

Electromechanical Maintenance Cell (1600)

INDUSTRIAL MAINTENANCE



JOB MASTER

SKILLS-BASED TRAINING

JobMaster™ provides a superior blended learning solution for automated manufacturing training by combining industrial-grade components with engaging e-learning content.

JobMaster™ courses are entirely skill-based, consisting of individual exercises that reproduce essential tasks performed by maintenance technicians, equipment operators, and machine repairmen. Each skill has been analyzed and field-tested by qualified maintenance technicians to teach the specific skills needed in the industrial environment.

These industry-validated maintenance/mechatronics standards were developed in collaboration with twelve major US industrial companies, including Boeing, Caterpillar, Ford, GE, and US Steel.

JobMaster™, the new standard in industrial maintenance and mechatronics training!

In a footprint of 60 square feet (5.6 square meters), the **JobMaster™ 1600 Electromechanical Maintenance Cell** simulates an automated manufacturing operation in an industrial plant. This platform delivers the most relevant training in the installation, operation, troubleshooting and maintenance of industrial processes and equipment.

The construction of the cell can be performed entirely by the trainees. Using industry-standard work orders, standard operating procedures, schematic diagrams and manufacturers technical manuals as resources, students assemble the frame and install the electrical wiring for the Maintenance Cell and add-on components. Once constructed, instructors can remotely insert faults in the electromechanical systems. Trainees can thus develop troubleshooting skills in a relevant, engaging manner. Each task includes validated industry standards providing measurable criteria for assessing students' performance.

P O W E R E D B Y

LearnMate™

JobMaster™ courses are powered by LearnMate™ - intelitek's innovative e-learning platform. The LearnMate™ e-learning suite provides everything needed for the ultimate blended learning experience, including self-paced interactive content and a robust learning management system (LMS):

- SCORM-compliant interactive content
- Anytime, anywhere accessibility
- Student and class management
- Grade tracking
- Skill/competency reporting mapped to national skill standards
- JobMaster™ Certification



The **JobMaster™ 1600 Electromechanical Maintenance Cell** is the ultimate capstone to any industrial maintenance / mechatronics program. The Electromechanical Maintenance Cell ensures relevant instruction by enabling a robust simulation of the workplace and a more valid delivery of career skills. Students learn to assemble, wire, maintain, and troubleshoot electromechanical systems just as if they were in the industrial environment. This results in the most effective authentic assessment of a trainee's ability to succeed in the field of mechatronics or industrial maintenance.

The basic cell includes electrical power distribution and controls, wire and cable tray, wireways, conduit and equipment housings. Students gain enhanced understanding of industrial processes by installing, operating and troubleshooting sub-systems onto the cell including:

- Conveyor drive and control
- Part manipulator and controls with paint bake & cool process tunnel
- Industrial lighting
- Three-phase motor controls and Variable frequency drive
- DC motor controls and drive
- Lubrication components
- Pneumatic system and controls
- Instructor fault insertion system

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1600 ELECTRO-MECHANICAL MAINTENANCE CELL HARDWARE SPECIFICATIONS

<p>Order # 10-1600</p> <p>MECHANICAL CONSTRUCTION:</p> <p>Assembled frame size (H x W x D): 120" x 72" x 96" (3048mm x 1829mm x 2438mm)</p> <p>Weight (approximate): 1400 lbs (635 kg)</p> <p>1.5" (38mm) square anodized slotted aluminum frame with adjustable frame levels</p> <p>ELECTRICAL DISTRIBUTION COMPONENTS:</p> <p>Electrical equipment enclosures: NEMA-1 standard, steel with hinged latch door, pre-drilled and pre-punched for installation</p> <p>Wireways: NEMA-1 standard 16-gauge steel, 4" x 4" (102mm x 102mm), with hinged cover, knockouts and end closure caps</p> <p>Cable trays, Ladder-style: Aluminum, (LxWxD) 144" x 12" x 4" (3658mm x 305mm x 102mm), with 90-degree turndown</p> <p>Cable trays, Basket-style: Aluminum, (LxWxD) 84" x 6" x 6" (152mm x 152mm x 2134mm)</p> <p>Pull box enclosures: NEMA-1 Standard with knockouts and screw front cover</p> <p>Safety disconnects General duty, 3-phase, 3-pole, 240V, 30A cartridge-style fuse safety disconnects Quick-make, quick-break operating mechanism provides for OSHA standard lockout/tagout procedures and meets UL 98 standards</p> <p>Main Load Center NEMA-1 load center supplies 12 1-pole circuits 125 amp, 3-phase, main breaker Front cover with hinged door and 2-and 3-pole breakers</p> <p>Station transformer Type: Indoor/outdoor, wall mounted Input: 208/240V single phase Output: 120/110V at 1 kVA</p> <p>Conduit and components 0.75" (19mm) EMT 0.75" (19mm) flexible metal 0.50" (13mm) flexible, liquid-tight Steel bodies, fittings, and clamps</p> <p>Station/building Wire 14 AWG Type TFFN building wire, UL listed, stranded, PVC insulation and a nylon jacket</p> <p>ELECTRICAL PROCESS COMPONENTS</p> <p>AC motor: 208/240V, 3-phase, 1/3 HP (0.25 kW), 1725 rpm, 1.8 FLA, 56 C-face, TEFC, with a rigid mounting base</p> <p>DC motor: 90V, 0.25 HP (0.18 kW), TENV, 1725 rpm, 3.0 FLA, 56-face, with a rigid mounting base</p> <p>Motor controllers: Motor contactor, overload relay, station transformer, pushbutton start / stop switches, hand-off-auto switch, pilot lamps</p> <p>Variable frequency drive 208/240V 3-phase input Standard equipment enclosure Programming keypad Digital readout of programming parameters Analog, 10V, 0-60 Hz panel mounted speed control Acceleration/deceleration/current boost control Voltage/current/alarm monitoring RS485 mod bus Red pilot lamp, panel mounted, 240V 3-position For-Off-Rev selector switch with legend plate</p> <p>DC drive Standard equipment enclosure Regenerative drive/braking 240/120VAC input 90V DC armature voltage output Potentiometer speed control Adjustable acceleration/deceleration/IR comp/max speed Red pilot lamp, panel mount, 120V</p> <p>Electric brake Fail-safe operation Single-phase and 240/460V 3-phase control circuits NEMA 56 double-face Mounting standards Manual release with automatic reset</p> <p>Electrical signaling components 120VAC strobe-type status lights for paint/bake/cool process</p> <p>Process paint cool down blower 115V, 60 Hz, PSC direct drive blower, 2450 RPM CFM @ 0.000-In SP 150</p>	<p>Process sensors Proximity switch, capacitive, 0.125 - 1.0" (3-25mm) range, NO output mode Fiber-optic photoelectric switch, thru beam, NPN-SPST form</p> <p>Process programmable logic controller Inputs: 9 DC sinking or sourcing with diagnostic LEDs Outputs: 7 AC relay with diagnostic LEDs Input power requirements: 100-240VAC Front panel LED indicators HMI connector for direct front panel plug-in mounting Expansion port for expansion modules Communications port RS-232 or RS-485 adapter Cartridge connector for optional memory or clock cartridge Program capacity: 27,000 bytes, 4500 steps RAM backup: lithium battery Backup duration: 30 days Instruction words: 35 basic and 46 advanced Self-diagnostic functions</p> <p>Accessories: Computer link cable for connecting to a compatible computer to provide the following functions: Monitoring of operating and I/O status Monitoring/updating CPU module data Uploading/downloading user programs 9-position I/O simulator Programming software on CD-ROM Printed user's manual</p> <p>INDUSTRIAL LIGHTING COMPONENTS</p> <p>Low bay: 120/277VAC 175W, (H x W) 11.5" x 12.5" (292mm x 318mm) enclosed reflector with lamp</p> <p>High bay: 120/208/240/277VAC, 250W metal halide lamp (H x W) 21" x 18" (533mm x 457mm)</p> <p>Emergency: 120/277VAC, 10.8W @ 90 minutes output with 2 lamp heads, thermoplastic housing, 6V battery and charger</p> <p>Floodlight: 120VAC, 70W HPS stem-mount lamp with die-cast aluminum housing, hinged door with toolless latch</p> <p>Hazardous location: 300W incandescent glass globe, copper-free aluminum pendant mounted, explosion-proof, corrosion resistant</p> <p>Fluorescent task: 120/277 VAC, 32W, general duty lamps with 48" x 12" x 4" (1219mm x 305mm x 102mm) fixture, reflector and electronic ballast.</p> <p>Industrial Lighting Controllers 2 pole rotary cam switch 120V 3-pole lighting contactor 120V 4-pole lighting contactor 120 VAC power relay DPST-NO 3-position switch, spring return to center OFF</p> <p>MANUFACTURING MECHANICAL COMPONENTS</p> <p>Process Conveyor 96" L x 6" W (152mm x 2438mm) flat belt-type mounted on a 2.5" (63.5mm) H, rugged-duty, hard-black-anodized aluminum frame Standard 0.60" (1.5mm) above-belt side fences Integral, direct-drive, 0.50" (13mm) side-mount drive input shaft Leveling-type hold down brackets Belt tensioning device</p> <p>Speed reducer Type: right angle Drive ratio: 60:1 Mounting: NEMA 56 C-face Housing: cast iron Bearings: ball bearing on input shaft, tapered roller bearings on output shaft Gearing: hardened alloy steel worm, hardened forged bronze worm gear Lubrication: oil sump supplied full Seals: spring loaded, double lip Configured to mount in tandem with the 56 C-face motor and 56 C-face brake forming a drive train</p> <p>Chain drive Drive input sprocket: #40 chain, 14-tooth, 0.625" (16mm) bore with keyway Drive output sprocket #40 chain, 20-tooth, with 0.50" (13mm) split tapered bushing and keyway Chain: #40, 0.50" x 120" (13mm x 3048mm) pitch 5 chain links, 5 offset links 0.50" (13mm) rigid shaft coupling with keyway</p> <p>Chain guard Steel sheet metal covering full front, back, and sides Safety equipment: 1 each NEMA-1, plunger-type, 2PDT, safety switch with 10-foot (3-meter) covered, 3 conductor electrical cord</p>	<p>Process parts feeder Feeder tube and base: 3.5" x 3.5" x 3.0" (89mm x 89mm x 76mm), clear polycarbonate Parts feeder ramp: aluminum, black finish Pneumatic cylinder, 1.25" (32mm) bore, 4.0" (102mm) stroke, double acting, pivot/end mount, with two mounted flow controls and mounting bracket 60 unfinished process parts included</p> <p>Process paint tunnel Material: 12 ga painted HRS Dimensions: (L x W x H) 48.0" x 6.0" x 6.5" (1219mm x 152mm x 165mm) Pre-drilled and punched for component mounting</p> <p>FAULT INSERTION/TROUBLESHOOTING SYSTEM A configurable and programmable fault insertion system installed as a complete system integrated into the completed cell Fault initiating and timing is either preset or actuated by wireless remote control</p> <p>120 faults and related troubleshooting scenarios including: shorted/open/miswired components or wiring intermittent faults blown circuit fuses/electrical overloads/imbalance mechanical misalignment improper component lubrication equipment vibration improper pneumatic pressure/flow Up to 4 faults may run simultaneously</p> <p>DOCUMENTATION/OPERATING INSTRUCTIONS Supplied for each task in standard industry format: work orders and operating procedures electrical schematics and mechanical drawings observable and measurable performance standards maintenance supervisor signoff/assessment All documentation deliverable via LearnMate</p>
<h3>SKILLS ACQUIRED</h3>		
<p>BASIC MAINTENANCE CELL ZA01</p> <p>Cell Frame Work Order 1: Assemble the Base Work Order 2: Assemble and Install the Conveyor Mount... Work Order 3: Install Pull Box, End and Feeder Tube Supports Work Order 4: Install Crossbars and Top Members Work Order 5: Inspect & Align Completed Frame</p> <p>Enclosures Work Order 6: Install Load Center Work Order 7: Install Cable Trays Work Order 8: Install Wireway Work Order 9: Install Pull Boxes Work Order 10: Install Equipment Enclosures Work Order 11: Install Safety Disconnects Work Order 12: Install Fuse Box and Station Transformer</p> <p>Conduit & Fittings Work Order 13: Cut and Ream Conduit Work Order 14: Install Flexible Metal Conduit Work Order 15: Install EMT Conduit</p> <p>Low Voltage & Circuit Protection Work Order 16: Wire & Connect Main Power Cord Work Order 17: Install & Connect Circuit Breakers Work Order 18: Install Equipment Grounds Work Order 19: Wire Fuse Box Work Order 20: Wire Station Transformer Work Order 21: Perform Megohmmeter Tests</p>	<p>CONVEYOR, CONVEYOR DRIVE & CONTROLS ZA02</p> <p>Conveyor Work Order 1: Install Conveyor Work Order 2: Install Conveyor Drive Components Work Order 3: Install and Align Conveyor Drive Chain Work Order 4: Install Conveyor Drive Safety Guard</p> <p>Conveyor Controls Work Order 5: Install and Connect Conveyor Drive Controls Work Order 6: Install Emergency Stop Circuits Work Order 7: Perform Circuit Continuity Tests Work Order 8: Megger Test Conveyor Drive Work Order 9: Test and Troubleshoot Conveyor Drive</p> <p>Predictive/Preventive Maintenance Work Order 10: Lubricate Conveyor Drive Work Order 11: Verify Conveyor Alignment Work Order 12: Verify Drive Chain Alignment Work Order 13: Obtain Vibration Profiles</p>	<p>Work Order 6: Install Paint Bake Heaters Work Order 7: Install Cool Down Blower Work Order 8: Install Part Count Sensor Work Order 9: Install Paint Tunnel Status Indicators</p> <p>Programmable Logic Controller (PLC) Work Order 10: Install the PLC Work Order 11: Rough-In PLC Power Work Order 12: Program PLC Work Order 13: Connect PLC Input Sensor Circuits Work Order 14: Connect PLC Output Sensor Circuits Work Order 15: Troubleshoot Paint, Bake & Cool System</p> <p>INDUSTRIAL LIGHTING CIRCUITS ZA04</p> <p>Industrial Lighting Circuits Work Order 1: Install Fluorescent Task Lighting Work Order 2: Install Low Bay Lighting Work Order 3: Install High Bay Lighting Work Order 4: Install Flood Lighting Work Order 5: Install Hazardous Location Lighting Work Order 6: Install Emergency Lighting Work Order 7: Rough-In Lighting Circuits Work Order 8: Megger Test Lighting Circuits</p> <p>Industrial Power Circuits Work Order 9: Install Wiring Devices Work Order 10: Rough-In Wiring Device Circuits Work Order 11: Megger Test Power Circuits Work Order 12: Wire Lighting & Lighting Control Work Order 13: Install and Test GFCI Circuit Work Order 14: Troubleshoot Lighting and Power System</p>
<p>VARIABLE FREQUENCY DRIVE ZA05</p> <p>Variable Frequency Drive Work Order 1: Install Drive Work Order 2: Rough-In Drive Wiring Work Order 3: Megger Test VFD Wires Work Order 4: Program and Test Drive</p> <p>DC MOTOR DRIVE ZA06</p> <p>Dc Motor & Drive Work Order 1: Measure and Remove AC Motor Work Order 2: Install DC motor Work Order 3: Install DC drive Work Order 4: Rough-In DC Drive Wiring Work Order 5: Set Up and Test DC Drive (Manual - jumpers) Work Order 6: Finalize Drive Wiring and Installation Work Order 7: Troubleshoot DC Drive System</p>	<p>FAULT INSERTION SYSTEM ZA07</p> <p>Fault Insertion System Installation Work Order 1: Install fault insertion sub panel Work Order 2: Rough-in power circuit Work Order 3: Rough-in fault insertion wiring Work Order 4: Install and configure triggered faults Work Order 5: Test triggered fault system</p>	<p>PART MANIPULATION ZA03</p> <p>Part Manipulation Work Order 1: Install Part Stacker and Feeder Tray Work Order 2: Install Part Kicker Work Order 3: Install Stacker Part Sensor</p> <p>Paint, Bake and Cool Tunnel Work Order 4: Install Tunnel Work Order 5: Install Paint Nozzles</p>
<div style="text-align: center;"> <p>800-221-2763 • info@intelitek.com</p> <p>All specifications subject to change without notice. All trademarks are property of their respective owners.</p> <p>35-1600-DS01 Rev-C</p> </div>		