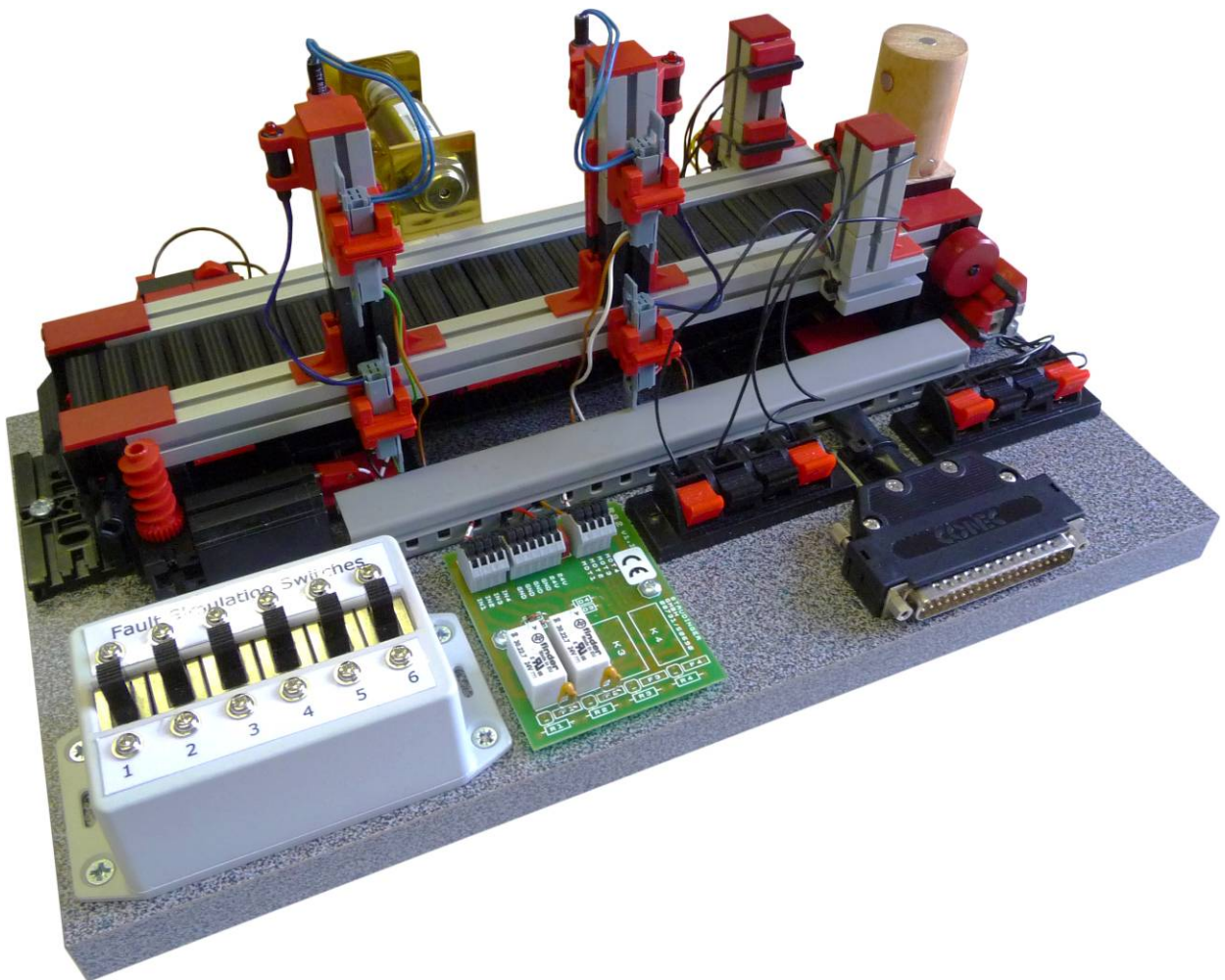




INTACS PLC

Training Conveyor (IPTC)



INDUSTRIAL TRAINING & CONSULTANCY SERVICES

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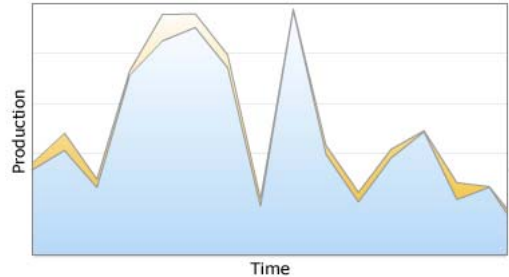
Product Information

The Challenge

PLC training – how to keep the knowledge & skills sharp

These days, the technical demands on the engineering maintenance team in the modern production environment are great. PLC-based machine & process control systems are clever but complex. Tight budgets mean that companies are often forced to run with the minimum number of maintenance people meaning that those on shift need to be on top of their game.

Customers & consumers are generally pretty cost-conscious & this means that manufacturing companies are operating in a very competitive market. The key to survival is about being able to produce volume, on time & whilst maintaining quality but at the lowest cost. This means that the dependence on the availability of production machinery & systems is total.



The popular misconception is that because the PLCs themselves are very reliable, the requirement for training is not a big issue. People who take this line generally fail to realise that very often the problem is not with the PLC but a field fault out on the machine or process; the real issue is finding the problem! To remain competitive, costly breakdowns & stoppages have to be resolved fast & understanding the



PLC itself, being able to read the program & monitor field status provides the very best troubleshooting tool. Where companies rely on expensive third-party support, response time can still mean costly delays whilst waiting for an engineer to get to site. Modern links to remote support sites are not without their problems, can be unreliable due to communications problems & also may still require a competent person on-site by the machine. Also, where companies rely on remote support, time differences in other countries & different holiday patterns sometimes means the cover is not available when needed.

The Solution

Where companies have enough PLC spares to make a small “test-rig”, following appropriate PLC foundation training, the IPTC can be connected & used to provide the essential practice necessary to keep front-line skills sharp, to refresh basic Maintenance Procedures & further develop Fault-finding techniques. Where PLC hardware is not readily available on-site for this purpose, INTACS can quote to supply suitable equipment to match site needs.

PLC Competency Pack

In order for companies to reliably conduct an appropriate Risk Assessment to understand the strength of capability within their maintenance team to minimise the risk to production of machine or process problems & protect factory output, some form of monitoring & recording of skills is required. The starting point is to identify the range of essential skills needed for the particular PLC system. Individual abilities then need to be compared with the Skill Set to identify strengths & weaknesses.

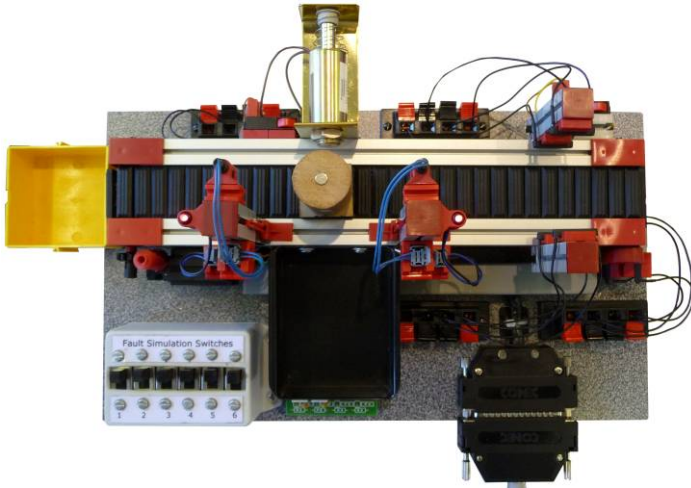
INTACS have developed the different detailed Skill Sets & the framework together with the specific documentation needed for a number of the most popular PLC systems so that companies can get started right away. The PLC Competency Pack documentation for the required PLC systems is included in the cost of the IPTS software.

Trainees Development matrix										Siemens S7-300/400 PLC									
Skill Set																			
System Diagnostic Tools																			
Log Ref.										Workbook		Monitor name		Date		Validated by		Date	

IPTC Product Overview

Conveyor Hardware

The IPTC is a compact & working bench top multi-platform test bed designed to provide practice at essential Maintenance & Troubleshooting skills for maintenance personnel on the required PLC system used on-site. The one IPTC can be connected & used with any make of PLC system provided the appropriate number of 24 volt field Input & Output terminations are available.

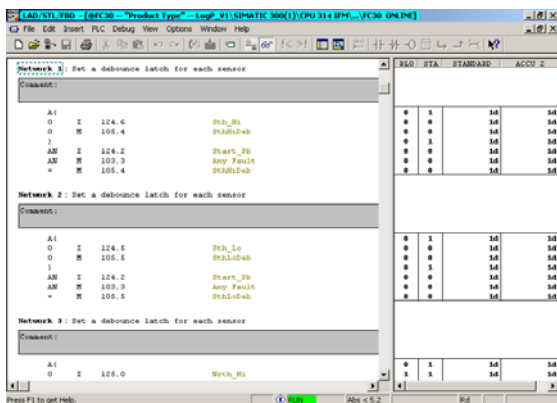
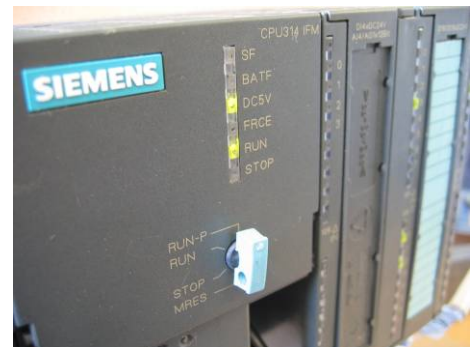


The IPTC consists of a base plate on which is mounted a bi-directional slat conveyor powered by a 24 volt motor. A load station, two simulated workstations, a quality station & reject station (with reject solenoid) are identified along the conveyor with sensors to detect product type & position. Start & pause pushbuttons are incorporated & the IPTC also features a quad-pole encoder used for low resolution position control. Two LEDs are used to indicate machine status. A bank of 6 Fault Selection switches is mounted on the base plate & these are pre-wired to simulate machine hardware problems.

The **Basic IPTC-1** Hardware rig features 11 PLC Inputs & 5 PLC Outputs (all digital 24 volt) & needs only a suitable PLC with power supply & I/O module(s) & a PC or laptop with the PLC monitoring software installed.

The **Enhanced IPTC-2** Hardware rig is based on IPTC-1 but has been extended to offer further Fault-finding practice having 11 PLC Inputs & 11 PLC Outputs (all digital 24 volt).

The **Customised IPTC-3** Hardware rig can be based on either the IPTC-1 or IPTC-2 platforms & provides the customer the opportunity to add further hardware features that are required for maintenance personnel to develop experience with (e.g. an HMI, analog control or a Networking option such as Profibus, Interbus, ASI, DeviceNet, ControlNet or Ethernet).



Appropriate PLC software to control the IPTC can be written by the customer if time & resource is available. However, since this can be a time consuming exercise, a choice of options is available with specific software for popular PLC systems pre-written.

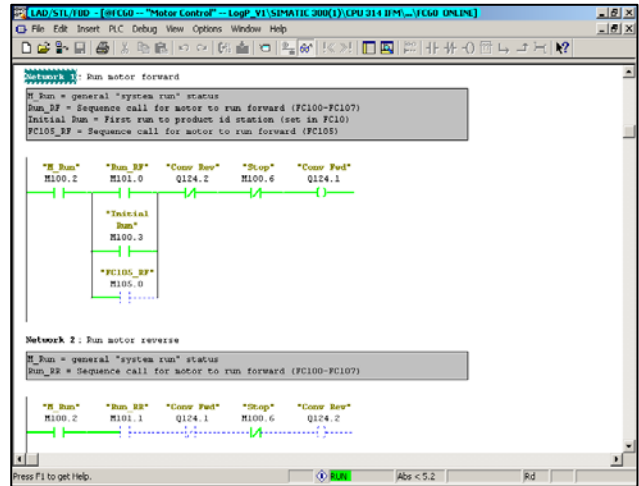
Accessories

If unavailable on-site as system spares, PLC &/or I/O hardware (including I/O Terminal Connectors) which are not supplied as part of the package can be quoted for & provided on demand as needed.

Conveyor Fault-finding Skills Software

So that trainees can get started immediately & benefit from the structured practical fault-finding experience, a range of Fault-finding Software modules have been pre-written for a number of the more popular PLC systems including Siemens S5 & S7-300/400, Allen Bradley PLC-5, SLC500 & ControlLogix / CompactLogix & Mitsubishi FX, A & Q Series PLCs. Other PLC types can be available as needed.

IPTS-1 Software, Level 1 Fault-finding Software is a single program or project designed to run with each of the hardware platforms IPTS-1, 2 or 3 & allows trainees to gain practical PLC troubleshooting experience utilising the 6 hardware fault-selection switches.



No.	Time of day	Date	Event
1	08:29:52:231 AM	03/21/2010	Illegal command in block (detected by compiler)
2	08:29:52:239 AM	03/21/2010	Mode transition from STARTUP to RUN
3	08:29:52:238 AM	03/21/2010	Request for manual warm restart
4	08:29:52:194 AM	03/21/2010	Mode transition from STOP to STARTUP
5	08:29:11:331 AM	03/21/2010	STOP caused by stop switch being activated
6	08:08:56:313 AM	03/21/2010	Mode transition from STARTUP to RUN
7	08:08:56:313 AM	03/21/2010	Request for automatic warm restart
8	08:08:56:269 AM	03/21/2010	Mode transition from STOP to STARTUP

IPTS-2 Software, Level 2 Fault-finding Software is designed to run with the hardware platform IPTC-2 & consists of a suite of 6 programs or projects to provide extended practical PLC troubleshooting experience.

IPTS-3 Software, Level 3 Fault-finding Software is designed to run with each of the hardware platforms IPTS-1, 2 or 3 & consists of a suite of 6 more challenging programs or projects & allows trainees to gain a higher level of practical PLC troubleshooting experience through tackling more difficult fault scenarios.

Operation of the IPTC Conveyors

The operation of each Conveyor Model is based on the principle of sorting a Product Workpiece & then transporting the Workpiece through a specific sequence of programmed operations.

Five simulated stations exist (Load Station, Workstations 1 & 2, a Quality Station & a Reject Station).

The Conveyor can obviously be programmed to run any one of a number of different sequences but the pre-written Fault-finding Software packages accommodate 4 valid product types & 3 invalid product types.

With **IPTS-1** Software, faults are introduced manually by setting the appropriate fault switch. The trainee continues to exercise the Conveyor but will find that it does not operate correctly. The challenge is to identify the problem.

With **IPTS-2** Software, there is a suite of 6 different programs or projects. During the normal running of the Conveyor, the trainee will observe incorrect operation. Problems are not reliant on the setting of a Fault Selection Switch but may occur at random times. Each of the 6 programs or projects will introduce a different problem. The challenge is to identify the problem.

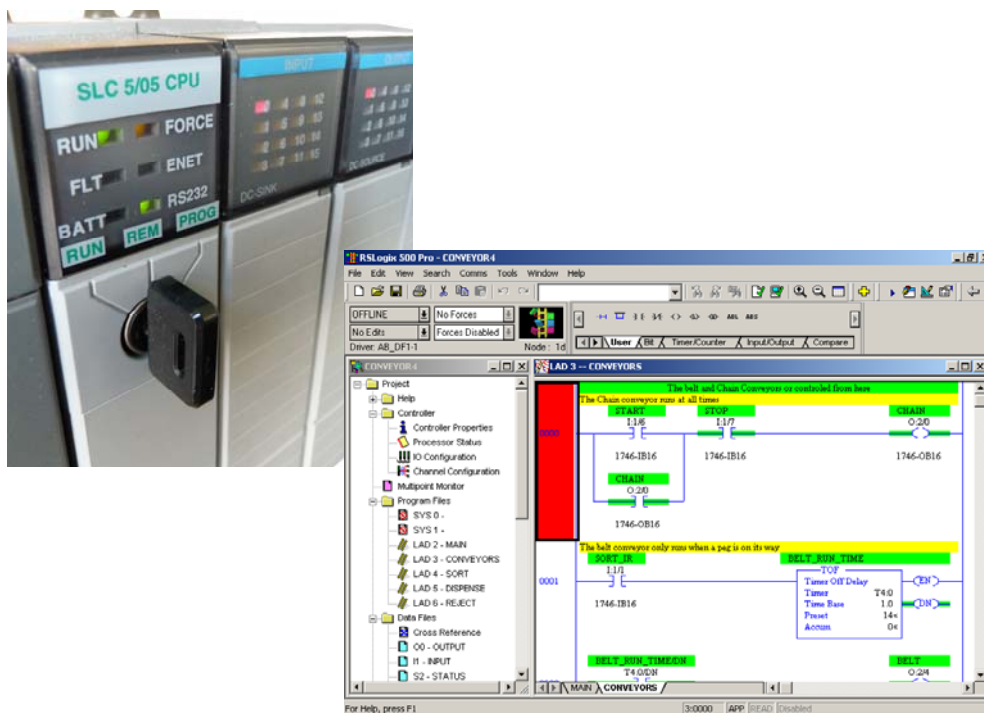


With **IPTS-3** Software, there is a suite of 6 different programs or projects. Each program or project when loaded into the PLC will immediately present a different fault scenario which will need to be investigated. The challenge is to identify the problem & to suggest how it could be resolved. These faults demand a more thorough understanding of how the PLC operates & are more challenging.

Conveyor Programming Skills Software

IPTS-4 Programming Software consists of a suite of 6 programs or projects each of which requires a program modification to be made. The required modifications range from relatively minor “software tweaks”, through alterations to existing sequences of operation to the coding of an entirely new sequence.

The PLC Programming Software module provides very good practice for those companies who require their maintenance personnel to be able to make small program modifications safely & properly.



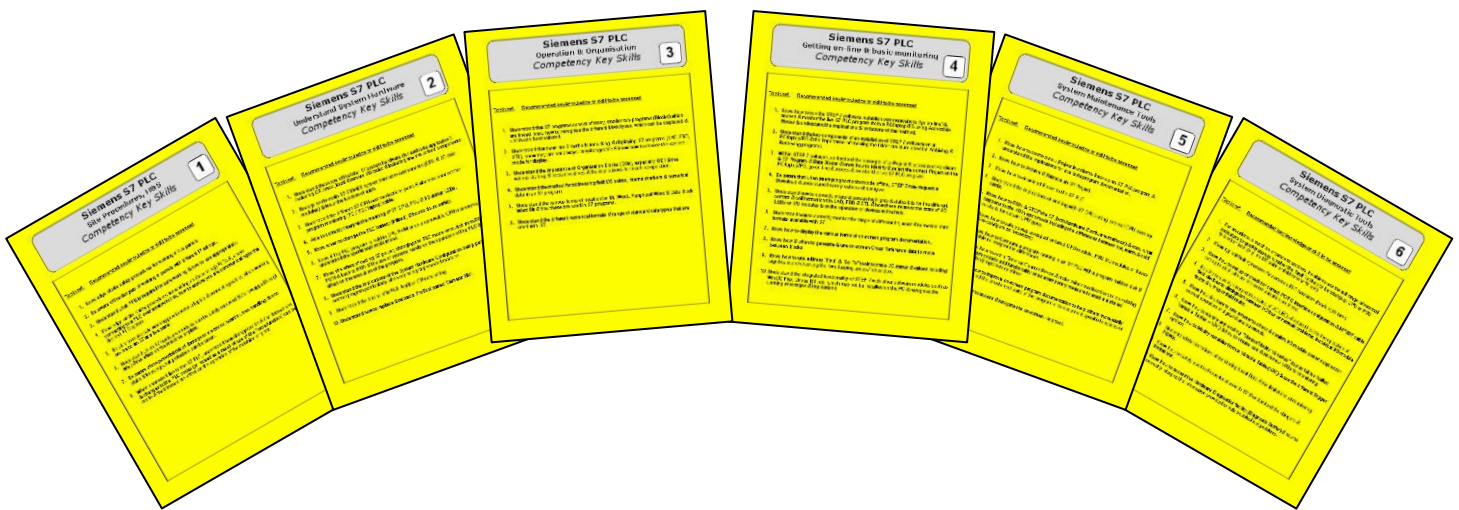
Supporting Documentation

Fault-finding Worksheet

Each Fault-finding Software module is supported by a Fault-finding Worksheet allowing the trainee to record in a logical manner the observed symptoms, the checks or actions performed & results or conclusions.

PLC Competency Pack

For the chosen PLC system, INTACS will provide a Competency Pack which highlights the essential PLC knowledge & key skills (Skill Sets) that maintenance personnel need to have in order to work safely & effectively on the required PLC system. Included within the PLC Competency Pack will be the documentation for the trainee to complete as evidence of work completed in-plant or on the IPTC Model & documentation for the Manager or Supervisor to record individual progress.



Price List & Delivery

Price List

Conveyor Hardware

IPTC-1 Conveyor Hardware, Basic Model, £950+VAT

IPTC-2 Conveyor Hardware, Enhanced Model, £1350+VAT

IPTC-3 Conveyor Hardware, Customised Model, price dependent on requirements

The IPTC Conveyor Models are equipped with field wiring which customers need to connect to an appropriate 24 volt I/O terminal connector on their own training PLC system.

Conveyor Fault-finding Skills Software

IPTS-1, Basic Fault-finding Software (6 faults)

Cost: £600+VAT

You will need IPTC-1 Basic or IPTC-2 Enhanced Hardware platform

IPTS-2, Basic & Intermediate Fault-finding Software (12 faults)

Cost: £1200+VAT

You will need IPTC-2 Enhanced Hardware platform

IPTS-3, Basic, Intermediate & Advanced Fault-finding Software (18 faults)

Cost: £1800+VAT

You will need IPTC-2 Enhanced Hardware platform

Cost for software requirements for Customised IPTC-3 Hardware will depend on hardware configuration.

Conveyor Programming Skills Software

IPTS-4, Programming Skills Software (6 programming tasks)

IPTS-4 will run with any of the Conveyor Hardware platforms

Cost: £750+VAT

Delivery

For hardware orders, to ensure that the IPTC arrives undamaged, there are three options for delivery.

1. Customer collection.
2. Courier delivery (for which there would be a charge).
3. INTACS delivery & installation (for which there would be a charge).

Actual cost will depend on location.