INDUSTRIAL MAINTENANCE

Intelitek’s JobMaster® Industrial Maintenance Training program delivers the knowledge and training necessary to develop a qualified workforce. The shortage of skilled workers demands programs that can deliver the critical skills that will enable industry worldwide to be competitive.

Intelitek’s skill-based curriculum include a comprehensive range of relevant competencies for maintenance technicians. Developed in partnership with leading industrial companies, students obtain a skillset that will serve in their careers today and well into the future. Our blended learning solution for industrial maintenance and mechatronics combines industrial-grade components with engaging e-learning content to prepare students for rewarding careers.

| JOBMASTER® ELECTRICAL TRAINING SERIES | CTI 4 |
| Curriculum | CTI 5 |
| Hardware | CTI 11 |
| JOBMASTER® MECHANICAL TRAINING SERIES | CTI 16 |
| Curriculum | CTI 17 |
| JOBMASTER® ELECTROMECHANICAL MAINTENANCE TRAINING SERIES | CTI 18 |
| Curriculum | CTI 19 |

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The ownership of skills training is a heavy burden that technical schools carry – educators not only need to select the disciplines industry will value, but also need to guide students in the soft skills required to succeed in today’s increasingly technology dependent and fast moving world.

How do you train a workforce for jobs that do not exist yet? By teaching skills, not tasks, that will transfer from one industry to another, and by teaching in ways that are as flexible as tomorrow’s workforce is expected to be.

The JobMaster® Industrial Maintenance Training teaches the specialized skills required for industrial technicians. JobMaster provides a superior blended learning solution for mechatronics and industrial maintenance training by combining industrial-grade components with engaging e-learning content integrated into programs that educate students to solve problems, embrace change, and develop collaborative working environments.

Intelitek’s unique hands-on approach using state-of-the-art industrial grade equipment to deliver skills-driven programs that combine projects, challenges, and creative thinking, enables programs that turn out technicians and not workers. Graduates of these programs develop the core knowledge and the soft skills to succeed in industry and deliver value to employers.
Quality Hardware

JobMaster provides exposure to industry-standard practices with hardware platforms consisting of industry-grade components.

Skill-based E-learning Content

JobMaster curriculum are skill-based, developed by industry experts from Fortune 1000 companies across a wide range of sectors.

The skill-based training consists of individual exercises that reproduce essential tasks performed by maintenance technicians, equipment operators, and machine repairmen.

Industry Competence

JobMaster’s interactive and multi-disciplinary curriculum entrench values that help secure jobs and work skills to enable students to thrive in collaborative workplaces with the can-do and problem solving attitude employers seek.
JobMaster® Electrical Series

Employers in all sectors, from traditional manufacturing to emerging industries, need qualified workers to meet the increasing demands of a changing world. Advancing technologies and global competition put new demands on the workforce. The shortage of qualified workers is felt whether searching for highly-skilled candidates or entry-level candidates with basic skills.

The JobMaster Training program provides an effective solution to this critical need. JobMaster training delivers the critical skills needed by industries of all sectors, and for trainees of all types. Whether implemented in high school and community college programs, or in industrial training programs to equip existing employees with new skills, JobMaster provides a scalable training program custom-fit to your needs.

With a comprehensive skill list developed in tangent with many industries, students obtain skills that will serve in careers today and well into the future.

Electrical Series teaches the specialized skills required for today’s industrial technicians. JobMaster provides a superior blended learning solution for mechatronics and industrial maintenance training by combining industrial-grade components with engaging e-learning content.
ELECTRICAL SERIES CURRICULUM

Electrical Circuits

HOURS OF INSTRUCTION: 21

**COURSE OUTLINE**
- Lockout/Tagout
- Connecting a Basic Circuit
- Identifying Switches
- Connecting a Momentary Switch
- Connecting a Toggle Switch
- Identifying Sources of Electricity
- Measuring DC Voltage
- Constructing a Series Circuit
- Constructing a Parallel Circuit
- Applying DC Voltage Principles
- Testing an Electrolytic Cell
- Testing a Battery
- Testing a Thermocouple
- Testing a Solar Cell

**PREREQUISITE:**
- Electrical Circuits (EA01A)

**CATALOG #: JM-BASE-EA01A**

Includes Flexponent Panels:
- E040, E045, E047, E151, E152

Resistors & Conductors

HOURS OF INSTRUCTION: 15

**COURSE OUTLINE**
- Measuring Resistance
- Measuring Resistance in Series Circuits
- Measuring Resistance in Parallel Circuits
- Drawing and Reading Resistor Symbols
- Testing an Adjustable Resistor
- Measuring Wire Size
- Applying Resistance and Wire Size
- Calculating Wire Size
- Determining Losses in a Conductor

**PREREQUISITE:**
- Electrical Circuits (EA01A)

**CATALOG #: JM-BASE-EA01B**

LCR Circuits

HOURS OF INSTRUCTION: 15

**COURSE OUTLINE**
- Discharge a Capacitor
- Testing a Capacitor
- Determining Capacitance
- Applying Capacitance Principles
- Applying Magnetic Principles
- Inducing a Magnetic Field
- Assembling an Electromagnet
- Applying Electromagnetic Principles
- Inducing Voltage
- Inducing DC Voltage
- Assembling and Operating Transformers

**PREREQUISITE:**
- Resistors and Conductors (EA01B)

**CATALOG #: JM-BASE-EA01C**

Includes Flexponent Panels:
- E029, E043, E044, E057, E150

Motors & Generators

HOURS OF INSTRUCTION: 15

**COURSE OUTLINE**
- Operating a PMDC Motor
- Operating a DC Generator
- Operating an AC Generator
- Operating a Series Motor
- Reactance and Impedance
- Applying Phase Relationship Principles

**PREREQUISITE:**
- LCR Circuits (EA01C)
- Three-Phase Power
- Measuring AC Voltage

**CATALOG #: JM-BASE-EA01D**

Includes Flexponent Panels:
- E042

CATALOG #: JM-BASE-EA01B

Includes Flexponent Panel:
- E042

CATALOG #: JM-BASE-EA01D

Includes Flexponent Panels:
- E029, E043, E044, E057, E150

CATALOG #: JM-BASE-EA01C

Includes Flexponent Panels:
- E040, E045, E047, E151, E152

CATALOG #: JM-BASE-EA01A
Three-Phase Transformers
HOURS OF INSTRUCTION: 15

Transformers (EA03) delivers hands-on skills in installing, operating, and troubleshooting transformers. Students learn about transformer principles and to read transformer symbols.

Transformers (EA03) covers eight skills including inspecting, servicing, and sizing transformers, connecting a transformer for buck and boost operation, and in delta and wye.

Includes Flexponent Panel: E003

CATALOG #: JM-CTRL-EA03

Electric Motors
HOURS OF INSTRUCTION: 21

Electric Motors (EA04) guides students through hands-on activities using common industrial motors, including three-phase, split-phase and capacitor-start motors. From wiring motor circuits to preventive maintenance and troubleshooting, students gain practical experience in all aspects of industrial motor operation, including connecting and operating a three-phase motor, troubleshooting a capacitor-start motor and testing motors with adjustable loads.

Includes Flexponent Panels: E007, E012, E027, E154, E156, E010, E019, E034, E065, E066

CATALOG #: JM-CTRL-EA04

Electromagnetic Motor Starters
HOURS OF INSTRUCTION: 15

Electromagnetic Motor Starters (EA07) guides students through hands-on activities using industrial motor controls. From wiring motor control circuits to troubleshooting, students gain practical experience in all aspects of industrial motor control, including testing and resetting overload protection, operating a three-phase reversing starter and troubleshooting a three-phase motor control circuit.

Includes Flexponent Panels: E002, E045, E005, E006, E010, E012, E016, E154, E155

CATALOG #: JM-CTRL-EA07

Electric Circuit Protection & Monitoring
HOURS OF INSTRUCTION: 15

Electric Circuit Protection and Monitoring (EA02) delivers hands-on skills in the methods and devices used to protect industrial electric circuits. The skills-based curriculum presents hands-on activities using industrial-grade components.

Includes Flexponent Panels: E022, E030

CATALOG #: JM-CTRL-EA02

PREREQUISITE:
• Electric Motors EA04
• Electromagnetic Motor Starters EA07

CATALOG #: JM-CTRL-EA02
Timers & Time-Delay Relays

HOURS OF INSTRUCTION: 15

Relays, Timers and Time Delay Relays (EA08) features hands-on skills in installing, programming and maintaining control devices used in industrial electric circuits. Relays, Timers and Time Delay Relays (EA08) is an add-on to Electromagnetic Motor Starters (EA07), covering eight additional skills using a digital relay and an electronic timer mounted on the two included Flexponent™ panels.

Includes Flexponent Panels: E017, E041

CATALOG #: JM-CTRL-EA08

Pilot Devices

HOURS OF INSTRUCTION: 15

Pilot Devices (EA09) delivers hands-on skills in installing, operating and troubleshooting pilot devices used in electric control circuits. Pilot Devices (EA09) is an add-on to Electromagnetic Motor Starters (EA07), covering ten additional skills including connecting and operating photoelectric sensors with fiber optics, capacitive and inductive proximity switches, limit switches, pressure switches, liquid level switches, and magnetic reed switches.

Includes Flexponent Panels: E011, E018, E126, E153

CATALOG #: JM-CTRL-EA09

PREREQUISITE:

- Electromagnetic Motor Starters EA07

Solid-State Reduced Voltage Starter

HOURS OF INSTRUCTION: 15

Solid-State Starters (EA11) guides trainees through installing, operating and troubleshooting solid-state starters used in electric motor circuits. Solid-State Starters (EA11) is an add-on to Electromagnetic Motor Starters (EA07), covering five additional skills.

The skills-based curriculum presents hands-on activities using industrial-grade components.

Includes Flexponent Panel: E024

CATALOG #: JM-CTRL-EA11

Variable Frequency Drives

HOURS OF INSTRUCTION: 15

Variable Frequency Drives (EA12) delivers comprehensive coverage of installing, operating and troubleshooting variable frequency drives (VFDs) in motor control circuits. Variable Frequency Drives (EA12) is an add-on to Electric Motors (EA04), covering six additional skills.

The skills-based curriculum presents hands-on activities using an industrial-grade Mitsubishi VFD.

Includes Flexponent Panel: E067

CATALOG #: JM-CTRL-EA12

PREREQUISITE:

- Electric Motors EA04

COURSE OUTLINE

- Applying VFD Principles
- Connecting and Operating a Variable Frequency Drive
- Adjusting VFD Operating Parameters
- VFD Protection Parameters and Inputs/Outputs
- Troubleshooting the VFD
- Understanding Additional VFD Features
## DC Motor Control

**HOURS OF INSTRUCTION:** 15

**COURSE OUTLINE**
- Demonstrating DC Drive Principles
- Connecting and Operating a SCR Speed Controller
- Connecting and Operating a PWM Speed Controller
- Connecting, Setting-up, and Operating a DC Drive
- Connecting and Operating Braking Controls
- Testing a DC Drive
- Troubleshooting a DC Drive
- Performing Preventative Maintenance

**PREREQUISITE:**
- Electric Motors EA04
- Electromagnetic Motor Starters EA07

**CATALOG #:** JM-CTRL-EA16

Includes Flexponent Panels: E007, E017, E025, E034, E038, E048, E071

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## Oscilloscope

**HOURS OF INSTRUCTION:** 15

**COURSE OUTLINE**
- Reading the Oscilloscope Screen
- Identifying Oscilloscope Controls
- Setting Up and Operating the Oscilloscope
- Adjusting Probe Compensation
- Performing AC Voltage Calculations
- Measuring AC Voltage and Frequency
- Performing DC Voltage Calculations
- Measuring DC Voltage

**PREREQUISITE:**
- Digital Multimeter (EB01B)

**CATALOG #:** JM-POWR-EB01A

Includes Flexponent Panels: E087, E153

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## Digital Multimeter

**HOURS OF INSTRUCTION:** 26

**COURSE OUTLINE**
- Digital Multimeter Safety
- DMM Controls and Features
- Locating and Reading DMM Icons and Symbols
- Reading the Liquid Crystal Display
- Setting Up the DMM for Reading AC Voltage
- Measuring AC Voltage
- Calculating & Converting AC Voltage
- Measuring DC Voltage
- Measuring Resistance
- Discharging a Capacitor
- Measuring Capacitance
- Testing Capacitors
- Measuring Current
- Measuring DC Millivolts
- Performing Continuity Tests
- Testing Grounds and Bonds
- Measuring Frequency

**PREREQUISITE:**
- Oscilloscope (EB01A)

**CATALOG #:** JM-POWR-EB01B

Includes Flexponent Panels: E052, E055

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## Hand Held Digital Oscilloscope

**HOURS OF INSTRUCTION:** 15

**COURSE OUTLINE**
- Reading the Oscilloscope Screen
- Identifying and Using Oscilloscope Controls
- Setting Up and Operating the Oscilloscope
- Performing AC Voltage Calculations
- Measuring AC Voltage and Frequency
- Performing DC Voltage Calculations
- Measuring DC Voltage
- Storing and Recalling Screen Displays

**PREREQUISITE:**
- Digital Multimeter (EB01B)

**CATALOG #:** JM-POWR-EB01C

Includes Flexponent Panels: E087, E153
DC Power Supplies

HOURS OF INSTRUCTION: 17

DC Power Supplies delivers hands-on skills in operating industrial-grade bridge rectifiers, transformers and test equipment.

The skills-based curriculum builds on the concepts learned in the prerequisite test instruments courses: Oscilloscope (EB01A) and Digital Multimeter (EB01B). DC Power Supplies presents eleven additional skills using bridge rectifiers, diode rectifiers and low-voltage transformers.

Includes Flexponent Panels: E039, E061, E062

CATALOG #: JM-POWR-EB02A

Thyristor Electric Motor Drives

HOURS OF INSTRUCTION: 23

Thyristor Electric Motor Drives brings students in contact with the same industrial grade components used in industrial electric motor drives. Students learn SCR control and PWM principles while acquiring skills including operating full-wave SCR DC motor drives, DIAC-controlled TRIAC AC motor drives and Schmitt Trigger controlled TRIAC AC motor drives.

Includes Flexponent Panels: E034, E081, E082, E083, E084, E085, E088, E157

CATALOG #: JM-POWR-EB03

Single-Phase & Three-Phase Power Supplies

HOURS OF INSTRUCTION: 20

Single-phase and Three-phase Power Supplies builds on the concepts learned in the prerequisite course: DC Power Supplies (EB02A). The skills-based curriculum presents thirteen additional skills using three new Flexponent™ panels covering industrial-grade bridge rectifiers, transformers and test equipment.

Includes Flexponent Panels: E049, E050, E053

CATALOG #: JM-POWR-EB02B

COURSE OUTLINE

- Power Supply Block Diagram
- Schematic Symbols
- Testing a Transformer
- Locating Diodes and Symbols
- Testing a Diode
- Drawing a Half-Wave Rectifier
- Connecting and Operating a Half-Wave DC Power Supply
- Confirming Full-Wave DC Power Supply Operation
- Connecting and Operating a Full-Wave DC Power Supply
- Confirming Single-Phase Bridge Rectifier Operation
- Connecting and Operating Single-Phase Bridge Rectifier

CATALOG #: JM-POWR-EB02B

COURSE OUTLINE

- Drawing Filter Schematic Diagrams
- Connecting and Operating a Power Supply
- Drawing Zener Schematic Symbols
- Connecting and Operating a Zener Diode Voltage Regulator
- Locating an IC Voltage Regulator
- Connecting and Operating a DC Power Supply with an IC Voltage Regulator
- Connecting and Operating a Bleeder Resistor
- Connecting and Operating a Voltage Divider
- Troubleshooting a DC Power Supply
- Confirming Three-Phase Bridge Rectifier Operation
- Testing a Three-Phase Bridge Rectifier
- Connecting and Operating a Three-Phase Bridge Rectifier
- Troubleshooting a Three-Phase Bridge Rectifier

PREREQUISITE:

- Power Supplies (EB02A)

PRACTICAL Job Skills:

- Troubleshooting
- Maintenance
- Repair
Electronic Timers & Triggers

HOURS OF INSTRUCTION: 15

In the Electronic Timers (EB04) course, students work with industrial-grade timer devices used extensively in time-delay relays, motor drives and digital circuits. Students acquire skills including connecting and operating a 555 timer, verifying an astable timer circuit and connecting and operating an electronic pulse train.

The skills-based curriculum builds on the concepts learned in the prerequisite course, Thyristor Electric Motor Drives (EB03). Electronic Timers (EB04) presents seven additional skills with a timer Flexponent™ panel.

Includes Flexponent Panel: E089

CATALOG #: JM-POWR-EB04

Servo Motor Drives

HOURS OF INSTRUCTION: 15

Servo Motor Drives (EB06) guides students through six additional skills with an industrial grade servo motor and drive mounted on a Flexponent™ panel. Using precision servo motor systems found in CNC machines, robotic and hydraulic systems, students learn closed-loop servo motor control and system feedback principles while acquiring skills including installing and troubleshooting servo motor drives.

Includes Flexponent Panel: E091

CATALOG #: JM-POWR-EB06

Stepper Motors & Drives

HOURS OF INSTRUCTION: 15

Stepper Motors and Drives delivers hands-on skills using stepper motor systems found in robots, precision linear positioning devices, CNC machines and other devices that provide motion control with calculated accuracy. Students acquire skills including confirming stepper motor step angle and troubleshooting stepper motor drives.

The skills-based curriculum builds on the concepts learned in the prerequisite courses in the Industrial Power Electronics series, presenting seven additional skills with an industrial-grade stepper motor and drive.

Includes Flexponent Panel: E090

CATALOG #: JM-POWR-EB05

COURSE OUTLINE
- Locating Timer Pins
- Verifying a Monostable Timer Circuit
- Connecting and Operating a 555 Timer in Monostable (One-Shot) Mode
- Verifying an Astable Timer Circuit
- Connecting and Operating a 555 Timer in Astable (Multi vibrator) Mode
- Verifying a Pulse Train Circuit
- Connecting and Operating an Electronic Pulse Train

PREREQUISITE:
- Thyristor Electric Motor Drives EB03

COURSE OUTLINE
- Demonstrating Closed-Loop Servo Motor Control Principles
- Demonstrating Closed-Loop Servo Motor Principles
- Demonstrating Servo System Feedback Device Principles
- Demonstrating Analog and Digital Servo Motor Drive Principles
- Installing, Connecting and Monitoring a Basic Servo Motor Drive
- Testing and Troubleshooting a Basic Servo Motor Drive

PREREQUISITE:
- Electronic Timers (EB04)
JOBMASTER ELECTRIC LEARNING STATION

HOW TO BUILD YOUR ELECTRICAL SERIES TRAINING PROGRAM:

1. Select Learning Stations to accommodate the number of students in your program.

The JobMaster Two-Sided Mobile Learning Station is the hardware foundation of the JobMaster Training System. Made from sturdy anodized aluminum, the learning station provides the mounting points for JobMaster Flexponent™ panels provided with the JobMaster courses. Each side of the learning station can hold 15 standard JobMaster Flexponent panels and accommodates two students. Panels may be mounted on the horizontal work surface and on the vertical rack. Students can quickly and easily mount and remove panels to configure their work area for each individual skill.

CATALOG #: 10-LS00-0200

2. Select the JobMaster® Electrical Series course[s] you need.

Once you have equipped your program with the appropriate learning stations to accommodate your students, simply choose the courses that cover the skills and concepts needed in your training program. With the content, each JobMaster® series of courses includes all the necessary Flexponent™ panels for use on the learning station, along with any additional tools and hardware used in the skill-based activities, such as meters and scopes.

Panels are easily added and exchanged allowing the workspace to be re-configured as multiple students progress through the course. This flexible modular approach allows you to build a custom program for your needs.

3. Select a Power Control Panel based on course requirements.

The final essential element of the JobMaster® Training System is the JobMaster® Power Control (PC) panels that serve three vital purposes:

- Providing the necessary electrical connection from the learning station to your facility power.
- Assuring a safe environment in the classroom.
- Exposing trainees to the same environment they will encounter in industrial settings.
Power Controllers

JobMaster® Power Control (PC) panels are an essential element of the JobMaster Training System. PC panels provide the necessary electrical connection from the JobMaster learning station to your facility power.

Power control panels serve the dual purpose of exposing trainees to the same environment they will encounter in industrial environments, and assuring a safe environment in the classroom.

PC panels feature industrial-level safety controls, including the lockout/tagout point, emergency stop, and the on/off switch for all the learning station components. Each power control panel provides three forms of lockout: one for the instructor, one for the student, one for emergency stop conditions.

Power controllers are available for both 120V single-phase and 220V three-phase power supplies. Each JobMaster technology training course specifies the model power controller needed.

SAFETY FEATURES OF THE PC PANELS:

- Two Keys - enabling instructors to control access to the learning station.
- The Power Lock Switch Key - must be activated using the key before power will flow through the panel. Once the power lock switch is engaged, as indicated by the power indicator light, the on/off toggle switch serves as the power switch for any components wired to the panel.
- The Emergency Stop Key - required to reset the e-stop once activated.
- Overload Protection - via 5 amp breakers. If tripped because of a circuit overload, the breakers and power lock switch must be reset.
- Emergency Stop - disconnects power to the entire system when activated. Once engaged, both the e-stop and the power lock switch must be reset using the respective keys.
- Beacon Warning Light - on top of the panel, that flashes when the e-stop is activated and continues flashing until the emergency stop button is reset.
- Industry-Standard Terminal Strips - for safe electrical connections.

POWER CONTROL PANELS (REQUIRED COMPONENT)

- Each learning station requires one power control panel for each side in use.
- Each JobMaster module specifies which power controller is needed.
- Power Control Panels* available:
  - 120V single-phase* Catalog #10-PC04-0000
  - 220V three-phase* Catalog #10-PC06-0000
  - International step-down transformer package Catalog #10-PC09-0000

* International step-down transformer package required for international applications.

* Power Control (PC) panels provide the necessary connection from the learning station to your facility power, as well as the lockout/tagout point, emergency stop, and the on/off switch for all the learning station components.
Flexponent™ Panels

All Flexponent panels are constructed of nonconductive, high density polyethylene with industry-standard recessed and insulated terminal strip connections.

Flexponent panels are a component of JobMaster courses. Each course specifies what materials are included. Flexponent panels require a JobMaster Learning Station with the appropriate Power Control Panel.

**PANEL E000: START-STOP CONTROL**
Panel type: Single
1. Switch, pushbutton, momentary, black, NO w/contact block
2. Fault switch, 4A, 250V push-on/push-off momentary

**PANEL E001: THREE-PHASE TRANSFORMER**
Panel type: Double
1. Midget fuse 2A
2. Midget fuse block, 30A
3. 0.05kVA, 50/60 Hz, Step-down transformer

**PANEL E002: START-REVERSE-STOP SWITCH**
Panel type: Single
1. Switch, pushbutton, momentary, red LED, NC w/contact block
2. Fault switch, 4A, 250V push-on/push-off momentary

**PANEL E003: THREE-PHASE TRANSFORMER**
Panel type: Single
1. Switch, pushbutton, momentary, red, NC w/contact block
2. Fault switch, 4A, 250V push-on/push-off momentary

**PANEL E004: SINGLE MAGNETIC STARTER**
Panel type: Single
1. Contactor, 9A, 43mm
2. AUX contact 2NO/2NC
3. Relay, thermal overload, 0.8-1.2A
4. Interlock unit
5. Reversing unit load side
6. Fault switch, 4A, 250V push-on/push-off momentary

**PANEL E005: START-REVERSE-STOP SWITCH**
Panel type: Single
1. Switch, pushbutton, momentary, red LED, NC w/contact block
2. Switch, pushbutton, momentary, green LED, NO w/contact block
3. Switch, pushbutton, momentary, yellow LED, NO w/contact block
4. Fault switch, 4A, 250V push-on/push-off momentary

**PANEL E006: REVERSING MAGNETIC STARTER**
Panel type: Single
1. Contactor, 9A, 43mm
2. AUX contact 2NO/2NC
3. Relay, thermal overload, 0.8-1.2A
4. Interlock unit
5. Reversing unit load side
6. Fault switch, 4A, 250V push-on/push-off momentary

**PANEL E007: SCR SPEED CONTROLLER**
Panel type: Single
1. 115V DC SCR speed control
2. Fault switch, 4A, 250V push-on/push-off momentary

**PANEL E010: THREE-PHASE MOTOR**
Panel type: Double
1. 3-phase motor, 13hp, 1725 rpm
2. Fault switch, 4A, 250V push-on/push-off momentary

**PANEL E011: LIMIT SWITCH**
Panel type: Single
1. Limit switch, snap action, one-way lever
2. Fault switch, 4A, 250V push-on/push-off momentary

**PANEL E012: TRANSFORMER**
Panel type: Single
1. Midget fuse 2A
2. Midget fuse block, 30A
3. Transformer, 110V, 230 to 115V
4. Transformer finger guard
5. Fault switch, 4A, 250V push-on/push-off momentary

**PANEL E016: ANALOG RELAY**
Panel type: Single
1. Relay, 120V 2PDT 15A LED Test PB
2. Socket relay
3. Timer multi-mode 2PDT, 100-240V 0.05S-60H
4. Socket relay, 11 pin octal

**PANEL E017: DIGITAL RELAY**
Panel type: Single
1. Relay, 120V 2PDT 15A LED Test PB
2. Socket relay
3. Time delay relay, DPDT, multi-function
4. Socket relay, 11 pin octal
### PANEL E019: LIQUID LEVEL AND PRESSURE SWITCH
- **Panel type:** Double
- 1 Pressure gauge, 60 psi, 1-1/2 dia
- 1 Pressure switch, NEMA 1 enclosed, 40-100 PSI
- 2 Liquid level switch, 1/4” x 1/2” NPT
- 1 Liquid level switch, float, 1/2” NPT
- 4 Fault switch, 4A, 250V, push-on/push-off momentary

### PANEL E021: CAPACITOR-START MOTOR
- **Panel type:** Double
  1 1-phase motor, 0.8hp, 1725rpm
  2 Fault switch, 4A, 250V push-on/push-off momentary

### PANEL E024: SOLID-STATE STARTER
- **Panel type:** Single
  1 Solid-state soft starter, 1/2HP, 100-240V control voltage, 115VAC input, 1 HP, 10A, 0-130VDC output

### PANEL E030: CIRCUIT OVERLOAD PROTECTION & MONITORING

### PANEL E034: DC MOTOR
- **Panel type:** Double
  1 Motor, 91VDC, 13hp
  1 Fault switch, 4A, 250V push-on/push-off momentary

### PANEL E038: PWM MOTOR CONTROL
- **Panel type:** Single
  1 Pulse Width Modulated (PWM) speed control, 115VAC input, 1 HP, 10A, 0-130VDC output

### PANEL E039: SINGLE-PHASE BRIDGE RECTIFIER
- **Panel type:** Single
  1 Bridge rectifier, 25A, 200V
  1 Heatsink, TO-3, 16.2mm
  2 Fault switch, 4A, 250V push-on/push-off momentary

### PANEL E040: SWITCH, LAMP AND BUZZER
- **Panel type:** Single
  1 87dB Piezo pulse buzzer
  1 12V jumbo lamp
  1 SPST toggle switch
  1 DPDT toggle switch
  1 NO pushbutton switch
  1 NC push button switch

### PANEL E041: ELECTRIC TIMER
- **Panel type:** Single
  1 Timer mechanism, electronic

### PANEL E042: RESISTANCE
- **Panel type:** Double
  1 Wire gauge, US standard
  1 Resistance coils package
  1 Rheostat, 100ohm
  1 5K-ohm linear taper potentiometer
  1 10K-ohm linear taper potentiometer
  1 50K-ohm linear taper potentiometer
  1 Knob, hexagon
  1 Resistor, wire wound, 100ohm, 5%, 5W, ceramic
  1 Resistor, wire wound, 400ohm, 5%, 5W
  1 Resistor, wire wound, 900ohm, 5%, 5W
  1 Resistor, wire wound, 10Kohm, 5%, 5W, ceramic
  1 Resistor, carbon film, 15Kohm, 5%, 1/4W

### PANEL E043: AC MOTOR
- **Panel type:** Single
  1 Motor, 110VAC, 13hp
  1 Fault switch, 4A, 250V push-on/push-off momentary

### PANEL E044: INDUCTANCE
- **Panel type:** Single
  1 Primary-secondary coil
  2 Bar magnets, 2"
**Panel E057: Motor/Generator**
- Panel type: Single
- 1 Motor/Generator
- 1 Cover, clear, 3.5” depth

**Panel E061: Low-Voltage Transformer**
- Panel type: Single
- 1 Transformer, bobbins, 115V to 24V, 96A
- 1 Midget fuse block, 30A
- 1 Fuse, midget, 10A, fast acting
- 2 Fault switch, 4A, 250V, push-on/push-off momentary

**Panel E062: Diode Rectifiers**
- Panel type: Single
- 1 Recovery rectifier, 16A, 1.23V
- 1 Heatsink, TO-3, 76.2mm
- 2 Fault switch, 4A, 250V, push-on/push-off momentary

**Panel E065: Split-Phase Motor**
- Panel type: Double
- 1 Motor, split phase, NEMA frame 42
- 2 Fault switch, 4A, 250V, push-on/push-off momentary

**Panel E066: Adjustable Motor Load**
- Panel type: Double
- 1 Brake, magnetic particle, 0.6-35 lb-in
- 1 Power supply, 0-24VDC output, 220V AC input
- 1 Bracket, adjustable torque brake mounting
- 1 Coupling body, jaw type, size L050, 1/2” bore
- 1 Coupling body, jaw type, size L050, 3/8” bore
- 1 Coupling insert, jaw type, size L050
- 1 Relay, solid state, 10sec delay
- 1 Relay, solid state, 1 To 100 min delay
- 1 NO pushbutton switch

**Panel E070: Variable Frequency Drive**
- Panel type: Single
- 1 AC adjustable drive, 115V, 0.5hp, 1 phase in 3 phase out

**Panel E071: Regenerative Four Quadrant**
- Panel type: Single
- 1 4-Quadrant regenerative DC drive, 115V/230V output, 0.75HP/1.5HP, 90V/180VDC armature

**Panel E082: Full-Wave SCR Drive**
- Panel type: Single
- 1 Speed control, DC 115V, SCR
- 2 Fault switch, 4A, 250V push-on/push-off momentary

**Panel E083: Triac**
- Panel type: Single
- 1 Heatsink, TO-3, 76.2mm
- 1 TRIAC, 15A, 600V
- 2 Fault switch, 4A, 250V push-on/push-off momentary

**Panel E084: Diac Adjustable Resistors**
- Panel type: Single
- 1 DIAC, 36V
- 1 Capacitor, 0.1uf, 600VDC, radial, metallized polyester
- 1 50K-ohm linear potentiometer 0.125 shaft
- 1 500K-ohm linear potentiometer 0.125 shaft

**Panel E085: Triac with Schmidt Trigger**
- Panel type: Single
- 1 Speed control, TRIAC
- 1 Switch, toggle, DPDT, flat lever

**Panel E086: Adjustable Power Supply**
- Panel type: Single
- 1 Adjustable power supply, 3-12V @ 2A

**Panel E087: Pulse Width Modulation (PWM)**
- Panel type: Single
- 1 Speed control, PWM

**Panel E088: Timers and Triggers**
- Panel type: Single
- 1 Timer
- 1 Potentiometer
- 1 NO pushbutton switch

**Panel E089: Servo Motor and Drive**
- Panel type: Single
- 1 Servo motor
- 1 Servo drive
- 1 NO pushbutton switch
- 1 Potentiometer
- 1 Dial
- 1 IC test clip, 16-position

**Panel E090: Universal AC/DC Motor and PMDC Motor**
- Panel type: Single
- 1 AC/DC motor, 1/15hp, 5000rpm
- 1 DC Motor, 12/24V, 1/44hp @ 12 VDC, 1/18hp @ 24VDC, 1800rpm @12 VDC, 4500rpm @ 24VDC
- 2 Fault switch, 4A, 250V push-on/push-off momentary
**JobMaster® Mechanical Training Series**

The JobMaster Mechanical Training series is a robust, stand-alone mobile training station providing comprehensive training in mechanical power transmission.

A true all-in-one trainer, the Mechanical Training Bench features industrial-strength components housed in a heavy duty mobile framework with a customized modular drawer storage system. Designed for two students per side, the trainer features bearings, belt drives, chain drives, gear drives and more. JobMaster courses are entirely skill-based, consisting of individual exercises that reproduce essential tasks performed by maintenance technicians, equipment operators, and machine repairmen.

**CATALOG #: JM-MBL*-0000**

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**MECHANICAL TRAINING SERIES INCLUDES:**
- Basic Machines
- Measurement
- Torque
- Work
- Power
- Horsepower
- Friction
- Velocity
- Acceleration
- Mass and Inertia
- Energy
- Mechanical Advantage
- Inclined Planes
- Wedges
- Screws
- Levers
- Wheel and Axles
- Pulley

**SYSTEM COMPONENTS**

**Mechanical Training Working Surface**

Standalone working surface setup suitable for use with Intelitek Mobile Bench or other workbenches. Single or Double sided configuration

Dimensions:  52” x 32” x 8” (LxWxH)
1310mm x 800mm x 203mm

**Lab Hardware Kits**

Hardware kits with industrial grade training components

- Coupling Kit
- Shaft, Bearing Kit
- Sheave, Pulley, Sprocket Kit
- Motor/Speed Reducer Kit
- Gears Kit
- C-Brake/Speed Reducer Kit
- Gear Box Kit
- Laser Alignment Kit
- Vibration Analysis Kit
- Bearing Kit (standalone)

**Mobile Bench for Mechanical Training**

Optional mobile cart used for JobMaster Mechanical or Electrical series.

Dimensions:  52” x 32” x 32” (LxWxH)
1310mm x 800mm x 800mm
Mechanical Series Curriculum

LEVEL 1
Mechanical Training Level 1 Bundle includes the tabletop working surface for mechanical training and curriculum for Basic Machines, Machine Statics & Dynamics, Shafts & Keys, Bearings.

Level 1 bundle includes
- Mechanical Training Working Surface
- Coupling Kit for Mech Training
- Shaft, Bearing Kit for Mech Training
- Accessory Kit 1

The mobile bench is not included.

Skills Curriculum Included
- ME01 - Basic Machines
- ME02 - Machine Statics & Dynamics
- ME03 - Machine Shafts & Keys
- ME04 - Bearings

LEVEL 2
Mechanical Training Level 2 Bundle continues from the Level 1 training and includes training for Belt Drives, Chain Drives, and Machine Shaft Coupling.

Prerequisites: Level 1 is required

Level 2 bundle includes
- Sheave, Pulley, Sprocket Kit
- Motor/Speed Reducer Kit
- Accessory Kit 2

The mobile bench is not included.

Skills Curriculum Included
- ME05 - Belt Drives
- ME06 - Chain Drives
- ME07 - Machine Shaft Couplings

LEVEL 3
Mechanical Training Level 3 Bundle continues from the Level 2 training and includes training for Gear Drives, Machine Speed Reducers and Electric Brakes.

Prerequisites: Level 1 and Level 2 are required

Level 3 bundle includes
- Gears Kit
- C-Brake/Speed Reducer Kit
- Gear Box Kit

The mobile bench is not included.

Skills Curriculum Included
- ME08 - Gear Drives
- ME09 - Machine Speed Reducers
- ME10 - Electric Brakes

HOURS OF INSTRUCTION: 100

TYPE
LAPUAGES
EN

+1-603-413-2600
In a footprint of 5.6 square meters (60 square feet), the JobMaster® 1600 Electromechanical Maintenance Cell simulates an automated manufacturing operation in an industrial plant.

This platform delivers relevant skills in the installation, operation, troubleshooting and maintenance of industrial equipment.

The basic cell includes electrical power distribution and controls, wire and cable tray, wireways, conduit and equipment housings. Students gain an 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 and cool process tunnel
- Industrial lighting
- Three-phase motor controls and variable frequency drives
- DC motor controls and drive
- Lubrication components
- Pneumatic system and controls
- Instructor fault insertion system

The construction of the cell can be performed entirely by the trainees. Using industry-standard work orders, standard operating procedures, schematic diagrams and technical manuals as resources, students assemble the frame and install the electrical wiring for the cell and add-on components.

MAINTENANCE CELL INCLUDES:
- Cell Frame
- Enclosures
- Transformer
- Conduit and Fittings
- Low Voltage and Circuit Protection
- Conveyor
- Conveyor Controls
- Predictive/Preventive Maintenance
- Part Manipulation
- Paint, Bake and Cool Tunnel
- Programmable Logic Controller [PLC] System
- Industrial Lighting Circuits
- Industrial Power Circuits System
- Variable Frequency Drive [VFD]
- DC Motor and Drive
- Fault Insertion System

CATALOG #: JM-EMMC-1600
MAINTENANCE CELL CURRICULUM

The Electromechanical maintenance cell is a full emulation of an industrial plant with diverse mechanical and electrical components for students to construct, operate, and troubleshoot. Once operational, faults and skills exercises can be introduced to expand the knowledge of the students. The setup of the cell is an integral part of learning and includes the curriculum below.

**MAINTENANCE CELL SETUP (ZA01)**
- 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
- 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
- Work Order 13: Cut and Ream Conduit
- Work Order 14: Install Flexible Metal Conduit
- Work Order 15: Install EMT Conduit 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

**PART MANIPULATION (ZA03)**
- Work Order 1: Install Part Stacker and Feeder Tray
- Work Order 2: Install Part Kicker
- Work Order 3: Install Stacker Part Sensor Paint, Bake and Cool Tunnel
- Work Order 4: Install Tunnel
- Work Order 5: Install Paint Nozzles
- 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
- 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

**CONVEYOR, CONVEYOR DRIVE & CONTROLS (ZA02)**
- 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
- 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
- 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

**INDUSTRIAL LIGHTING CIRCUITS (ZA04)**
- 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
- 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

**VARIABLE FREQUENCY DRIVE (ZA05)**
- 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

**DC MOTOR DRIVE (ZA06)**
- 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

**FAULT INSERTION SYSTEM (ZA07)**
- 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
Intelitek Learning Solutions

Intelitek transforms education across the globe with comprehensive technology learning solutions. Our innovative tools and technologies empower instructors and inspire students to improve the world around them. We understand the changing needs of your career and technology classrooms and design flexible solutions that meet those needs.

With sustainable support and professional development to ensure the continued success of your programs, Intelitek programs deliver the competencies needed for in-demand careers.

At Intelitek we are producing results for students, teachers, nations and economies.