

Modular Training System

A Totally NEW Concept in Engineering Training



MECHATRONICS

The all-NEW, low-cost **Modular Training System (MTS)**, from **MECHATRONICS**, is a totally unique concept in Multi-skilling technology, utilising an extensive range of industrial drives and control methods. The **MTS** consists of a range of differing modules, all of which can be used independently, or alternatively can be connected together, as 2 or more modules, to form part or complete integrated systems, simulating a full production process.

As with other products within our range the **Modular Training System** has been developed at the specific request of existing clients. These clients felt that the systems already available did not meet their needs for a number of reasons and therefore it needed someone to look at their requirements with some novel and fresh ideas and concepts, to develop an innovative solution.

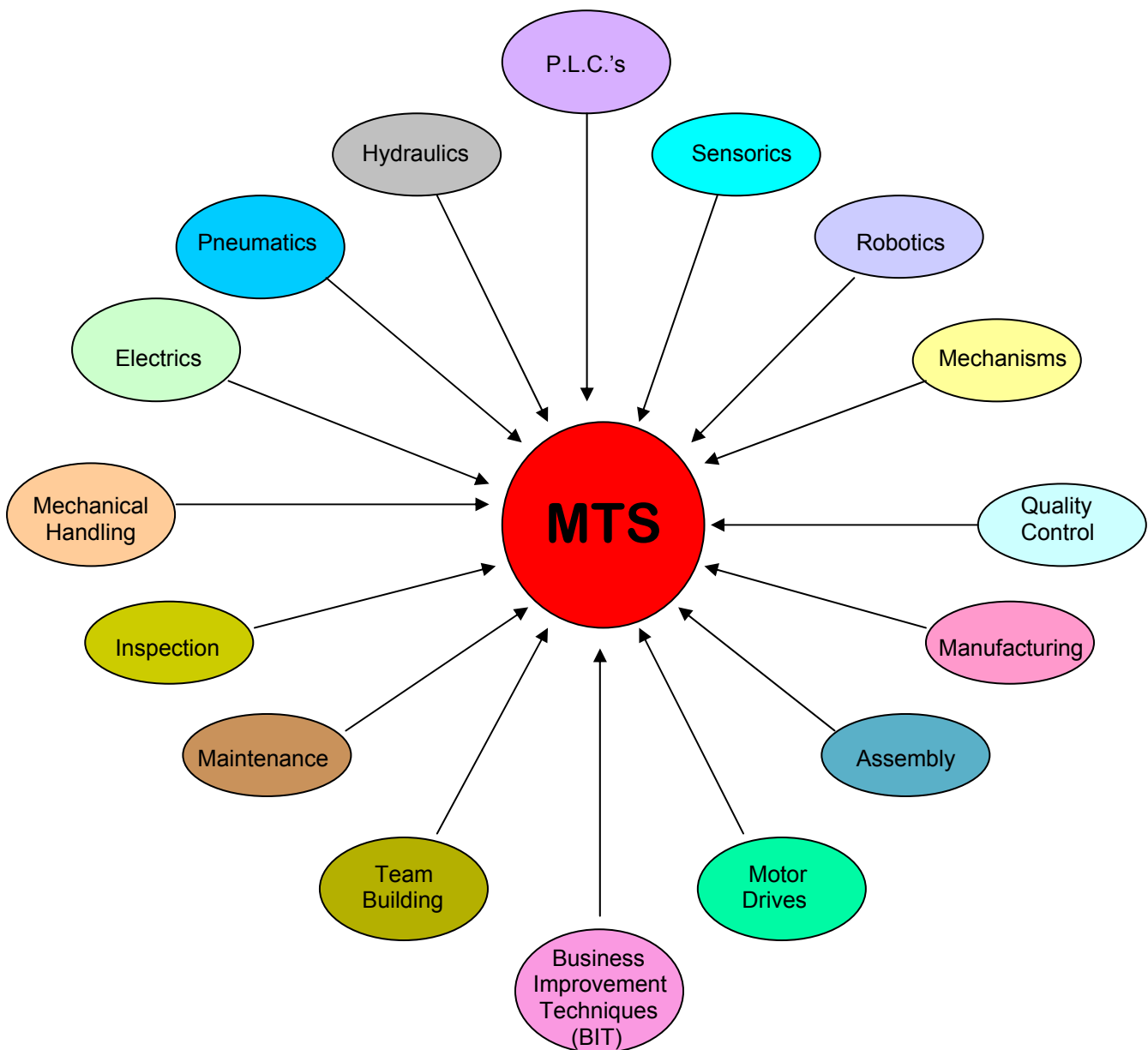
Specific requirements of the system that had been identified by Colleges included:-

- that the system (or parts thereof) should be low-cost and affordable, including add-on modules or spare parts for future expansion, whereas existing systems are always extremely expensive for what they offer
- systems must be widely used and fully utilised, to offer best value for money (most existing systems are very under utilised or never used and therefore offer no value for money whatsoever)
- complete system must be compact and space efficient, allowing classrooms to be multi-tasked, as opposed to dedicated solely to an FMS / CIM (existing FMS / CIM systems take up a complete dedicated lab or classroom at great expense)
- a range of modules available that cover different technologies
- modularity, so that different student groups can be taught different subjects by different lecturers and possibly all at the same time in different rooms / labs (existing systems do not lend themselves to this as often each section just repeats the same technologies used), but at the same time still allowing for complete systems to be constructed
- quick and easy to reconfigure for different student groups / levels (present systems are generally not suitable for reconfiguration)
- simple to use (existing systems are over complex for what they achieve and are therefore under utilised)
- ability to provide successful training in short durations, e.g. what can be achieved in a typical 1 – 2 hour lesson (with existing systems nothing can be achieved in this time scale and then students lose interest and get bored)
- expandability, where future needs dictate the requirement for additional module/s to create a larger system
- systems / modules should also be very robustly manufactured (existing systems are very flimsy in their construction and therefore easily damaged if used by students)
- good build quality essential (existing systems are often of very poor build quality, which reflects badly on any centre offering quality training)
- systems / modules should be complete and ready for use upon delivery, so that there is no installation, commissioning and development time required (some existing systems have not been ready to run two years after supply)
- systems / modules should be fully commissioned upon delivery (existing systems often take an extremely long time to get commissioned)
- systems / modules should be supplied with all relevant documentation, this documentation should be licensed for copying to issue to students (other systems are often supplied with either very poor documentation or no documentation at all)
- college staff trained on their own system, so as to be confident in using it (existing systems are generally over complex with little or no staff training offered and therefore they never get used)

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- systems must be safe in use, fitted with guards etc.. (some existing systems have no guards and require students to work 'live' when programming the P.L.C.'s – contrary to Health and Safety regulations, as well as being very dangerous)
- ongoing '**After Sales**' support (present systems are very poorly supported), our systems are covered by the **MECHATRONICS full 5 year warranty**

With the **MECHATRONICS Modular Training System** each module utilises a selection of different technologies and can therefore be used for a variety of different curricula including:-



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Students from craft right through to technician, as well as mature employed craftsmen and technicians will all benefit from training on the **MTS** due to simple functions and operations are the basis of each module but by combining modules into an integrated system the complexity can be increased, as and when required. Each module has its own integral on-board P.L.C. (except for the robot module which has its own industrial controller), all that is required to power the system is a compressed air supply and 230V 50Hz single-phase electrical supply.

All of the modules within the **MTS** have been designed so that all P.L.C. programming, monitoring etc.. can be carried out without accessing the control panel (other systems on the market require that you work 'live' inside a cabinet to programme or monitor the P.L.C., this is both dangerous and in contravention of Health and Safety regulations). For safety purposes the modules are supplied complete with clear (see-through) guards, so that the training system can be operated with safety as a paramount consideration, whilst still being able to see the equipment in operation (again some systems on the market are not guarded and are therefore dangerous in use and contravene Health and Safety regulations).

Each module is supplied completely assembled, plumbed, wired, and tested, ready for use, they are built onto an extruded aluminium profile trolley, fitted with 4 castors (2 lockable), allowing mobility between different training locations. Included with each module are the required power, control, connection and interlinking cables, along with programming software, very extensive manuals and exercises.

There are a range of **MECHATRONICS MTS** modules available, which are being constantly expanded, to cover an ever-widening range of technologies. Each module can be used as a stand-alone unit or combined with others to create a low-cost, yet simple to use system.

As the modules are available separately, it is possible to purchase them as and when budgets allow, or requirements change, the system can then be built up, over a period of time, it is not essential to spend a fortune on day one for a 'full blown' system that is overpowering to staff as well as students and is therefore little (or never) used, it also means the system will not become outdated or redundant, being expandable to meet your future requirements.



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Modular Training System

Loading Station



The 'Loading (Handling) Station' when used in a 'system' is the first module and comprises a manually loaded magazine, with pneumatically driven feed, load and transfer mechanisms, all controlled by an industrial P.L.C. Equipment installed on the Loading Station includes:- rodless cylinder, gripper unit, compact cylinder, guided compact cylinder, multimach valve island, air service unit, flow control valves, inductive and magnetic proximity sensors.

Function:-

The 'Loading (Handling) Station' separates, feeds and distributes components. Components may be stored in the manually fed magazine tube and are detected by means of an inductive sensor. A compact cylinder pushes the components out of the magazine, individually, for transfer by a rodless cylinder with gripper assembly. When used as an independent station the module can be used to perform a wide range of exercises, from simple operations allowing students to become familiar with the system to more complex operations thereby increasing the student's knowledge. If the Loading Station is used as part of a system, it is the first module within the system and feeds components to the downstream (e.g. Processing Station) module.

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Loading Station

Technical data:-

Operating pressure:	3 – 8 bar (300 – 800 kPa)
Electrical supply:	230 Volt a.c. 50 Hz single-phase
P.L.C. specification:	16 digital inputs / 14 digital relay outputs
Component diameter:	40 mm
Component length:	40 mm
Components supplied:	5 off Aluminium, 5 off Nylon

Dimensions:-

Length:	720 mm
Width:	550 mm
Height:	800 mm (to top of trolley)
Weight:	Kg (complete module)

Equipment list:-

- 1 off Extruded aluminium profile trolley with 4 castors (2 lockable)
- 1 off Set of safety guards (extruded aluminium framework with clear PETG panels)
- 1 off Control cabinet complete with P.L.C. (16 inputs, 14 relay outputs, 24V d.c. supply), 6 input switches, illuminated mains switch, input fuse, output fuse and Emergency STOP switch
- 1 off Air service unit with 3/2 way solenoid actuated, spring return, ON/OFF valve
- 1 off Pneumatic pressure gauge
- 1 off 4-station pneumatic 'Multimach' valve island
- 1 off Pneumatic compact cylinder
- 1 off Pneumatic compact guided cylinder
- 1 off Pneumatic rodless cylinder
- 1 off Pneumatic gripper unit
- 8 off Cylinder proximity sensor (magnetic)
- 8 off Pneumatic flow control valve
- 5 off Aluminium component workpiece
- 5 off Nylon component workpiece
- 1 off Magazine module
- 1 off Power lead
- 1 off P.C. – P.L.C. connection cable
- 1 off P.L.C. programming software
- 1 off P.L.C. manual
- 1 off Communication cable
- 1 off Accessories pack (tubing, cable, cable ties, sleeves, pneumatic fittings, labels, etc...)
- 1 off Comprehensive user's manual with exercises



Modular Training System

Processing Station



The '**Processing Station**' when used in a 'system' is an intermediate module, that is installed downstream of the Loading Station and comprises an electrically driven rotary index table, with drilling and tapping stations mounted around the perimeter of the index table, all controlled by an industrial P.L.C. Equipment installed on the Processing Station includes:- stepper motor with drive card, d.c. motor, d.c. motor with gearbox, twin-rod guided pneumatic cylinders (2 off), single acting cylinder, manifold mounted pneumatic control valves, air service unit, flow control valves, inductive, capacitive and magnetic proximity sensors.

Function:

On the '**Processing Station**' components are drilled and tapped (simulated) on a rotary index table, which is driven by an electrical (d.c.) stepper motor. A P.L.C. controlled circuit positions the index table, its position is detected by means of an inductive sensor and locked in position by a single acting cartridge cylinder. When on the index table the components are drilled and tapped in two parallel processes, the drilling and tapping heads are powered by d.c. motors (tapping head motor also incorporates a gearbox) and fed by means of twin-rod guided pneumatic cylinders, with position sensors and flow control valves incorporated. When used as an independent station the index table can be programmed to give numerous operations (number of indexed positions selectable is infinitely variable e.g. if indexing to 1° angle then 360 positions are possible, both clockwise and counter-clockwise). The drill or tapping unit (or both) can be used in conjunction with the index table, or they may be used independently of each other or the index table. If the Processing Station is used as part of a system it is fed with components from an upstream module (e.g. Loading Station) before processing the component, which is then presented for transfer to a downstream module (e.g. Hydraulic Press Station).

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Processing Station

Technical data:-

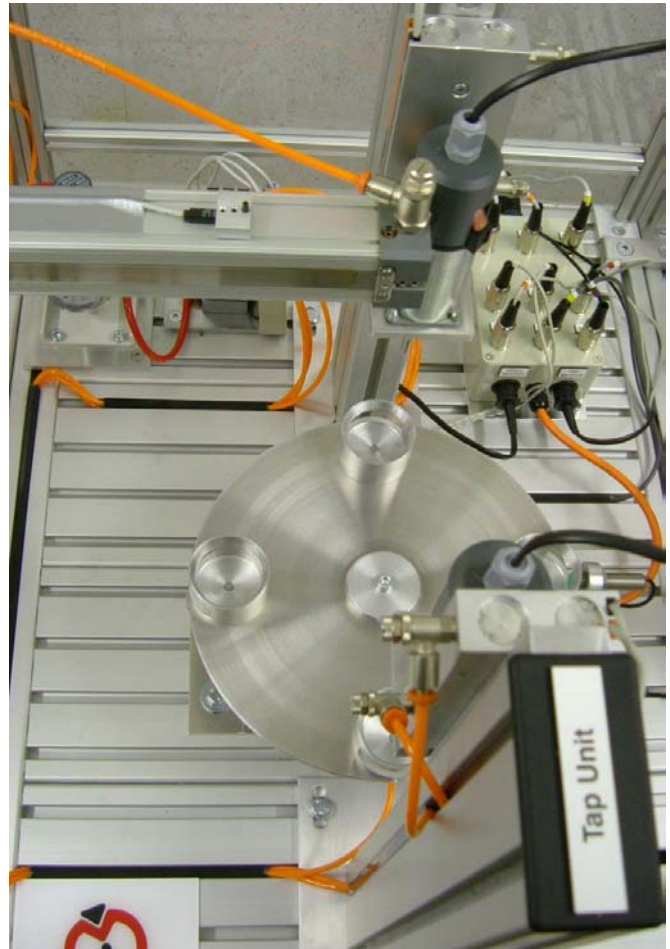
Operating pressure:	3 – 8 bar (300 – 800 kPa)
Electrical supply:	230 Volt a.c. 50 Hz single-phase
P.L.C. specification:	16 digital inputs / 14 digital transistor outputs

Dimensions:-

Length:	720 mm
Width:	550 mm
Height:	800 mm (to top of trolley)
Weight:	Kg (complete module)

Equipment list:-

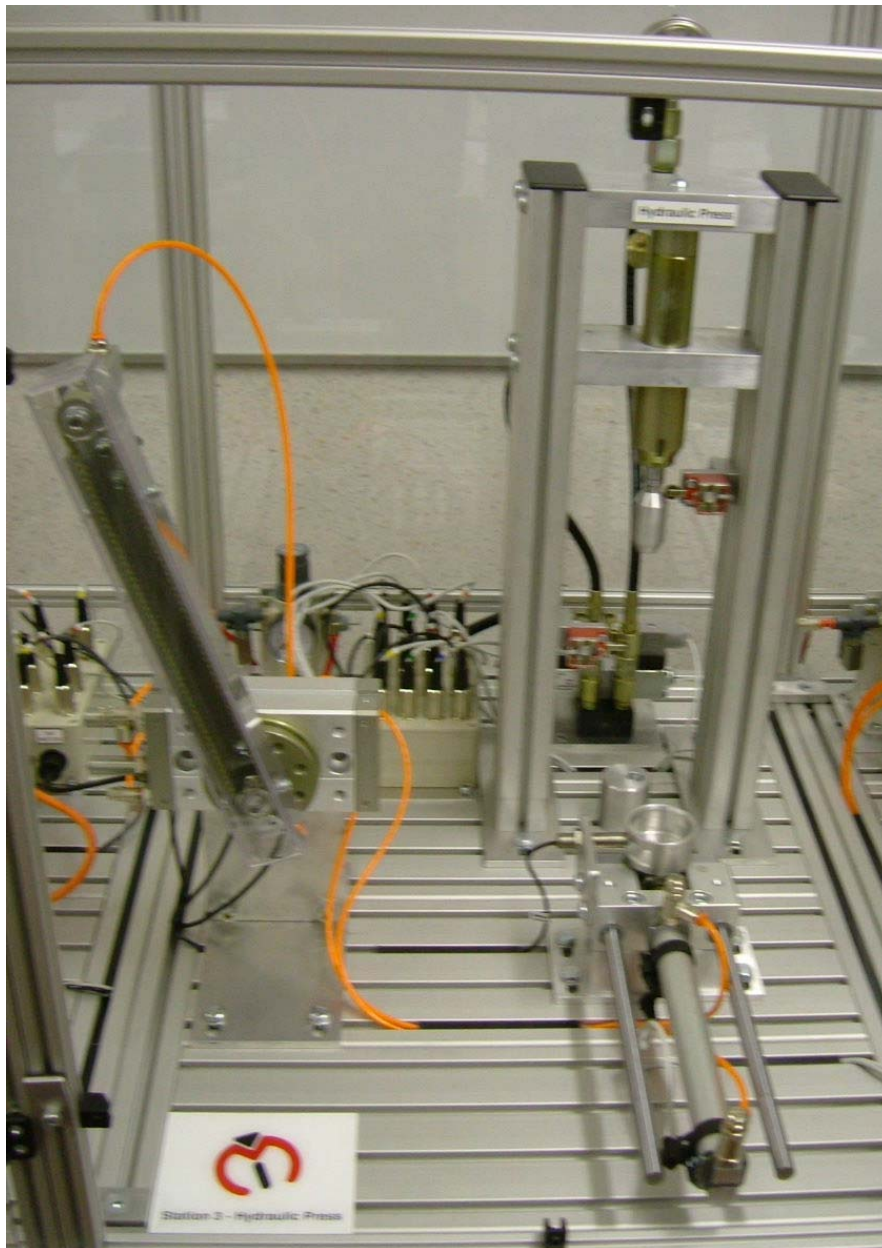
- 1 off Extruded aluminium profile trolley with 4 castors (2 lockable)
- 1 off Set of safety guards (extruded aluminium framework with clear PETG panels)
- 1 off Control cabinet complete with P.L.C. (16 inputs, 14 transistor outputs, 24V d.c. supply), 6 input switches, illuminated mains switch, input fuse, output fuse and Emergency STOP switch
- 1 off Air service unit with 3/2 way solenoid actuated, spring return, ON/OFF valve
- 1 off Pneumatic pressure gauge
- 1 off Index table with 4 component locations (24V d.c. stepper motor driven)
- 1 off Inductive sensor for index table positioning
- 1 off Capacitive sensor for component registration
- 1 off 3-station manifold mounted pneumatic valve island
- 2 off Pneumatic twin-rod guided cylinder
- 1 off Pneumatic single acting cartridge cylinder
- 1 off Drill station (24V d.c. motor)
- 1 off Tapping station (24V d.c. motor & gearbox)
- 4 off Cylinder proximity sensor (magnetic)
- 4 off Pneumatic flow control valve
- 1 off Power lead
- 1 off P.C. – P.L.C. connection cable
- 1 off P.L.C. programming software
- 1 off P.L.C. manual
- 1 off Communication cable
- 1 off Accessories pack (tubing, cable, cable ties, sleeves, pneumatic fittings, labels, etc...)
- 1 off Comprehensive user's manual with exercises



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Modular Training System

Hydraulic Press Station



The '**Hydraulic Press Station**' when used in a 'system' is an intermediate module, that is installed downstream of the Processing Station and upstream of the Robot (Inspection) Station and comprises hydraulic, pneumatic, vacuum and P.L.C. controls all within one module. This station will simulate the stamping of a product (e.g. date or serial number stamping).

Function:-

The '**Hydraulic Press Station**' takes the components that are presented from an upstream module (e.g. Processing Station) and transfers them by means of a swing transfer mechanism and vacuum into a holding device, which is then fed into the stamping fixture. Once stamped (simulated) the component is removed from the holding device and transferred to a downstream module (e.g. Robot (Inspection) Station).

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Hydraulic Press Station

Technical data:-

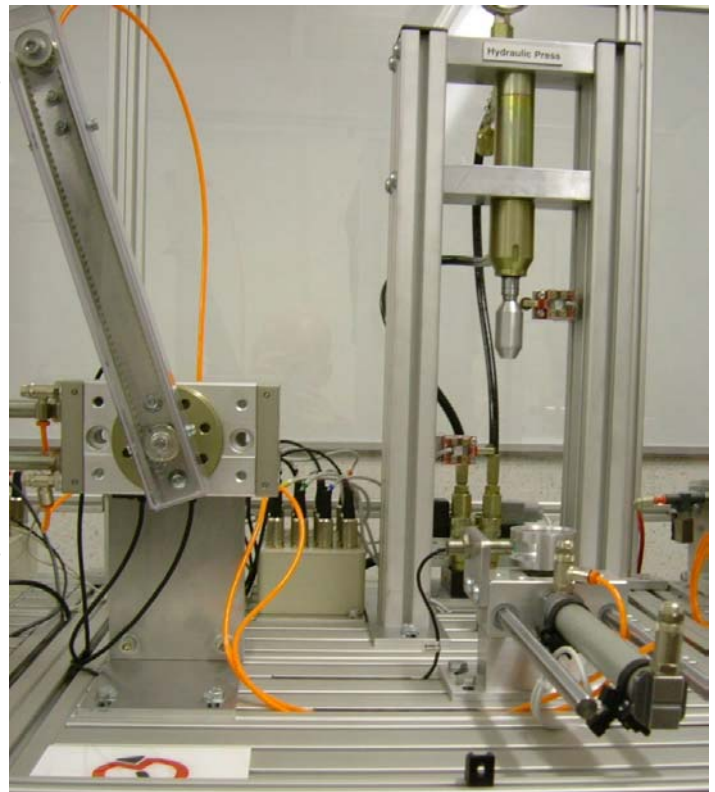
Operating pressure (air):	3 – 8 bar (300 – 800 kPa)
Operating pressure (hyd.):	30 bar (3000 kPa)
Electrical supply:	230 Volt a.c. 50 Hz single-phase
P.L.C. specification:	16 digital inputs / 14 digital relay outputs

Dimensions:-

Length:	720 mm
Width:	550 mm
Height:	800 mm (to top of trolley)
Weight:	Kg (complete module)

Equipment list:-

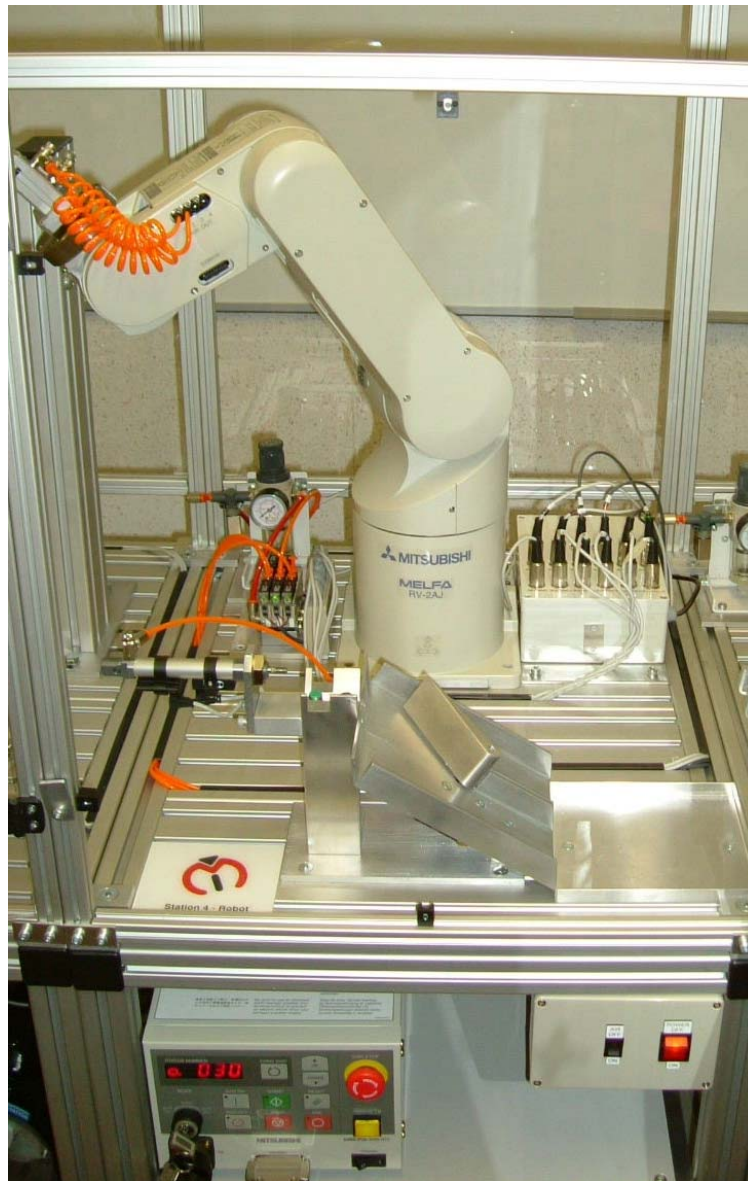
- 1 off Extruded aluminium profile trolley with 4 castors (2 lockable)
- 1 off Press frame
- 1 off Set of safety guards (extruded aluminium framework with clear PETG panels)
- 1 off Control cabinet complete with P.L.C. (16 inputs, 14 relay outputs, 24V d.c. supply), 6 input switches, illuminated mains switch (system), illuminated mains switch (hydraulics), thermal overload (hydraulics), input fuse, output fuse and Emergency STOP switch
- 1 off Hydraulic power pack
- 1 off Hydraulic double acting cylinder
- 1 off Hydraulic 4/3 way Solenoid / solenoid valve (tandem centre)
- 1 off Hydraulic flow control valve
- 1 off Hydraulic pressure gauge
- 2 off Limit switches
- 1 off Air service unit with 3/2 way solenoid actuated, spring return, ON/OFF valve
- 1 off Pneumatic pressure gauge
- 1 off Pneumatic double acting cylinder (ISO 6432)
- 1 off Pneumatic cylinder guide unit
- 1 off Pneumatic rotary actuator 180°
- 1 off 3-station manifold mounted pneumatic valves
- 1 off Vacuum generator
- 1 off Vacuum cup
- 1 off Swing frame mechanism
- 1 off Capacitive sensor
- 4 off Cylinder proximity sensor (magnetic)
- 1 off Power lead
- 1 off P.C. – P.L.C. connection cable
- 1 off P.L.C. programming software
- 1 off P.L.C. manual
- 1 off Communication cable
- 1 off Accessories pack (tubing, cable, cable ties, sleeves, pneumatic fittings, labels, etc...)
- 1 off Comprehensive user's manual with exercises



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Modular Training System

Robot (Inspection) Station



The '**Robot (Inspection) Station**' when used in a 'system' is an intermediate module, that will transfer a component from an upstream module (e.g. Hydraulic Press Station) to a downstream module (e.g. Pick & Place Station) and comprises a 'genuine' industrial robot (**MITSUBISHI RV-2AJ**), complete with industrial programming software (Cosirop) for programming from a PC and also a hand-held teach pendant.

Function:-

The '**Robot (Inspection) Station**' can take components that are presented from an upstream module (e.g. Hydraulic Press Station) and manipulate them before presenting them to an inspection jig, provided the component passes the inspection the robot then takes it and processes it on to the downstream module (e.g. Pick & Place Station).

The robot used is a genuine industrial version (Mitsubishi model RV2AJ), which is supplied complete with controller, hand-held teach pendant and PC programming software (Cosirop).

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Robot (Inspection) Station

Technical data:-

Operating pressure (air): 3 – 8 bar (300 – 800 kPa)
Electrical supply: 230 Volt a.c. 50 Hz single-phase

Dimensions:-

Length: 720 mm
Width: 550 mm
Height: 800 mm (to top of trolley)
Weight: Kg (complete module)

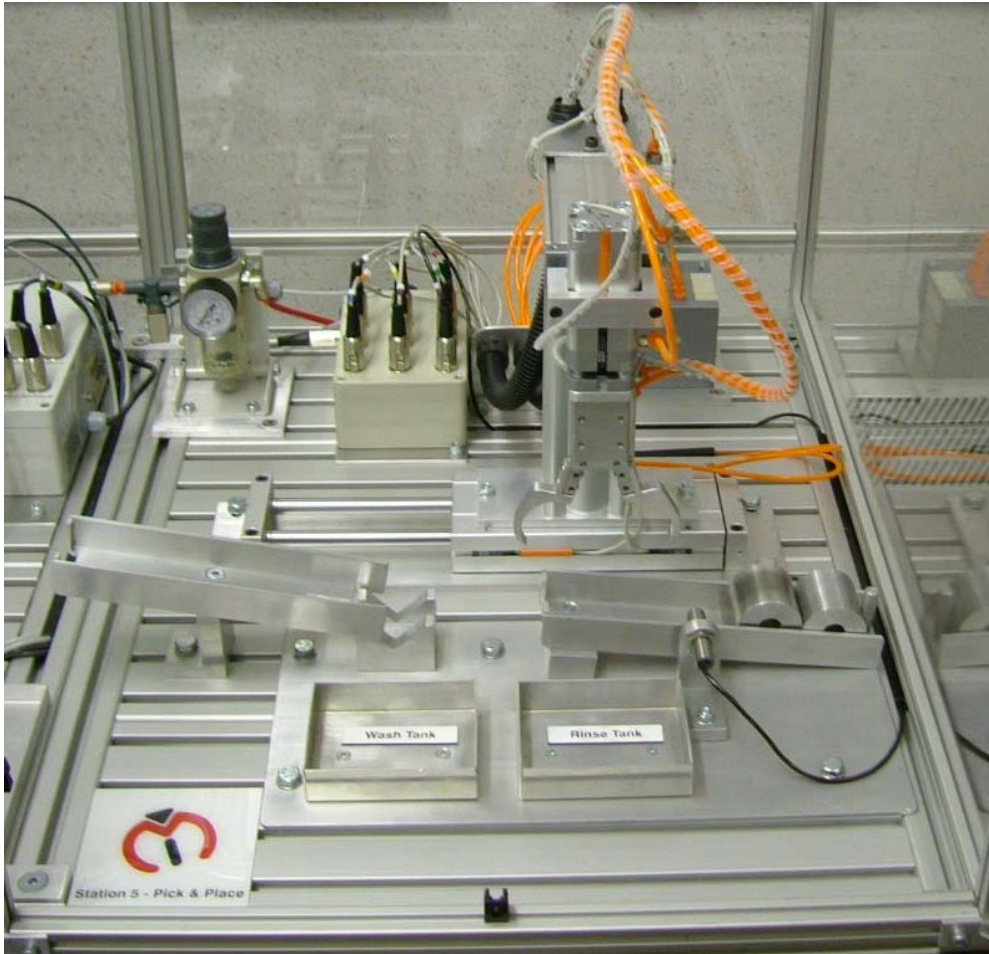
Equipment list:-

- 1 off Extruded aluminium profile trolley with 4 castors (2 lockable)
- 1 off Set of safety guards (extruded aluminium framework with clear PETG panels)
- 1 off Mitsubishi RV-2AJ industrial 5-axis robot
- 1 off Mitsubishi robot controller
- 1 off Mitsubishi teach pendant (hand-held)
- 1 off Mitsubishi 'Cosirop' PC programming software
- 1 off Set of manuals for robot, software and controller
- 1 off Air service unit with 3/2 way solenoid actuated, spring return, ON/OFF valve
- 1 off Pneumatic pressure gauge
- 1 off Pneumatic gripper unit
- 1 off Pneumatic single acting cylinder (ISO 6432)
- 1 off Pneumatic rotary actuator 90°
- 5 off Pneumatic flow control valve
- 5 off Cylinder proximity sensor (magnetic)
- 1 off 3-station manifold mounted pneumatic valves
- 1 off Inductive sensor
- 1 off Capacitive sensor
- 1 off Power lead
- 1 off Communication cable
- 1 off PC to Robot controller connection cable
- 1 off Accessories pack (tubing, cable, cable ties, sleeves, pneumatic fittings, labels, etc...)
- 1 off Comprehensive user's manual with exercises



Modular Training System

Pick & Place Station



The '**Pick & Place Station**' when used in a 'system' can be an intermediate or final module, that is typically installed downstream of the Robot (Inspection) Station and comprises a pneumatically driven 4-axis manipulator, with varying functions (in fact the module comes with 2 different location plates, so that different processes may be carried out), all controlled by an industrial P.L.C. Equipment installed on the Pick & Place Station includes:- double ended twin-rod guided cylinder, twin-rod guided cylinder, guided compact cylinder, pneumatic gripper unit, 'Multimach' valve island, air service unit, sensors (magnetic and inductive) and flow control valves.

Function:-

On the '**Pick & Place Station**' various processes may be performed, for instance components can be sorted and rotated from one position to any of three others, according to the P.L.C. programme used. The Pick & Place manipulator is operated and positioned by a P.L.C. controlled circuit with its positions being detected by cylinder proximity (magnetic) sensors. Numerous P.L.C. programmes can be entered into the module and therefore the number of exercises possible is too long to list here, with the two options of component location plate supplied the number of exercises becomes long enough to keep even the most advanced student/s occupied. If the Pick & Place Station is used as part of a system it is fed with components from an upstream module (e.g. Robot (Inspection) Station), before processing them and presenting them for transfer to a downstream module.

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Pick & Place Station

Technical data:-

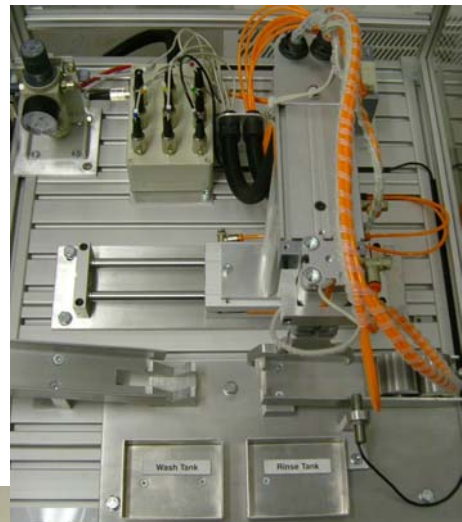
Operating pressure:	3 – 8 bar (300 – 800 kPa)
Electrical supply:	230 Volt a.c. 50 Hz single-phase
P.L.C. specification:	16 digital inputs / 14 digital relay outputs

Dimensions:-

Length:	720 mm
Width:	550 mm
Height:	800 mm (to top of trolley)
Weight:	Kg (complete module)

Equipment list:-

- 1 off Extruded aluminium profile trolley with 4 castors (2 lockable)
- 1 off Set of safety guards (extruded aluminium framework with clear PETG panels)
- 1 off Control cabinet complete with P.L.C. (16 inputs, 14 relay outputs, 24V d.c. supply), 6 input switches, illuminated mains switch, input fuse, output fuse and Emergency STOP switch
- 1 off Pick & place component location plate (component sorting)
- 1 off Pick & place component location plate (clean & rinse of component)
- 1 off Air service unit with 3/2 way solenoid actuated, spring return, ON/OFF valve
- 1 off Pneumatic pressure gauge
- 1 off Pneumatic double ended, twin-rod guided cylinder
- 1 off Pneumatic twin-rod guided cylinder
- 1 off Pneumatic compact guided cylinder
- 1 off Pneumatic gripper unit
- 1 off 4-station pneumatic 'Multimach' valve island
- 8 off Cylinder proximity sensor (magnetic)
- 8 off Pneumatic flow control valve
- 1 off Power lead
- 1 off P.C. – P.L.C. connection cable
- 1 off P.L.C. programming software
- 1 off P.L.C. manual
- 1 off Communication cable
- 1 off Accessories pack (tubing, cable, cable ties, sleeves, pneumatic fittings, labels, etc...)
- 1 off Comprehensive user's manual with exercises



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F.A.Q.'s (Frequently Asked Questions)

- Q. Is **MECHATRONICS International Ltd** part of, or associated with any other company ?
A. No, it is a privately owned independent company.
- Q. How long has **MECHATRONICS International Ltd** been trading ?
A. The company started in 1988 and had a name change to **MECHATRONICS International Ltd** in 1993.
- Q. Do **MECHATRONICS International Ltd** manufacture their own systems, or are they just an agent for another manufacturer ?
A. **YES**, We manufacture all of our own systems at our facility in Lichfield, we do not represent other companies.
- Q. Is **MECHATRONICS International Ltd** a British company ?
A. **YES**, In fact to the best of our knowledge we are the only British company of our type, all others being foreign owned.
- Q. Do **MECHATRONICS International Ltd** manufacture the individual valves, cylinders, etc.. that are used in the various systems ?
A. **NO**, We purchase proprietary brands and due to volumes that we purchase we are able to get excellent prices from the manufacturers, which we then pass onto our clients.
- Q. Do you allow visits to your premises ?
A. **YES**, Most definitely.
- Q. What charges are there for delivery ?
A. Absolutely none for orders in excess of £500-00
- Q. Can product commissioning be carried out 'on-site' at our premises ?
A. **YES**, In fact we always recommend this.
- Q. What charges are there for 'on-site' commissioning ?
A. None for orders above £500-00
- Q. Can **MECHATRONICS International Ltd** carry out staff training on our behalf ?
A. **YES**, If it is product familiarity training (on our products) we carry this out 'Free of Charge' at your premises. For full subject matter training we can offer this either 'on-site' or at our Lichfield Training Centre (this is a chargeable service).
- Q. What sort of warranty comes with **MECHATRONICS International Ltd** equipment ?
A. A full '**5 year**' NO QUIBBLE, repair or replacement warranty for faulty components or manufacturing is standard with all products.
- Q. Where has **MECHATRONICS International Ltd** equipment been supplied ?
A. Colleges (F.E. & H.E.), Universities, Polytechnics, Schools, Private Training Providers and Industrial (Company) Training Centres, both in the U.K. and overseas.
- Q. Who are some of the companies that use **MECHATRONICS International Ltd** equipment ?
A. Our client list includes:- Allibert, Arizona Light & Power, Boots, BMW, Ciba, Estee Lauder, Ford Motor Co., GlaxoSmithKline, Goodyear, ICI, Jaguar Cars, John Deere, Kuwait Petroleum, Land Rover, National Power, Nestle, Nissan, Rover Cars, Toyota.
- Q. How do **MECHATRONICS International Ltd** prices compare ?
A. On a 'like for like' specification, we are generally 25%+ lower on price than our competitors, on top of this we also offer free delivery, free 'on-site' commissioning, free staff familiarity training and a full '5 year' no quibble warranty.
- Q. Do we have to purchase 'standard (on the shelf, boxed) sets' ?
A. **NO**, at **MECHATRONICS International Ltd** we are happy to build specific sets to your requirements.
- Q. What can we do about any old equipment that we presently have ?
A. Ask us about our generous 'trade-in' allowance, against packages of new equipment.
- Q. Does **MECHATRONICS International Ltd** equipment meet the needs of course curriculum, such as BTEC, City & Guilds, SEMTA / EAL ?
A. **YES**, We presently have a lot of Colleges using our equipment for such courses.

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Other Products

MECHATRONICS International Ltd is a company purely involved in training and education, unlike other companies who see training as a means to open doors to sell their industrial products. Therefore our only interest is offering the ***BEST*** training equipment and systems available that are easy to use and effective in their results, we offer a very comprehensive range at unbeatable "Value for Money", that creates a professional image for the user.

Training Hardware

In addition to the **Modular Training System**, we also manufacture a very extensive range of training equipment and systems, at various levels, in the subject areas of:-

Pneumatics / Electro-pneumatics
Hydraulics / Electro-hydraulics / Proportional hydraulics
Programmable Logic Control (P.L.C.)
Mechanical Transmissions

Teachware & Courseware

To support the training system/s hardware, we have also developed a complete range of teachware suitable for instructors, lecturers, tutors and teachers. This teachware is available in the form of:-

OHP Transparencies
Magnetic Symbols

Courseware suitable for use by students is available in the form of 'industry related' practical exercises, supported by question and answer papers, thereby giving a complete (ready to use) structured assessment system. This material is covered by copyright but is supplied with a licence to copy, the following subjects are available:-

Collection of Circuit Exercises/ Solutions with Question/Answer Papers:

Pneumatics (level 1)
Electro-pneumatics (level 1)
Hydraulics (level 1)
Electro-hydraulics
P. L. C.

Pneumatics (level 2)
Electro-pneumatics (level 2)
Hydraulics (level 2)
Proportional hydraulics
Mechanical Transmissions

E. & O. E.

As the company operates a system of continually striving to improve its products and services we reserve the right to improve, change, amend, or modify our products without prior notification.

MECHATRONICS International Ltd

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