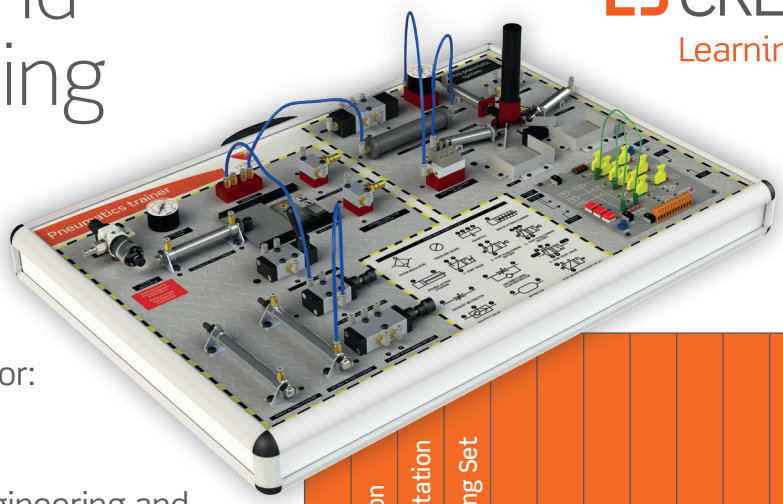
T-LEVELS: Engineering and Manufacturing

Products to support hands-on and online learning

LJ CREATE™
Learning for life

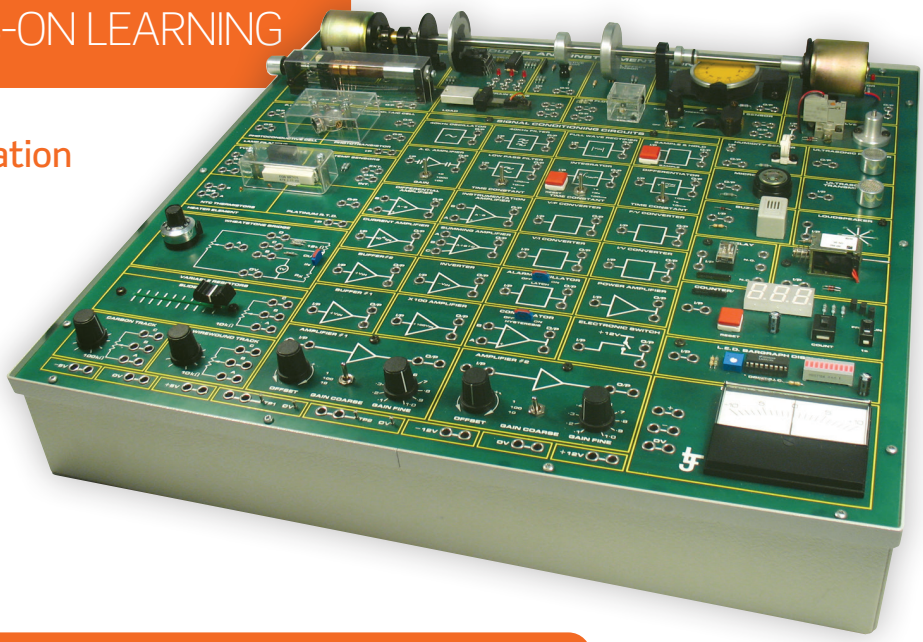


ENGINEERING CORE PRODUCTS

- Online Lessons Package for:
  - Units 1-17
- Hands-on Equipment for:
  - Working within the Engineering and Manufacturing Sectors
  - Essential Science for Engineering and Manufacturing
  - Mechanical Principles
  - Electrical and Electronic Principles
  - Mechatronics
  - Engineering and Manufacturing Control Systems

	ENG1/AL Online Lessons Pack	320-11 Core Electronics Workstation	217-50 Transducers and Instrumentation	290-00/SI Industrial Control Teaching Set	260-01 Mechanisms Trainer	270-01 Electro-Pneumatics Trainer	280-01 Hydraulics Trainer	350-01 Injection Moulding Trainer	511-01 Physics Apparatus Kit	511-02 Force and Energy Kit	511-03 Motion Kit	511-08 Measurement Kit	512-01 Chemistry Apparatus Kit	520-00/TL E&M T Level Data Logger Set
1: Working within the Engineering and Manufacturing Sectors	●							●						
2: Engineering and Manufacturing Past, Present, and Future	●													
3: Engineering Representations	●													
4: Essential Mathematics for Engineering and Manufacturing	●													
5: Essential Science for Engineering and Manufacturing	●	●							●	●	●	●	●	●
6: Materials and their Properties	●													●
7: Mechanical Principles	●				●				●	●	●			●
8: Electrical and Electronic Principles	●	●												
9: Mechatronics	●			●	●	●	●							
10: Engineering and Manufacturing Control Systems	●	●	●											
11: Quality Management	●													
12: Health and Safety Principles and Coverage	●													
13: Business, Commercial and Financial Awareness	●													
14: Professional Responsibilities, Attitudes, and Behaviours	●													
15: Stock and Asset Management	●													
16: Continuous Improvement	●													
17: Project and Programme Management	●													

CORE 10: ENGINEERING AND MANUFACTURING CONTROL SYSTEMS
EQUIPMENT FOR HANDS-ON LEARNING



Transducers and Instrumentation (24 Practical Activities)

- Types of sensors
- Purpose and function of sensors
- Types of actuators
- Measurement applications
- Electrical and pneumatic power sources
- Open and closed loop systems
- Overdamping and underdamped systems
- Three term control

CORE 8: ELECTRICAL AND ELECTRONIC PRINCIPLES
EQUIPMENT FOR HANDS-ON LEARNING

Core Electronics Workstation (148 Practical Activities)

- Introduction to basic circuits
- DC circuits
- AC circuits and phasors
- Analogue and digital signal conditioning
- Semiconductor devices
- Electromagnetic systems

CORE 1: WORKING WITHIN THE ENGINEERING AND MANUFACTURING SECTORS
EQUIPMENT FOR HANDS-ON LEARNING

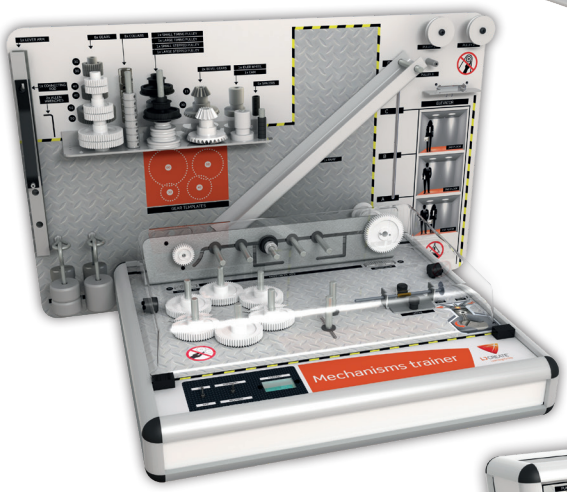
Injection Moulding Trainer

- Injection mould the parts for a model car
- Mould different doorknob designs and test each one for strength
- Investigate why a mould must be securely clamped
- Mould a plastic handled screwdriver with a metal blade
- Adapt an existing mould design to make a corn cob holder
- Explore the benefits of adding a draft angle to a mould
- Investigate the effects of component undercuts and overhangs on mould tool design

CORE 9: MECHATRONICS
EQUIPMENT FOR HANDS-ON LEARNING

Programmable Logic Controls (23 Practical Activities)

- Operation, use and application of programmable logic controllers

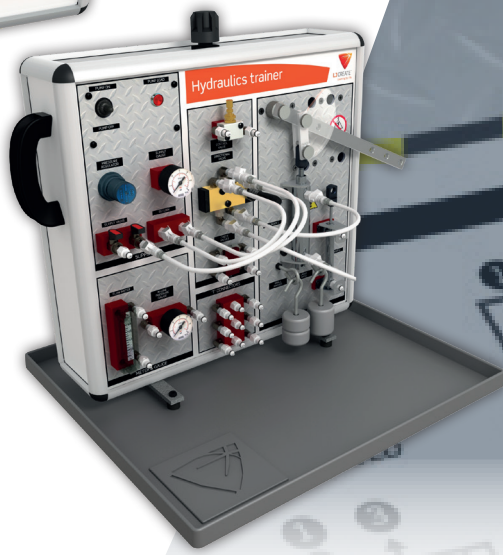


Electro-Pneumatic Trainer (8 Practical Activities)

- Basic principles and applications of pneumatics in relevant contexts
- Operation of electronic devices and circuits in mechatronics contexts

Hydraulics Systems Trainer (7 Practical Activities)

- Basic Principles and applications of hydraulics in relevant contexts



Mechanisms Trainer (5 Practical Activities)

- Basic Principles and applications of mechanisms in relevant contexts

CORE 5: ESSENTIAL SCIENCE FOR ENGINEERING AND MANUFACTURING
EQUIPMENT FOR HANDS-ON LEARNING

Measurement Kit (5 Practical Activities)

- Techniques for making accurate measurements along with use of a range of measurement instruments
- Density

Chemistry Apparatus Kit (39 Practical Activities)

- The structure of mixtures, solutions, suspensions and solubility
- Density and metals
- Chemical reactions such as acidity and alkalinity

Force and Energy Kit (3 Practical Activities)

- Force, displacement and cause in work
- Calculating the amount of work

Motion Kit (4 Practical Activities)

- Speed, velocity, acceleration, force and mass
- Forces acting at a point, linear motion
- Linear momentum and impulse

Physics Apparatus Kit (18 Practical Activities)

- Friction
- Conservation of energy
- Linear momentum and impulse

Data Logging Kit (22 Practical Activities)

- Measurement
- Forces
- Motion
- Thermodynamics






T Levels: Engineering and Manufacturing

Online Lessons Pack: Topics for Engineering Core Content

Course 1: Working within the Engineering and Manufacturing Sectors
- Engineering and manufacturing design
- Maintenance, installation and repair practices
- Manufacturing, processing and control practices

Course 2: Engineering and Manufacturing Past, Present and Future
- Innovation and emerging trends
- Impact of technological advances

Course 3: Engineering Representations
- Graphical information
- Drawing, dimensions and sizing

Course 4: Essential Mathematics for Engineering and Manufacturing
- Basic arithmetic
- Algebra
- Geometry
- Area and volume
- Graphs and charts
- Trigonometry
- Vectors and moments

Course 5: Essential Science for Engineering and Manufacturing
- Scientific method
- Measurement
- Chemical composition and behaviours
- Physical forces and behaviours
- Thermal dynamics
- Fluid dynamics

Course 6: Materials and their Properties
- Material structures
- Metals
- Plastics
- Polymers
- Material properties
- Disposal of materials
- Material processing
- Heat treatments
- Material testing

Course 7: Mechanical Principles
- Motion and mechanics
- Newton's laws
- Beams
- Storage and transfer of force and energy
- Gravity
- Friction
- Power sources

Course 8: Electrical and Electronic Principles
- Atomic theory
- Voltage, current and resistance
- Ohm's law
- Analogue and digital signals
- Signal processing
- DC circuit networks
- AC circuits
- Phasors
- Semiconductor devices
- High power devices
- Magnetism and electromagnetism

Course 9: Mechatronics
- Electronic control of mechanical devices
- Programmable logic controllers
- Hydraulics
- Pneumatics

Course 10: Engineering and Manufacturing Control Systems
- Open and closed loop systems
- Feedback
- Summing points
- PID control
- Transfer functions
- Relationship between input and output
- Overdamping and underdamping
- Pulse width and amplitude modulation
- Industrial network systems
- Types of sensors and measurement applications
- Actuators and power sources

Course 11: Quality Management
- BS and ISO standards
- Effects of standards on quality and safety

Course 12: Health and Safety Principles and Coverage
- Health and safety practices
- Health and safety in laboratories
- Health and safety in the workplace
- Fire Safety
- Chemical hazards
- Manual handling
- Risk and hazard identification
- Control measures

Course 13: Business, Commercial and Financial Awareness
- Commercial priorities
- Markets and customers
- Management practices
- Business models
- Profits and cash flow
- Balance sheets and P/L statements
- Budgets and recording financial transactions

Course 14: Professional Responsibilities, Attitudes, and Behaviours
- Organisational structure
- Relationship to others
- Equality and inclusion
- Performance and error reduction
- Reputation and ethics

Course 15: Stock and Asset Management
- Stock and inventory control
- Product life cycles
- Supply chain issues
- Warehousing
- Asset management

Course 16: Continuous Improvement
- Principles of continuous improvement
- Planning, monitoring and implementing
- Lean principles and practices

Course 17: Project and Programme Management
- Project planning, control and practices
- Collaborative project working practices

If you'd like a call or a visit: **tel: +44 (0)1603 748001 | email: info@ljcreate.co.uk**

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