

### **Online Manufacturing Training**

### **FOUNDATIONAL**

#### **GENERAL SAFETY**

Intro to OSHA 101 Ergonomics 102 Personal Protective Equipment 111 Noise Reduction/Hearing Conservation 121 Respiratory Safety 131 Lockout/Tagout Procedures 141 SDS and Hazard Communication 151 Bloodborne Pathogens 161 Walking and Working Surfaces 171 Fire Safety and Prevention 181 Flammable/Combustible Liquids 191 Hand and Power Tool Safety 201 Safety for Lifting Devices 211 Powered Industrial Truck Safety 221

#### **DEPARTMENT SAFETY**

**Environmental Safety Hazards 241** 

Confined Spaces 231

Arc Flash Safety 251

Machine Guarding 271

Fall Protection 261

Safety for Hydraulics and Pneumatics 211 Grinding Safety 211 Additive Manufacturing Safety 121 Mazak Mill: Safety for the Mill 260 Mazak Mill: Safety for the Lathe 265 Safety for Composite Processing 115 Safety for Electrical Work 111 Safety for Assembly 105 Safety for Mechanical Work 111 Safety for Metal Cutting 101 Metal Cutting Fluid Safety 231 Press Brake Safety 100 Rigging Inspection and Safety 210 Robot Safety 211 Safety for Soldering 115 Stamping Safety 115 Welding Safety Essentials 101 PPE for Welding 111 Welding Fumes and Gases Safety 121 Electrical Safety for Welding 131 Oxyfuel Welding Safety 105

#### APPLIED MATHEMATICS

Math Fundamentals 101 Math: Fractions and Decimals 111 Applied and Engineering Sciences 110 Units of Measurement 112 Basics of Tolerance 121 Manufacturing Process Applications I 124 Manufacturing Process Applications II 125 Blueprint Reading 131

Algebra Fundamentals 141 Geometry: Lines and Angles 151 Geometry: Triangles 161

Geometry: Circles and Polygons 171 Shop Geometry Overview 170 Trig: The Pythagorean Theorem 201 Trigonometry: Sine, Cosine, Tangent 211 Trigonometry: Sine Bar Applications 221 Shop Trig Overview 210

Statistics 231

Interpreting Blueprints 230 Concepts of Calculus 310

#### **MATERIALS**

Introduction to Physical Properties 101 Introduction to Mechanical Properties 111 Introduction to Metals 121 Introduction to Ceramics 141 Introduction to Composites 151 Composite Processing 152 Metal Manufacturing 140 Classification of Steel 201 Essentials of Heat Treatment of Steel 211 Hardness Testing 221 Ferrous Metals 231 Nonferrous Metals 241 Thermosets 261 Principles of Injection Molding 255 Principles of Thermoforming 265 Exotic Alloys 301

#### INSPECTION

Basic Measurement 101 Calibration Fundamentals 111 Basics of Tolerance 121 **Blueprint Reading 131** Hole Standards and Inspection 141 Thread Standards and Inspection 151 Surface Texture and Inspection 201 Hardness Testing 221 Measuring System Analysis 300 Introduction to GD&T 301 Introduction to GD&T 200 (1994) Major Rules of GD&T 311 Interpreting GD&T 310 (1994) GD&T Applications 312 Inspecting a Prismatic Part 321 Inspecting a Cylindrical Part 331 Advanced Hole Inspection 341 Inspecting with Optical Comparators 351 Inspecting with CMMs 361 Calibration and Documentation 371 In-Line Inspection Applications 381

Lean Manufacturing Overview 101

Managing Flow 124 Identifying and Eliminating Waste 125 Developing a Lean Culture 135 **Total Productive Maintenance 141** 5S Overview 151 Cell Design and Pull Systems 161 Intro to Six Sigma 171 Troubleshooting 181 Conducting Kaizen Events 191 SPC Overview 211 Metrics for Lean 231 **Process Flow Charting 241** Strategies for Setup Reduction 251 **Total Quality Management Overview 261** Problem Solving 270 Product and Process Design 275 Value Stream Mapping: The Present State Value Stream Mapping: The Future State 311 Six Sigma Goals and Tools 310 Maintaining a Consistent Lean Culture 330 Transforming Lean into Business Results 340 Measuring Lean Systems 350

#### **QUALITY**

Quality Overview 111 ISO 9000 Review 121 ISO 9001: 2015 Review 122 Approaches to Maintenance 131 Process Design and Development 133 Product Design and Development 134 Production System Design & Development 136 Equipment/Tool Design and Development Intro to Supply Chain Management 140 Quality and Customer Service 175 Conducting an Internal Audit 201 IATF 16949: 2016 Overview 222

#### **MACHINING**

#### **ABRASIVES**

Intro to Abrasives 101 **Grinding Processes 201** Grinding Safety 211 Basic Grinding Theory 221 Basics of the Surface Grinder 231 Basics of the Cylindrical Grinder 232 Basics of the Centerless Grinder 233 Setup for the Surface Grinder 241 Setup for the Cylindrical Grinder 242 Setup for the Centerless Grinder 243 Surface Grinder Operation 251 Cylindrical Grinder Operation 252 Centerless Grinder Operation 253 Introduction to Grinding Fluids 261 **Grinding Variables 301 Grinding Ferrous Metals 311 Grinding Nonferrous Metals 321** Grinding Wheel Materials 331 Dressing and Truing 341 **Grinding Wheel Selection 351** Grinding Wheel Geometry 361

#### CNC

Intro to CNC Machines 201 History and Definition of CNC 202 Basics of the CNC Lathe 211 Basics of the CNC Mill 212 Basics of the CNC Swiss-Type Lathe 135 Coordinates for the CNC Lathe 221 Coordinates for the CNC Mill 222 Basics of G Code Programming 231 Intro to CAD and CAM for Machining 241 Control Panel Functions for CNC Lathe 251 Control Panel Functions for CNC Mill 252 Offsets on the CNC Lathe 261 Offsets on the CNC Mill 262 CNC Specs for the Mill 220 CNC Specs for the Lathe 225 Creating a CNC Turning Program 301 Creating a CNC Milling Program 302 Calculations for Programming the Lathe 311 Calculations for Programming the Mill 312 Canned Cycles for the Lathe 321 Canned Cycles for the Mill 322

#### CNC CONTROL-FANUC

Fanuc Mill: Control Panel Overview 250
Fanuc Lathe: Control Panel Overview 255
Fanuc Mill: Entering Offsets 260
Fanuc Lathe: Entering Offsets 265
Fanuc Mill: Locating Program Zero 270
Fanuc Lathe: Locating Program Zero 275
Fanuc Mill: Program Execution 280
Fanuc Lathe: Program Execution 285
Fanuc Mill: Program Storage 310
Fanuc Lathe: Program Storage 315

Fanuc Mill: First Part Runs 320 Fanuc Lathe: First Part Runs 325

#### CNC CONTROL-HAAS

Haas NGC: Control Panel Overview 101
Haas NGC: Entering Mill Offsets 201
Haas NGC: Entering Lathe Offsets 202
Haas NGC: Locating Program Zero on the

Haas NGC: Locating Program Zero on the

Lathe 212

Haas Mill: Control Panel Overview 250 Haas Lathe: Control Panel Overview 255 Haas Mill Classic Controls: Entering Offsets

260

Haas Lathe: Entering Offsets 265 Haas Mill Classic Controls: Locating

Program Zero 270

Haas Lathe: Locating Program Zero 275
Haas Mill: Program Execution 280
Haas Lathe: Program Execution 285
Haas Mill: Program Storage 310
Haas Lathe: Program Storage 315
Haas Mill: First Part Runs 320
Haas Lathe: First Part Runs 325

#### CNC CONTROL-MAZAK

Mazak Mill: Control Panel Overview 250 Mazak Lathe: Control Panel Overview 255 Mazak Mill: Safety for the Mill 260 Mazak Lathe: Safety for the Lathe 265 Mazak Mill: Locating Program Zero 270 Mazak Lathe: Locating Program Zero 275 Mazak Mill: Entering Offsets 280 Mazak Lathe: Entering Offsets 285 Creating an EIA/ISO Program for the Mazak Mill 286 Creating an EIA/ISO Program for the Mazak Lathe 287 Creating a Mazatrol Program for the Mill Creating a Mazatrol Program for the Lathe Mazak Mill: Program Execution 290 Mazak Lathe: Program Execution 295 Mazak Mill: Program Storage 310 Mazak Lathe: Program Storage 315 Mazak Mill: First Part Runs 320

#### MANUAL MACHINING

Mazak Lathe: First Part Runs 325

Manual Mill Basics 201
Engine Lathe Basics 211
Manual Mill Setup 221
Engine Lathe Setup 231
Benchwork and Layout Operations 241
Manual Mill Operation 251
Engine Lathe Operation 261
Holemaking on the Mill 271

Threading on the Engine Lathe 301
Taper Turning on the Engine Lathe 240

#### **Metal Cutting**

Safety for Metal Cutting 101 **Cutting Processes 111** Overview of Machine Tools 121 **Basic Cutting Theory 201** Intro to Screw Machining 160 **Band Saw Operations 211** Intro to Metal Cutting Fluids 221 Metal Cutting Fluid Safety 231 Prints for Metal Cutting Operations 241 Toolholders for Turning 260 Speed and Feed for the Lathe 301 Speed and Feed for the Mill 311 **Cutting Tool Materials 321** Carbide Grade Selection 331 **ANSI Insert Selection 341** Advanced Tool Materials 345 Lathe Tool Geometry 351 Mill Tool Geometry 361 **Drill Tool Geometry 371** Optimizing Tool Life and Process 381 Impact of Workpiece Materials 391

High-Speed Machining 310

Hard Turning 315

Machining Titanium Alloys 325

Intro to EDM 100

NIMS Core Skills 111

#### NIMS

NIMS Core Machining Skills 121
NIMS Core Milling Skills 131
NIMS Core Turning Skills 132
NIMS Core CNC Milling Skills 141
NIMS Core CNC Turning Skills 142
NIMS Core Advanced Machining Skills 151
NIMS Core Measurement & Materials Skills 211
NIMS Core Job Planning Skills 221
NIMS Core Mill Programming and Setup Skills 231
NIMS Core Lathe Programming and Setup Skills 232
NIMS Core Drill Press Skills 241
NIMS Core Grinding Skills 251
NIMS Core Manual Milling Skills 261

#### WORKHOLDING

Intro to Workholding 101 Locating Devices 121 Clamping Basics 108 Chucks, Collets, and Vises 110 Supporting and Locating Principles 111 Fixture Body Construction 200 Fixture Design Basics 201 Drill Bushing Selection 230

NIMS Core Manual Turning Skills 262

#### **MAINTENANCE**

#### **ELECTRICAL SYSTEMS**

Electrical Units 101
Safety for Electrical Work 111
Introduction to Circuits 201
Introduction to Magnetism 211
DC Circuit Components 221
NEC Overview 231
AC Fundamentals 241
Electrical Instruments 251
Electrical Print Reading 261
DC Power Sources 271
AC Power Sources 281
Conductor Selection 291
Series Circuit Calculations 201
Parallel Circuit Calculations 311
Battery Selection 321

#### HYDRAULICS AND PNEUMATICS

Intro to Fluid Systems 101
The Forces of Fluid Power 201
Safety for Hydraulics and Pneumatics 211
Introduction to Hydraulic Components 221
Introduction to Pneumatic Components 231
Introduction to Fluid Conductors 241
Fittings for Fluid Systems 251
Preventive Maintenance for Fluid Systems 261

Hydraulic Power Variables 301
Hydraulic Power Sources 302
Pneumatic Power Variables 311
Pneumatic Power Sources 312
Hydraulic Control Valves 341
Hydraulic Schematics and Basic Circuit
Design 342
Pneumatic Control Valves 351
Pneumatic Schematics and Basic Circuit
Design 352
Actuator Applications 361
Hydraulic Fluid Selection 371
Contamination and Filter Selection 381

Hydraulic Principles and System Design 391

#### MECHANICAL SYSTEMS

Introduction to Mechanical Systems 101
Safety for Mechanical Work 111
Forces of Machines 121
Mechanical Power Variables 202
Power Transmission Components 201
Lubricant Fundamentals 211
Bearing Applications 221
Spring Applications 231
Belt Drive Applications 241
Gear Applications 251
Gear Geometry 261
Clutch and Brake Applications 271

#### RIGGING

Intro to Machine Rigging 110
Rigging Equipment 120
Lifting and Moving Equipment 130
Rigging Inspection and Safety 210
Rigging Mechanics 220

#### MOTOR CONTROLS

Relays, Contactors, and Motor Starters 201 Control Devices 211 **Distribution Systems 221** Limit Switches and Proximity Sensors 231 Introduction to Electric Motors 301 Symbols and Diagrams for Motors 311 Logic and Line Diagrams 312 DC Motor Applications 321 AC Motor Applications 322 Solenoids 331 Reversing Motor Circuits 341 Motor Drive Systems and Maintenance 347 **Electrical Maintenance for Motor Drive** Systems 348 Mechanical Maintenance for Motor Drive Systems 349 Specs for Servomotors 330 Timers and Counters 340 Electronic Semiconductor Devices 350 Photonic Semiconductor Devices 355 Limit Switches and Proximity Sensors 360 Photoelectric and Ultrasonic Devices 365 Reduced Voltage Starting 370 Solid-State Relays and Starters 375 **Deceleration Methods 380** Acceleration Methods 385

#### PLCs-ALLEN BRADLEY/ROCKWELL

Introduction to PLCs 201 Hardware for PLCs 211 Basics of Ladder Logic 221 Numbering Systems and Codes 222 PLC Inputs and Outputs 231 Basic Programming for PLCS 241 PLC Timers and Counters 251 Networking for PLCs 261 Hand-Held Programmers of PLCs 280 PLC Diagrams and Programs 300 Overview of PLC Registers 305 PLC Program Control Instructions 310 Math for PLCs 320 Sequencer Instructions for PLCs 330 **PLC Installation Practices 340** PID for PLCs 350 Data Manipulation 360 Shift Registers 370

#### PLCs-SIEMENS

Basics of Siemens PLCs 200 Siemens PLC Hardware 210

Numbers, Codes, and Data Types for Siemens PLCs 220 Siemens PLC Communication 230 Siemens Human Machine Interfaces 250 Siemens PLC Inputs and Outputs 240 Siemens SIMATIC Modular PLCs 260 Siemens PLC Programming Concepts 270 Basic Ladder Diagram Programming for Siemens PLCs 280 **Basic Function Block Diagram Programming** for Siemens PLCs 290 Ladder Diagram Timers and Counters for Siemens PLCs 300 Function Block Diagram Timers and Counters for Siemens PLCs 310 Additional Ladder Diagram Instructions for Siemens PLCs 320 Additional Function Block Diagram Instructions for Siemens PLCs 330 Siemens SIMATIC S7-1200 PLCs 340 Siemens SIMATIC S7-1500 PLCs 350 Siemens Safety Integrated for Factory Automation 360

#### **ROBOTICS**

Introduction to Robotics 201 Robot Safety 211 Robot Components 120 **End Effectors 125** Applications for Robots 130 **Automated Systems and Control 135** Robot Axes 140 **Robot Sensors 150** Robot Troubleshooting 331 **Robot Maintenance 170** Concepts of Robot Programming 341 Robotic Drives, Hardware, and Components 220 Robot Installations 230 Robotic Control Systems 240 Vision Systems 250 **Industrial Network Integration 260** 

#### WELDING

What Is Oxyfuel Welding 100 Oxyfuel Welding Safety 105 Welding Safety Essentials 101 PPE for Welding 111 Welding Fumes and Gases Safety 121 **Electrical Safety for Welding 131** Introduction to Welding 141 What Is Arc Welding? 110 Introduction to Welding Processes 151 Arc Welding Processes 120 Math Fundamentals for Welding 161 Geometry Fundamentals for Welding 171 Material Tests for Welding 201 Welding Ferrous Metals 211 Welding Nonferrous Metals 212 Overview of Weld Types 221 Overview of Weld Defects 222 Welding Symbols and Codes 231 **Fabrication Process 232** Electrical Power for Arc Welding 241 Introduction to GMAW 251 Introduction to SMAW 252 Introduction to FCAW 261 Introduction to GTAW 262 Introduction to Submerged Arc Welding 160 Arc Welding Power Sources 260 Overview of Soldering 271 Thermal Cutting Overview 281 Oxyfuel Cutting Applications 282 Plasma Cutting 283 Intro to Automation 291 **GMAW Applications 301** Advanced GMAW Applications 302 **SMAW Applications 311** FCAW Applications 321 **GTAW Applications 331** Oxyfuel Welding Applications 207 SAW Applications 255

# ADDITIVE MANUFACTURING

Arc Welding Aluminum Alloys 310

Introduction to Additive Manufacturing 111
Additive Manufacturing Safety 121
The Basic Additive Manufacturing Process 131
Additive Manufacturing Methods and Materials 141
Design for Additive Manufacturing 201
Additive Manufacturing Materials Science 211
Integrating Additive Manufacturing with Traditional Manufacturing 221
Additive Manufacturing as a Secondary Process 231

### STAMPING/FORMING/ FABRICATING

#### **STAMPING**

Press Basics 110
Stamping Safety 115
Punch and Die Operations 120
Die Components 130
Coil Handling Equipment 140
Die Cutting Variables 200
Monitoring Press Operations 220
Guiding System Components 230
Stripper System Components 235

#### PRESS BRAKE

Press Brake Safety 100
Press Brake Components 110
Bending Fundamentals 120
Die Bending Operations 130
Operating the Press Brake 200
Press Brake Specifications 220

## COMPOSITES PROCESSING

Safety for Composite Processing 115
Traditional Composites 125
Adv. Thermoset Resins for Composites 130
Advanced Materials for Composites 135
Intro to Lay-up and Spray-up Molding 140
Intro to Compression Molding 170
Surface Finishing Composites 190
Vacuum Bagging: Single-Sided Bagging 230
Composite Inspection & Defect Prevention 240
Repair Methods for Composites 250

# ASSEMBLY/FINAL STAGE PROCESSES

#### **ADHESIVES**

Intro to Adhesive Bonding 110
Basics of the Bonding Process 120
Intro to Adhesive Properties 130
Types of Adhesives 140
Surface Preparation 210
Steps for Adhesive Application 220

#### COATINGS

Intro to Coating Composition 110 Surface Preparation for Coatings 120 Processes for Applying Coatings 140 Coating Defects 150 Troubleshooting Coating Defects 170

#### **FASTENERS**

Intro to Assembly 100
Safety for Assembly 105
Intro to Fastener Threads 110
Overview of Threaded Fasteners 117
Tools for Threaded Fasteners 120
Overview of Non-Threaded Fasteners 125
Intro to Fastener Ergonomics 130
Properties for Fasteners 200
Understanding Torque 210
Threaded Fastener Selection 215

#### **SOLDERING**

What is Soldering? 110 Safety for Soldering 115 Soldering Equipment 130 Soldering Applications 200 Solder and Flux Selection 210 Soldering PCBs 220 Lead-Free Soldering 230