TECHNICAL SKILLS KNOWLEDGEBASE

ASSESSMENTS TO IDENTIFY SKILL GAP

COMPANY NAME: ☐ **JOB TITLE:** ☐

COURSE NAME AND DESCRIPTION	MPACT	CLIENT

FUNDAMENTALS

101 - Reading Blueprints ☐ ☐
Introduction to Blueprints; Machine Parts; Machine Drawings; Sheet Metal Drawings; Building Drawings; Hydraulic and Pneumatic Drawings; Piping and Plumbing Drawings; Electrical Drawings; A/C and Refrigeration Drawings; Sketching

102 - Reading Schematics and Symbols ☐ ☐
Introduction to Schematics and Symbols; Symbols on Schematics; Electrical Symbols; Piping Symbols; Hydraulic and Pneumatic Symbols; Hydraulic and Pneumatic Diagrams; A/C and Refrigeration Systems; Welding and Joining Symbols

103 - Mathematics in the Plant ☐ ☐
Whole Numbers; Common Fractions; Decimal Fractions; Ratios and Proportions; Powers and Roots; Calculators; Geometry; Algebra; Using Formulas; Trigonometry

104 - Making Measurements ☐ ☐
Units of Measurement; Metric Measurement; Linear Measurement; Comparison and Surface Measurement; Measuring Bulk Materials; Measuring Motion; Measuring Forces; Measuring Temperature; Measuring Fluids; Measuring Electricity

105 - Metals in the Plant ☐ ☐
Introduction to Metals; Properties of Metals; Manufacturing Processes; Iron and Steel; Standard Steels; Heat Treatment; Copper; Aluminum; Magnesium and Titanium; Lead, Nickel, Tin, and Zinc

106 - Nonmetals in the Plant ☐ ☐
Introduction to Nonmetals; Plastics; Rubber; Wood; Construction Materials; Insulating Materials; Paints and Coatings; Industrial Chemicals; Adhesives; Carbon

107 - Hand Tools ☐ ☐
Measuring Tools; Wrenches and Screwdrivers; Pipefitting Tools; Plumbing Tools; Electrician's Tools; Woodworking Tools; Masonry, Plastering, and Glazing Tools; Sheet Metalworking Tools; Metalworking Tools; Hoisting and Pulling Tools

108 - Portable Power Tools ☐ ☐
Electric Drills; Electric Hammers; Pneumatic Drills and Hammers; Screwdrivers, Nut runners, and Wrenches; Linear-Motion Saws; Circular Saws; Routers and Planes; Electric Sanders; Grinders and Shears; Tool Sharpening

109.1 - Industrial Safety and Health ☐ ☐
Introduction to Safety and Health; Government Safety and Health Regulations; Personal Protective Equipment; Chemical Safety; Tool Safety; Material Handling; Working Safely with Machinery; Working Safely with Electricity; Electrical Equipment Protection; Fire Safety; Protecting your Health; A Safe Work Environment

110 - Troubleshooting Skills ☐ ☐
Introduction to Troubleshooting; Working with Other People; Troubleshooting Techniques; Aids to Troubleshooting; Preparing for Troubleshooting; Using Schematics and Diagrams; Solving Mechanical Problems; Solving Electrical Problems; Breakdown Maintenance; Planned Maintenance

ELECTRICAL SYSTEMS

201 - Basic Electricity and Electronics ☐ ☐
Introduction to Electricity; Static Electricity; Current Electricity; Magnetism; Current, Resistance, and Potential Difference; Electrical Components; Conductors; DC Circuits; AC Circuits; Electronics

202 - Batteries and DC Circuits ☐ ☐
Electrochemical Action; Battery Characteristics; Kinds of Batteries; Maintaining Lead-Acid Batteries; Charging Lead-Acid Batteries; Solving Problems in DC Circuits; DC Series Circuits; Parallel Circuits; Series-Parallel Circuits; DC Circuits in Use

COMPANY NAME: ☐ **JOB TITLE:** ☐

COURSE NAME AND DESCRIPTION	MPACT	CLIENT
203 - Transformers and AC Circuits Principles of Alternating Current; Mathematics in AC Circuits; Inductance and Inductive Reactance; Capacitance and Capacitive Reactance; Impedance; Power and Energy in AC Circuits; Three-Phase Circuits; Principles of Transformers; Transformer Applications; Maintaining Transformers	☐	☐
204.1 - Electrical Measuring Instruments Principles of Meter Operation; Ammeters, Voltmeters, and Watt-meters; Resistance Measurement; Multi-meters; Oscilloscopes	☐	☐
205.1 - Electrical Safety and Protection Electrical Hazards; Electrical Safety Equipment; Electrical Safety Procedures; Grounding, Ground Faults, and Short Circuits; Fuses and Circuit Breakers; Motor Protection	☐	☐
206 - DC Equipment and Controls DC Power in Industry; DC Electromagnets; DC Generators; DC Motors; DC Armatures; DC Relays; DC Controllers; DC Power Supplies; Silicon-Controlled Rectifiers	☐	☐
207 - Single-Phase Motors Introduction to Single-Phase Motors; Split-Phase Motors; Capacitor Motors; Repulsion Motors; Universal Motors; Special Motors; Synchros; Servos; Motor Installation; Motor Maintenance	☐	☐
208 - Three-Phase Systems Principles of Three-Phase Motors; Induction Motors; Synchronous Motors; Multispeed Motors; Maintaining Three-Phase Motors; Motor Starters; Three-Phase Motor Controllers; Alternators; Auxiliary Generator Systems; Power Distribution Systems	☐	☐
209 - AC Control Equipment Motor Starters; Switches and Controls; Limit Switches; Special Control Switches; Timers and Counters; Control Relays; Equipment for Hazardous Locations; Special Motor Controls; Motor control Centers; Control Panel Wiring	☐	☐
210 - Electrical Troubleshooting Troubleshooting with Electrical Schematics; Troubleshooting with Building Drawings; Troubleshooting with Control Circuits; Troubleshooting Combination Starters; Troubleshooting Control Devices; Troubleshooting Special Controls; Troubleshooting DC Motors; Troubleshooting AC Motors; Troubleshooting Lighting Systems; Saving Time in Troubleshooting	☐	☐
MECHANICAL SYSTEMS		
301 - Basic Mechanics Forces and Motion; Work, Energy and Power; Fluid Mechanics; Simple Machines; Machine Elements; Measurement Tools and Instruments; The Safe Use of Hand Tools; The Safe Use of Portable Power Tools; Fasteners; Friction and Wear	☐	☐
302 - Lubricants and Lubrication Principles of Lubrication; Characteristics of Lubricants; Additives, Lubricating Action, and Bearing Lubrication; Oils and Their Applications; General-Purpose Greases; Special-Purpose Greases and Dry-Film Lubricants; Lubrication Systems and Methods; Automatic Lubrication Methods; Lubricant Storage and Handling; Lubrication Management	☐	☐
303.1 - Power Transmission Equipment Belt Drives; Chain Drives; Gears; Gear Drives; Adjustable-Speed Drives; Shaft Alignment; Shaft Coupling Devices; Clutches and Brakes	☐	☐
304 - Bearings Bearings and Shafts; Plain Journal Bearings I; Plain Journal Bearings II; Antifriction Bearings I; Antifriction Bearings II; Ball and Roller Bearings; Specialized Bearings; Bearing Seals; Lubrication; Bearing Maintenance	☐	☐

COMPANY NAME: ☐ **JOB TITLE:** ☐

COURSE NAME AND DESCRIPTION	MPACT	CLIENT
305 - Pumps Pump Development and Application; Basic Pump Hydraulics; End-Suction Centrifugal Pumps; Propeller and Turbine Pumps; Rotary Pumps; Reciprocating Pumps; Metering Pumps; Special-Purpose Pumps; Packings and Seals; Pump Maintenance	☐	☐
306 - Piping Systems Introduction to Piping Systems; Metal Piping; Nonmetallic Piping; Tubing; Hoses; Fittings; Common Valves; Special Valves; Strainers, Filters and Traps; Accessories	☐	☐
307 - Basic Hydraulics Principles of Hydraulics; Hydraulic Fluids; Strainers and Filters; Reservoirs and Accumulators; Hydraulic Pumps; Piping, Tubing, and Fittings; Directional Control Valves; Pressure Control Valves; Cylinders; Hydraulic Motors	☐	☐
308 - Hydraulic Troubleshooting Hydraulic Systems; Hydraulic Schematic Diagrams; Installing Hydraulic Components; Installing Pipe and Tubes; Selecting Hydraulic Fluids; Planning System Maintenance; Troubleshooting Systems; Troubleshooting Valves; Troubleshooting Cylinders; Troubleshooting Pumps and Motors	☐	☐
309 - Basic Pneumatics Pneumatic Principles; Reciprocating Compressors; Rotary Compressors; Primary Air Treatment; Secondary Air Treatment; Piping, Hoses, and Tubing; Directional Control Valves; Pressure-Control Valves; Pneumatic Cylinders; Pneumatic Motors and Rotary Actuators	☐	☐
310 - Pneumatic Troubleshooting Pneumatic Systems; Pneumatic Schematic Diagrams; Installation of System Components; System Maintenance; Determining System Failures; Troubleshooting Air Compressors; Troubleshooting Control Valves; Troubleshooting Cylinders; Troubleshooting Air Motors; Pneumatic/Hydraulic Systems	☐	☐
AIR CONDITIONING AND REFRIGERATION		
431 - The Refrigeration Cycle Refrigeration and Air Conditioning Basics; Heat, Pressure, and Change of State; The Basic Refrigeration Cycle; Air Properties and Simple Psychrometrics; Tools, Test Instruments, and Safe Work Practices	☐	☐
432 - Refrigerants and Refrigerant Oils Physical Properties of Refrigerants; Refrigerant Classifications and Applications; Refrigerants and the Atmosphere; Refrigerants and the TPA; Refrigerant Filters and Driers; Tools and Procedures for Working with Refrigerants; Refrigerant Oils, Oil Maintenance, and Service Procedures	☐	☐
433 - Compressors Introduction to Compressors; Reciprocating Compressors; Rotary, Helical, and Scroll Compressors; Centrifugal Compressors; Compressor Motors; Compressor Control and Protection; Compressor Maintenance, Troubleshooting, and Repair	☐	☐
434 - Evaporators and Metering Devices Introduction to Evaporators; Direct Expansion Evaporators and Secondary Refrigeration Systems; Improving Evaporator Performance; Defrosting, Maintaining, and Troubleshooting Evaporators	☐	☐
435 - Condensers and Cooling Towers Air-Cooled Condensers; Water-Cooled Condensers; Cooling Towers and Spray Ponds; Evaporative Condensers; Controlling Water-Related Problems	☐	☐
436 - Piping Piping Materials and Fittings; Discharge Line; Liquid Line; Suction Line; Piping Systems Maintenance	☐	☐

COMPANY NAME: _____ **JOB TITLE:** _____

COURSE NAME AND DESCRIPTION	MPACT	CLIENT
437 - Control Systems Introduction to Control Systems; Sensors and Controlled Devices; Automatic Control Systems; Control of Refrigeration and Air-Conditioning Processes; Maintaining and Troubleshooting Controls	☐	☐
438 - Air-Handling Systems Air Movement and Distribution; Fans and Fan Motors; Ductwork Types, Fabrication, and Repair; Air Filtration; Air System Balancing and Troubleshooting; Indoor Air Quality and Sick Building Syndrome	☐	☐
439 - System Troubleshooting Preparation for Troubleshooting; Troubleshooting Procedures; Troubleshooting Electric Controls; Troubleshooting Pneumatic Controls; Troubleshooting The Refrigerant Circuit	☐	☐
440 - Absorption Chillers Principles of Absorption Chiller Systems; Water/Lithium Bromide Absorption Systems; Lithium Bromide Absorption - Controls and Maintenance; Ammonia/Water Absorption Systems; Evolving Absorption Systems; Absorption Systems vs. Mechanical Compression Systems	☐	☐
441 - Heat Pumps Introduction to Heat Pumps; Heat Pump Systems; Balance Points and Cost of Operation; Heat Pump Components; Heat Pump Controls; Heat Pump Installation; Heat Pump Checkout and Startup	☐	☐
442 - Heating System Basics Heat Energy; Personal Comfort and Heat Distribution Systems; Combustion; Chimneys and Venting; forced-Air Systems	☐	☐
443 - Heating System Equipment Gas Heating Equipment; Oil Heating Equipment; Electrical Heating Systems; Solid-Fuel Furnaces and Furnace Performance Criteria; Hydronic Systems; Other Heating System Equipment	☐	☐
AMMONIA REFRIGERATION		
461 - Ammonia Refrigeration Basics Ammonia Characteristics; Single-Stage Ammonia Systems; Two-Stage Ammonia Systems; Suction Accumulators and Intercoolers; Liquid Overfeed Systems	☐	☐
462 - Positive-Displacement Compressors Reciprocating Compressors; Sliding-Vane Rotary Booster Compressors; Oil-Flooded Screw Compressors; Screw Compressor Units; Ammonia Systems Lubrication Oil Management	☐	☐
463 - Evaporators, Condensers, and Controls Liquid Ammonia Evaporator Supply Methods; Evaporators; Air Unit Defrost Systems; Evaporative Condensers; Control Valves and Switches	☐	☐
464 - Purging, Piping and Safety Purging Air and Non-condensables; Ammonia System Piping; Ammonia System Safety Codes and Guidelines; OSHA Process Safety Management; EPA Regulations and Ammonia Safety	☐	☐
BUILDINGS AND GROUNDS		
361 - Introduction to Carpentry Layout and Hand Tools; Carpenter's Power Tools; Lumber, Wood Products, and Fasteners; Estimating Carpentry Costs; Plans, Specifications, and Codes; Constructing the Building Shell	☐	☐
362 - Constructing the Building Shell Footings; Foundations, and Forms; Framing the Structure; Framing the Roof with a Framing Square; Installing Windows and Exterior Doors; Installing Roofing and Siding	☐	☐

COMPANY NAME: _____ **JOB TITLE:** _____

COURSE NAME AND DESCRIPTION	MPACT	CLIENT
363 - Finishing the Building Interior Interior Walls and Ceilings; Laying Flooring; Stair Construction; Interior Doors and Door Jambs; Installing Interior Trim	☐	☐
364 - Structural Painting Paint Selection for Normal Conditions; Coatings for Extreme Conditions; Painting tools; Surface Preparation; Painting Techniques; Ground and Aerial Supports; Handling Hazardous Materials Safely	☐	☐
366 - Flat Roof Maintenance Introduction To Flat Roof Systems; Roof-Related Components; Causes of Common Roof Problems; Roof Inspection; Preventive Maintenance and Repair; Single-Ply Roofing	☐	☐
367 - Plumbing Systems Maintenance Introduction to Plumbing; Plumbing Fixtures; Sanitary Drainage Systems; Vent Systems; Storm Water Drainage; Potable Water Distribution; Hot Water Distribution; Valves; Piping Assembly Procedures; Maintaining Plumbing Systems	☐	☐
374 - Locks and Key Systems Commonly Used Doors and Locks; How Locks Operate; Installing Locks; Maintaining and Adjusting Locks; Key Control and Master Key Systems	☐	☐
375 - Landscaping Maintenance Basic Plant Care; Shade Trees; Turf Management; Shrub and Flower Care; Pest and Disease Control	☐	☐
CUSTODIAL MAINTENANCE		
451 - Cleaning Chemicals Using Chemicals Safely; Introduction to Cleaning Chemicals; Cleaning Agents; Disinfectants; Special-Purpose Cleaning Chemicals	☐	☐
452 - Floors and Floor Care Equipment Kinds of Flooring; Floor Machines; Vacuum Cleaners; Automatic Scrubbers; Other Powered Equipment	☐	☐
453 - Maintaining Floors and Other Surfaces Routine Floor Care Tasks; Floor Coatings; Periodic Floor Care Tasks; Choosing a Floor Care Method; Floor Care Problems; Other Cleaning Tasks	☐	☐
454 - Rest Room Care Rest Room Basics; Routine Rest Room Cleaning; Cleaning Plumbing Fixtures; Periodic Rest Room Cleaning; Rest Room Disinfection	☐	☐
455 - Carpet and Upholstery Care Carpet Materials and Construction; Preventive Maintenance and Routine Carpet Cleaning; Periodic Carpet Cleaning; Carpet Care Problems; Upholstery Care	☐	☐
ELECTRONICS		
251 - Semiconductors Introduction to Semiconductors; Environmental Conditions; Printed Circuit Boards; Transistors and Integrated Circuits; Packages and Performance Analysis	☐	☐
252 - Power Supplies Power Supplies and Power Conditioners; Cells and Batteries; Rectifiers; Filters; Voltage Regulators; Troubleshooting Power Supplies	☐	☐
253 - Amplifiers Introduction to Amplifiers; Single-Stage Amplifiers; Amplifier Performance and Multistage Amplifiers; Op Amps; Troubleshooting Amplifiers	☐	☐

COMPANY NAME: ☐ **JOB TITLE:** ☐

COURSE NAME AND DESCRIPTION	MPACT	CLIENT
254 - Oscillators Introduction to Oscillators; Flip-Flops; Logic Clocks; Filters and Waveforms; Troubleshooting Oscillators	☐	☐
291 - Digital Logic Systems Digital Logic Fundamentals; Logic Building Blocks; Medium- and Large-Scale IC's; Functional Logic Systems; Troubleshooting Logic Systems	☐	☐
ENERGY CONSERVATION		
376 - Energy Conservation Basics Energy and Its Sources; Why the Energy Crisis?; Energy Consumption and Loss; Practical Conservation Measures; Conducting an Energy Audit	☐	☐
377 - Energy Losses in Buildings Heat Flow Principles; Heat Loss/Gain Through Roofs; Minimizing Heat Flow Through Walls; Heat Loss/Gain Through Windows and Doors; Controlling Losses Through Floors	☐	☐
378 - Heating/Cooling System Efficiency Conditioning the Air; Managing Airflow in HVAC Systems; Conserving Energy in Heating Systems; Conserving Energy in Cooling Systems; Reducing Losses in Distribution Systems	☐	☐
379 - Mechanical Energy Conservation Reducing Friction; Cutting Transmission Losses; Pumps, Fans, and Compressors; Elevators and Conveyor Systems; Improving Vehicle Efficiency	☐	☐
380 - Electrical Energy Conservation Surveying Electrical Consumption; Using Load Management Techniques; Improving Electrical Equipment Efficiency; Conducting a Lighting Survey; Evaluating Lamps and Fixtures	☐	☐
FOUNDATIONS OF TECHNOLOGY		
391 - Force and Motion Scalers and Vectors; Motion Along a Straight Line; Acceleration; How to Describe Force; Force and Acceleration; Equilibrium; Rotational and Circular Motion; Simple Harmonic Motion	☐	☐
INDUSTRIAL HAZARD CONTROL		
151 - Chemical Hazards What the Standard Requires; Types of Chemical Hazards; Material Safety Data Sheets	☐	☐
MACHINE SHOP PRACTICES		
315 - Machine Shop Practice Principles of Machining; Layout Work and Shop Safety; Setup Tools; Setup Measurement; How to Grind Single-Point Tools; How to Grind Multi-point Tools	☐	☐
316 - Machine Shop Turning Operations Latches and Attachments; Basic Lathe Operations; Drilling and Boring; Reaming; Threads and Threading	☐	☐
317 - Machine Shop Shaping Operations Milling Operations; Shaping and Planning; Grinding Operations; Gear Cutting; Power Sawing	☐	☐
323 - Machine Shop Job Analysis Machining Cylindrical Shapes; Drilling, Reaming, and Honing; Machining Flat Surfaces; Determining Tolerances and Finishes; Variables Affecting Job Efficiency	☐	☐

COMPANY NAME: _____ **JOB TITLE:** _____

COURSE NAME AND DESCRIPTION	MPACT	CLIENT
324 - Lathe-Turning Work Between Centers Lathe Setup and Workplace Preparation; Rough and Finish Turning; Shouldering, Knurling, and Notching; Cutting External Threads; Turning Tapers Between Centers	☐	☐
325 - Lathe-Machining Work in a Chuck Lathe Setup and Workplace Preparation; Rough Turning and Finish Turning; Boring and Counter boring; Cutting Internal Threads and Boring Tapers; Holding Irregular and Oversize Work pieces	☐	☐
326 - Basic Milling Procedures Using the Horizontal Milling Machine; Slab Milling Procedures; Milling Slots and Angles; Straddle, Side, and Face Milling; Milling Key seats, Squares, and Flats	☐	☐
327 - Indexed Milling Procedures Using the Dividing Head; Dividing Head Setup; Milling Spur Gears; Helical Milling; Milling Cams	☐	☐
328 - Multiple-Machine Procedures Power Sawing; Drilling Operations; Operating a Horizontal Shaper; Grinding Operations; Boring Mill Operations	☐	☐
**MACHINE TOOL SERIES		
161 - Measurements Linear Measurements; Working with Fractions; Using Calipers and the Rule Depth Gauge; Micrometer and Vernier Measurement; Developing a Sense of Touch; Working with Decimals in Reading a Micrometer; Using Vernier Caliper and Micrometer; Other Measuring Instruments	☐	☐
162 - Basic Hand Tools Fundamental Hand Tools; Machinist's Bench Vise, Files, Ball-Peen Hammers, Chisels, Wrenches, Screwdrivers, Pliers, etc.; Reamers; Thread and Taps, Types and Usage	☐	☐
163 - Work Planning and Setup Holding Work on Slotted Tables; Using Clamps, Blocks, Jacks, and Rods; Vises and their Uses; Production Jig; Holding Work with Chucks, Between Centers, and on Face Plates; Basic Layout: Lines, Angles, Shapes, Circles, and Three-Dimensional Shapes	☐	☐
164 - Metal Cutting Fundamentals Ferrous and Nonferrous Metals; Identifying Types of Steels; Characteristics of Metals and Cutting Techniques; Harig Speed and Feed Calculator	☐	☐
165 - Cutting Tools I Use, Mounting, and Types of Milling Cutters; Climb vs. Conventional Milling; Lathe Cutting Tools; Lathe Use; Making a Tool Bit and Grinding a Lathe Bit	☐	☐
166 – Cutting Tools II Use and Abuse of Twist Drills; Sharpening Twist Drill Bits; Using a Grinding Chart; Grinding Wheels – How They Work, Their Construction, and their Markings; Mounting a Grinding Wheel; Proper Dressing and Conditions that Prevent Free Cutting	☐	☐
MATERIAL HANDLING SYSTEMS		
331 - Bulk-Handling Conveyors Conveyor Components; Bulk-Conveyor Belting; Belt Cleaners and Idlers; Feed and Discharge Devices; Safety and Troubleshooting	☐	☐
MECHANICAL MAINTENANCE APPLICATIONS		
341 - Mechanical Drive Maintenance Chain Drives; Belt Drives; Open Gear Devices; Enclosed Gear Drives; Drive Couplings	☐	☐

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COURSE NAME AND DESCRIPTION	MPACT	CLIENT
342 - Mechanical and Fluid Drive Systems Mechanical Brakes and Clutches; Electric Brakes and Clutches; Adjustable-Speed Drives; Fluid Drives; Complete Drive Systems	☐	☐
343 - Bearings and Shaft Seal Maintenance Plain Bearings; Installing Antifriction Bearings; Removing and Replacing Antifriction Bearings; Mounted Antifriction Bearings; Linear Motion Bearings and Shafts	☐	☐
344 - Pump Installation and Maintenance Basic Pumping Concepts; Maintaining Packings and Seals; Maintaining Centrifugal Pumps; Overhauling Centrifugal Pumps; Maintaining Rotary Pumps	☐	☐
345 - Maintenance Pipefitting Piping Dimensions and Terminology; Threaded Piping Systems; Welded Piping Systems; Plastic Piping Systems; Pipefitting Accessories	☐	☐
346 - Tubing and Hose System Maintenance Tubing Fundamentals; Installing Tubing; Hydraulic Tubing Systems; Hose Systems; Gaskets, Sealants, and Adhesives	☐	☐
347 - Valve Maintenance and Piping System Protection Valve Maintenance; Special Valves; Actuators and Accessories; Valve Selection; Piping System Protection	☐	☐
PACKAGING MACHINERY MAINTENANCE		
311 - Introduction to Packaging The Packaging Mechanic; Actuating Mechanisms; Problem Solving Principles; Mechanical Drives; Motors and Brakes; Electrical Controls; Packaging Materials; Methods of Filling; Methods of Sealing; Weighing and Measuring	☐	☐
312 - Packaging Machinery	☐	☐
313 - Casing Machinery Uncasing and Unscrambling; Cleaning and Washing; Gathering Machines; Cartoning Machines; casing Machines; Wrapping Machines; Strapping and Stitching; Adhesives and Their Applications; Labeling and Coding; Maintenance and Safety	☐	☐
POWER PLANT OPERATIONS		
111 - How Power Plants Work Steam - The Primary Source; How Heat is Converted to Power; Power Plant Efficiency; Handling Water, Fuel, and Wastes; Power Plant Operation and Control	☐	☐
112 - Generating Steam in the Power Plant Transforming Energy into Work; Boiler Operation; Boiler Maintenance; Combustion and How It Works; Steam Generation	☐	☐
113 - Using Steam in the Power Plant Turbines; Boiler Instrumentation, Controls, and Safety; Electrical Power Fundamentals; Electrical Systems Analysis; Air-Conditioning Systems	☐	☐
114 - Waste to Energy Fundamentals Introduction to Waste Combustion; Characteristics of MSW Fuel; MSW Handling; Furnace Designs; Municipal Waste Combustion; Ash Handling and Material Recovery; Integrated Plant Operations	☐	☐
	☐	☐

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COURSE NAME AND DESCRIPTION	MPACT	CLIENT
PROCESS CONTROL INSTRUMENTATION		
271 - Introduction to Process Measurement and Control Covers the function of basic devices for measuring and controlling different kinds of variables in process control. Introduces closed-loop control and PID functions. Introduces maintenance of analog and digital devices and programmable logic controllers (PLCs). ISA and SAMA instrumentation symbols and interpretation and use of process diagrams are covered.	☐	☐
273 - Pressure Measurement Principles of Pressure in Liquids and Gases; Pressure Sensors; Pressure Transducers; Low-Pressure Measurement; Installation and Service	☐	☐
274 - Force, Weight, Motion Measurement Force, Stress, and Strain; Weight and Mass Measurement; Weighing Materials in Motion; Position Measurements; Acceleration, Vibration, and Shock	☐	☐
275 - Flow Measurement Properties of Fluid Flow; Primary Measuring Devices; Secondary Measuring Devices; Variable-Area Instruments; Open-Channel Flow Devices; Positive-Displacement Meters; Turbine and Magnetic Flowmeters; Specialized Flowmeters; Metering the Flow of Solid Particles; Installation and Maintenance of Flow Instruments	☐	☐
276 - Level Measurement Principles of Level Measurement; Electrical Instruments; Pressure Head Instruments; Solid Level Measurement; Other Level Measurement Instruments		
277 - Temperature Measurement Temperature Measurement Principles and Indicators; Bi-metallic and Fluid-Filled Temperature Instruments; Electrical Instruments; Pyrometry; Temperature Instrument Maintenance and Calibration	☐	☐
278 - Analytical Instrumentation Measuring Conductivity; Measuring pH and ORP; Optical Measurements; Measuring Products of Combustion; Chromatography	☐	☐
279 - Final Control Elements Final Control Elements in Process Loops; Electrical Actuators; Pneumatic and Hydraulic Actuators; Control Valves; Final Control Element Applications	☐	☐
280 - Safety, Calibration, and Testing Procedures Safety Standards and Practices; Servicing Fundamentals; Electrical and Electronic Stations; Pneumatic and Hydraulic Stations; Troubleshooting	☐	☐
PROCESS CONTROL SYSTEMS		
281 - Working with Controllers Controller Operation; Controller Modes and Tuning; Special Controller Applications and Options; Maintaining Controller Systems	☐	☐
282 - How Control Loops Operate Fundamentals of Control Loops; Control Loop Characteristics; Advanced Control Methods; Loop Dynamics; Loop Protection	☐	☐
283 - Data Transmission Process Data Transmission Methods; Electrical Data Transmission; Digital Data Transmission; Optical Data Transmission; Data Transmission Interference	☐	☐
284 - Computers in Process Control History and Overview; Small Computers in Process Control; DCS Architecture; DCS Configuration and Operation; System and Application Integration	☐	☐

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COURSE NAME AND DESCRIPTION	MPACT	CLIENT
PROGRAMMABLE LOGIC CONTROLLERS	☐	☐
298 - Programmable Logic Controllers Introduction to Programmable Logic Controllers; Programming; Input/Output Devices; Developing a PLC System; Maintenance and Troubleshooting; System Expansion and Retrofits; System Integration		
RIGGING and INSTALLATION		
318 - Industrial Rigging Principles and Practices Introduction to Industrial Rigging; Wire Rope and Wire Rope Slings; Chain and Metal-Mesh Slings; Fiber Rope and Webbing Slings; Industrial Hoists and Cranes; Operating Practices; Scaffolds and Ladders	☐	☐
319 - Equipment Installation Preparing the Site; Vibration Control and Anchoring; Moving and Setting; Leveling and Aligning; Checking and Test Running	☐	☐
ROBOTICS		
501 - Introduction to Robotics Robotics in Automated Manufacturing; The Basic Robot System; Robot Classification I; Robot Classification II; Work-Cell Sensors; End-of-Arm Tooling; Robot Teaching Techniques	☐	☐
WATER/WASTEWATER TREATMENT		
381 - Introduction to Water Technology Water: The Basic Resource; Water Collection, Treatment, and Distribution; Physical Properties of Water; Chemical Properties of Water; Biological Properties of Water	☐	☐
382 - Wastewater Treatment Processes Overview of Wastewater Treatment; Physical Separation of Solids; Chemical Treatment Processes; Biological Processes; Solids Treatment and Disposal	☐	☐
383 - Maintaining Wastewater Equipment Pumping Stations; Screening and Grinding Equipment; Grit Removal Systems; Sludge- and Scum-Collection Apparatus; Flow Measurement Devices	☐	☐
WELDING		
417 - Welding Principles Fundamentals of Welding; Welding Safety; Oxyfuel Welding Equipment; Arc Welding Equipment; Welding Techniques; Avoiding Welding Faults; Welding Symbols	☐	☐
418 - Oxyfuel Operations Welding Ferrous Metals; Welding Nonferrous Metals; Oxygen Cutting; Brazing and Soldering; Surfacing Techniques	☐	☐
419 - Arc Welding Operations Shielded Meta -Arc Welding; Selecting Electrodes for SMAW; Gas Metal Arc Welding; Gas Tungsten Arc Welding; Other Welding Processes; Pre-heating and Post-heating; Welding Ferrous Metals; Welding Nonferrous Metals; Pipe Welding; Hard Facing and Rebuilding	☐	☐
MAINTENANCE MANAGEMENT		
901 - Maintenance Organization Covers the basic types of maintenance organizations. Discusses cost-saving concepts of using work order systems. Explains how to develop and use information sources to implement maintenance management. Shows how to apply work standards and planning procedures to simplify a supervisor's job. Introduces the use of computers for first-line supervisors	☐	☐
902 - Implementing Preventive Maintenance Covers what PM is and why it is necessary. Develops procedures for setting up a practical PM	☐	☐

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COURSE NAME AND DESCRIPTION	MPACT	CLIENT
program, and describes effects of PM on scheduled and unscheduled work. Explains the requirements and advantages of the program as it applies to maintenance management. Provides information on the relationship of PM to production and quality control.		
903 - Controlling Maintenance Resources Covers methods of using maintenance resources for greatest efficiency, and tells how to implement the techniques effectively. Explains what workload is and how to measure it. Provides a thorough investigation into the control of labor, parts, and materials—both in the field and in the shop. Examines the budget process and how to control costs through budgeting.	☐	☐
904 – Improving Performance in Maintenance Covers instructions to first-line supervisor in the strategies involved in improving performances, and presents proven methods for increasing maintenance productivity. Develops ways of evaluating training effectiveness and the management of time. Describes the information necessary to stimulate improvement in all facets of the maintenance program.	☐	☐
905 - Effective Communication for Supervisors Covers how to use verbal and written communication tools, including the importance of listening. Explains how to motivate personnel through effective communication. Discusses how to organize written communication, best utilizing the elements of writing—parts of speech, phrases, clauses, sentences, structure, punctuation, and syntax. Gives examples of business writing used for reporting progress and motivating employees.	☐	☐
906 - Employee Relations Defines the supervisor's job in terms of maintenance planning, operations, and employee interaction. Demonstrates how good leadership requires administering discipline fairly, recognizing employee needs, and preventing employee strife. Discusses the basic information supervisors need in handling grievances and union disputes	☐	☐
907 - Managing a Training Program Covers analysis of training needs. Describes various kinds of training and lists important steps in administering training. Compares group management techniques to self-study. Discusses the training environment. Examines how to keep training records and how to evaluate training results	☐	☐
Custom Questions from Client Add your own custom block of questions that pertain to your specific industry or plant procedures. We can add to existing tests or create a custom test per your specifications.		

***Please note that the Machine Tool Series does not have online classes.*
We do provide assessments and hands-on classes that coordinate with these subject areas.