufacturing technology.

Post-Program Modules

NTMA-U 0-0950 –Advanced Diemaking Series 2 - 38 Contact Hours**Textbook – Advanced Diemaking**

This course covers die to press relationships, automatic feeds, inverted dies, compound dies, and progressive dies using the blank through process, and chop-off and parting principles. It also covers secondary operations: dies to notch, trim, shave, side-action dies to pierce, semi pierce, and shear form. The content finishes with drawing operations, redraw dies, combination dies, and computation procedures.

NTMA-U 0-4000-7 Dimensional Metrology - 45 Contact Hours**No Textbook**

This course teaches technical manufacturing terms and principles, the proper use of common hand-held measuring tools, the applications for GD&T, and probability and statistics including organization of data, sample space concepts, random variables, counting problems, binomial and normal distribution, central limit theorem, confidence intervals and test hypotheses for large and small samples, types I and II errors, linear regression and correlation