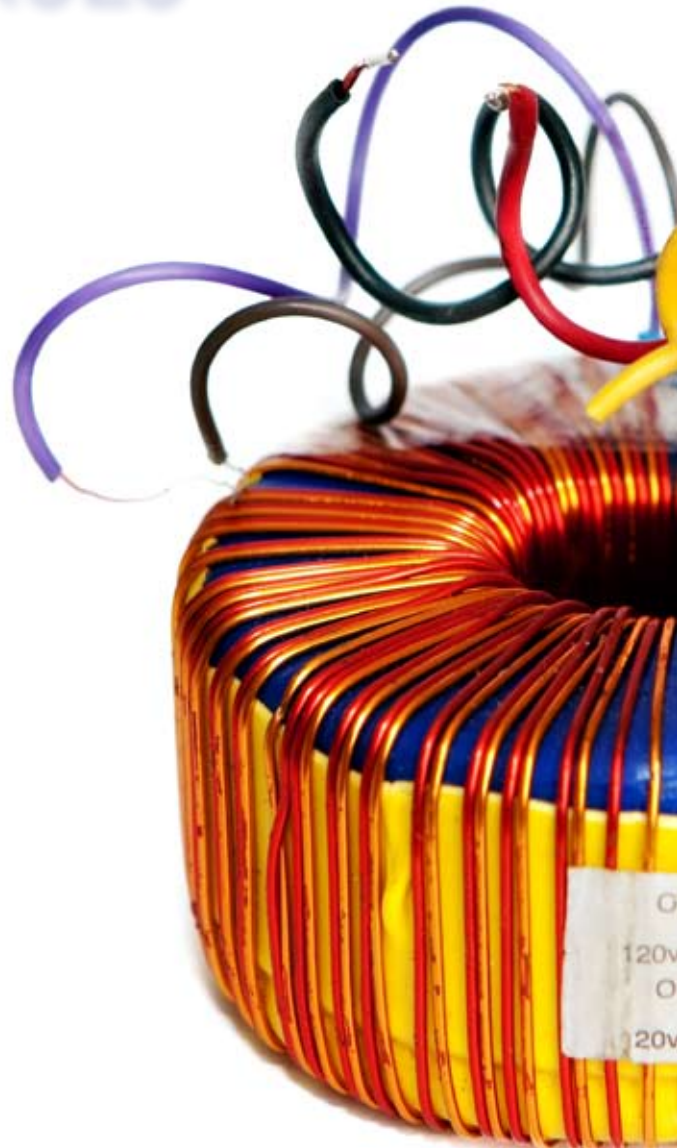




## TRAINING COURSES 2010



# Testimonials

What our clients are saying about us

## **“An excellent training company”**

“We contacted several training providers and from the beginning it was clear that Technical Training was an excellent training company. The training was delivered to a very high standard, feedback was extremely positive, and the delegates have already put into practice what they learned.”

*James Neill / Allied Mills (Extract from an article published in Food Technology & Packaging in Summer 2009)*

## **“Tech Training were keen to meet our business needs exactly”**

“We found that Technical Training were keen to meet our business needs exactly and were able to quickly adapt the courses accordingly. Our engineers found the training enjoyable and interesting - the breadth of knowledge gained clearly added flexibility to our team.”

*Gillian Russell, PPM Manager, Fox's Biscuits, Batley*

## **“We look forward to a continued working partnership with Technical Training Solutions”**

“The courses have been delivered in a professional manner, by a dedicated team who clearly demonstrate an expert knowledge and understanding of training requirements in the engineering field. The courses have proved to be very popular with our staff, and we look forward to a continued working partnership with Technical Training Solutions”

*Andy Cox, Engineering Manager, Mirror Colour Print*

## **“The trainees enjoyed the courses immensely”**

“The courses were very practically orientated – there was a large amount of equipment used for training on all the courses. The trainees enjoyed the courses immensely. Technical Training Solutions had really put some effort into ensuring that our trainees learned useful practical skills that they could apply to their work. The feedback at the end of the courses was very positive.”

*Simon Tucker, Training Manager, Kodak Limited*

## **“Courses were targeted at the right level”**

“The courses were targeted at the right level and by concentrating on the subject areas over the duration of a short course the trainees learned far more effectively than on a day release system or using self-study packages.”

*Bryan Dods, Training Project Co-ordinator (Engineering), UKAEA Dounreay*

## **“Top-quality training”**

“We are very pleased with the quality of the courses provided. Our candidates get the very best in terms of the depth of understanding and acquisition of useful skills possible and also we have been able to create customised courses to fit our business exactly. Technical Training have done everything they possibly could to help me ensure that my candidates get top-quality training.”

*Mark Cornford, Training Co-ordinator, Coca-Cola Enterprises Limited*

## **“We were delighted with the results of the training”**

Everyone passed their City & Guilds examinations, and it is a credit to the instructor at Technical Training Solutions. His teaching skills ensured that such a good result was achieved. We were delighted with the results of the training.”

*Bill Funnell, Process Control Engineer, TIMET UK Limited*

## **“Candidate feedback from our employees is excellent”**

“My organisation has had many dealings in the past with Technical Training Solutions and we have always found them to be trustworthy, efficient and professional. Candidate feedback from our employees is excellent. Their training courses provide everything that they promise and the post-training help and support that they provide is exceptional. We look forward to working with them again in the future and would recommend their services to other organisations without hesitation.”

*Marisa George, Learning & Development Advisor, Aylesford Newsprint Ltd*

# Technical Training Solutions

The Unite Preferred Training Provider

Technical Training Solutions is an engineering skills training company with 29 years of experience behind it.

*A comprehensive range of highly-focused technical courses from abrasive wheels to programmable logic controllers.*

*The emphasis on useful practical skills.*

*A 'hands-on' approach to training so that delegates 'learn by doing' on modern industrial equipment.*

*Competence-based and Nationally recognized Unite / Technical Training Solutions certification.*

*Consolidation schemes for safe and controlled application of new skills in the work place, assisting in the determination of competence.*

*Convenient delivery of training at your own site (anywhere in the British Isles or overseas) or on a scheduled course.*

*Customized courses can be created to match specific training needs.*

*Comprehensive course notes are provided for candidates on all courses.*



The courses ensure that the candidates are able to perform useful skills that they understand.

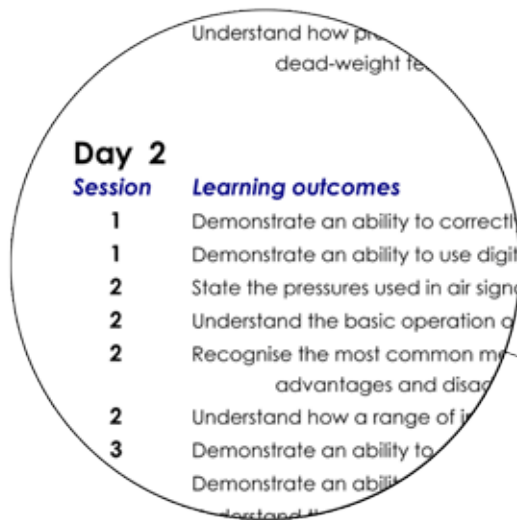
Importantly, each course incorporates assessments to ensure that the candidates have actually acquired the specific skills that the course's objectives promised.

Employers can be confident that candidates will acquire new skills that will be valuable in their workplace, and individual candidates who book themselves onto a course can be assured that they will gain useful skills and knowledge.




# Design of the courses

Detailed course programmes list the learning outcomes



Day 2	Session	Learning outcomes
	1	Demonstrate an ability to correctly connect and calibrate a range of typical pressure sensors, switches and gauges.
	1	Demonstrate an ability to use digital pressure indicators, dead weight boxes and comparators.
	2	State the pressures used in air signification.
	2	Understand the basic operation of air and electrical DP cells and how they are calibrated.
	2	Recognise the most common methods of measuring the level of fluids in industrial applications and state their advantages and disadvantages.
	2	Understand how a range of fluids in industrial applications are configured and calibrated.
	3	Demonstrate an ability to correctly connect and calibrate a range of typical pressure sensors, switches and gauges.
	3	Demonstrate an ability to use digital pressure indicators, dead weight boxes and comparators.

Every course offered by Technical Training has a further level of detail made available for our clients to examine. This describes in detail what will actually be taught throughout the course.



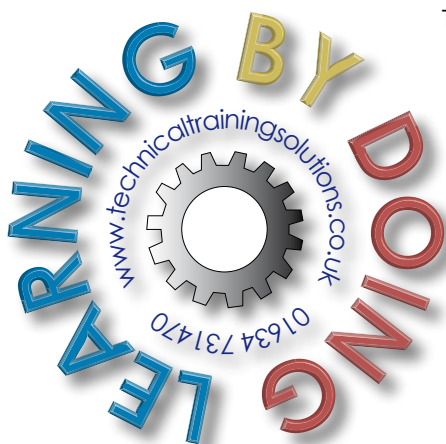
Detailed Course Programme		© Technical Training Solutions 2007
Instrumentation - Course 510		
Day 1	Session	Learning outcomes
	1	Recognise and understand some typical process control applications and the problems that affect the choice of measurement and control devices.
	1	State the most common electrical signal transmission standards.
	2	Understand the advantages of current transmission used for measurement and control purposes.
	2	Recognise and understand the various devices that are based on current loops.
	2	Recognise the equipment needed to calibrate and commission current loop devices.
	2	Recognise the requirements of using linear barriers in current loops.
	2	Demonstrate an ability to use equipment that generates/interprets current loop signals.
	2	Demonstrate an ability to correctly and safely set up and calibrate a range of current loop devices.
	2	Recognise the most common types of temperature sensors used in industry and state the signals that each produces.
	2	Understand the problems associated with the use of the most common types of temperature sensors and the steps used to counteract these problems.
	2	Demonstrate an ability to identify the correct operation of RTDs and thermocouples, and understand how an incorrect set-up sensor or wiring may produce misleading measurements.
	2	Demonstrate an ability to correctly connect, commission and calibrate temperature sensors, transmitters and loop indication using RTDs and thermocouples.
	4	State the most common units of pressure measurement and their relationship to each other.
	4	State the differences between absolute, gauge and differential pressure measurements, their uses, and the practical difficulties that each experience.
	4	Recognise the most common types of pressure switches and sensors used in industry.
	4	Understand how pressure sensors and switches can be commissioned and calibrated using comparators, standard gauges, dead weight boxes and digital pressure indicators.
Day 2	Session	Learning outcomes
	1	Demonstrate an ability to correctly and safely connect and calibrate a range of typical pressure sensors, switches and gauges.
	1	Demonstrate an ability to use digital pressure indicators, dead weight boxes and comparators.
	2	State the pressures used in air signification.
	2	Understand the basic operation of air and electrical DP cells and how they are calibrated.
	2	Recognise the most common methods of measuring the level of fluids in industrial applications and state their advantages and disadvantages.
	2	Understand how a range of fluids in industrial applications are configured and calibrated.
	2	Demonstrate an ability to correctly connect and calibrate a range of typical pressure sensors, switches and gauges.
	2	Demonstrate an ability to use digital pressure indicators, dead weight boxes and comparators.
	2	Recognise the most common types of pressure sensors used in industry and state the signals that each produces.
	2	Understand the problems associated with the use of the most common types of pressure sensors and the steps used to counteract these problems.
	2	Demonstrate an ability to identify the correct operation of RTDs and thermocouples, and understand how an incorrect set-up sensor or wiring may produce misleading measurements.
	2	Demonstrate an ability to correctly connect, commission and calibrate temperature sensors, transmitters and loop indication using RTDs and thermocouples.
	4	State the most common units of pressure measurement and their relationship to each other.
	4	State the differences between absolute, gauge and differential pressure measurements, their uses, and the practical difficulties that each experience.
	4	Recognise the most common types of pressure switches and sensors used in industry.
	4	Understand how pressure sensors and switches can be commissioned and calibrated using comparators, standard gauges, dead weight boxes and digital pressure indicators.
Day 3	Session	Learning outcomes
	1	Recognise the signals that fluid level cells produce, how they are connected to a typical industrial amplifier, and the methods used to commission and calibrate them.
	1	Understand how pneumatic and electronic level measurement systems are configured and calibrated.
	2	Demonstrate an ability to correctly and safely connect and commission a 'smart' electrical DP cell.
	2	Demonstrate an ability to correctly and safely connect and set-up a level cell and amplifier electronics.
	2	Demonstrate an ability to calibrate a typical industrial transmitter.
	2	Demonstrate an ability to correctly and safely commission a typical electronic pneumatic control valve and to P converters.
	2	Recognise the most common methods used to measure flow rate of fluids in industrial applications, and their advantages or disadvantages.
	2	Course detail

# Delivery of the courses

Our policy of 'Learning by Doing'

Training courses created by Technical Training are designed to be relevant to the candidate's needs and delivered in an interesting and enjoyable manner.

All unnecessary theory and academic observations are dispensed with; only those aspects that directly underpin the knowledge and skills specified in the course objectives are covered.



The courses employ large numbers of practical activities where candidates are given the opportunity to 'learn by doing'.

The use of real industrial components in practical exercises ensures that the experiences are realistic and relevant.

This is made possible by a large investment in equipment used on the courses and the industrial experience, professionalism and dedication of our instructors.

# Assessments

## Ensuring candidates reach the course objectives

Technical Training Solutions Competence Assessment

Course 160: Portable Appliance Testing

Candidate's Name: DAVE BROWN

Company: ROCHESTER ENGINEERING

You must show that you can:

- assess the required frequency of inspection and testing
- carry out visual inspections of appliances and equipment
- carry out the following tests using a wide range of proprietary PAT testers:
  - earth continuity (low and high current)
  - insulation resistance
  - load test
  - earth leakage
- correctly interpret test results and determine appropriate pass levels
- maintain a system of record keeping.

You must show that you:

- understand the dangers associated with PAT testing
- recognise the precautions necessary both for safety - and for the protection of equipment
- understand the legal requirement for testing portable appliances
- understand the importance of specific identification of equipment
- recognise the testing requirements for different classes of equipment.

Assessor's observations:

The candidate **has achieved** all aspects of this assessment satisfactorily.

The candidate **has not achieved** this assessment satisfactorily, for the following reason:

Assessor's Signature: [Signature] Date: 14/10/17

Candidate's Signature: [Signature] Date: 14/10/17

Wherever possible candidates are assessed to ensure that they can perform the skills promised in the course objectives. For example, if the course has an objective of "isolate a three-phase motor" each candidate would need to demonstrate to his/her instructor that they can do this. This would be carried out on an individual basis using our specially-designed training rigs.

Competence-based assessments are described using 'performance criteria' and 'range statements'. Each assessment card is signed and dated by the candidate and the instructor. The candidate keeps the assessment record card for possible future use, when the information recorded on the card can be useful for the purposes of APL towards an S/NVQ unit.

Courses that form part of the C&G suite of approved courses have an assessment process determined by C&G. Some of these assessments are knowledge-based, some are practically-based. For further information on these please contact us.

# Certificates

## Providing evidence that candidates were successful

Technical Training Solutions

Learning by Doing

This is to certify that

**David Brown**

Successfully completed

Course No 160: Portable Appliance Testing

Demonstrating competence in

- understanding the dangers associated with PAT testing
- recognising the precautions necessary for safety - and for the protection of equipment
- understanding the legal requirement for testing portable appliances
- assessing the required frequency of inspection and testing
- understanding the importance of specific identification of equipment
- recognising the testing requirements for different classes of equipment
- carrying out visual inspection of appliances and equipment
- carrying out the following tests using a wide range of proprietary PAT testers:
  - earth continuity (low and high current)
  - insulation resistance
  - load test
  - earth leakage
- correctly interpreting test results and determine appropriate pass levels
- maintaining a system of record keeping.

Derek Simpson, Assessor / Verifier, On behalf of Technical Training Solutions

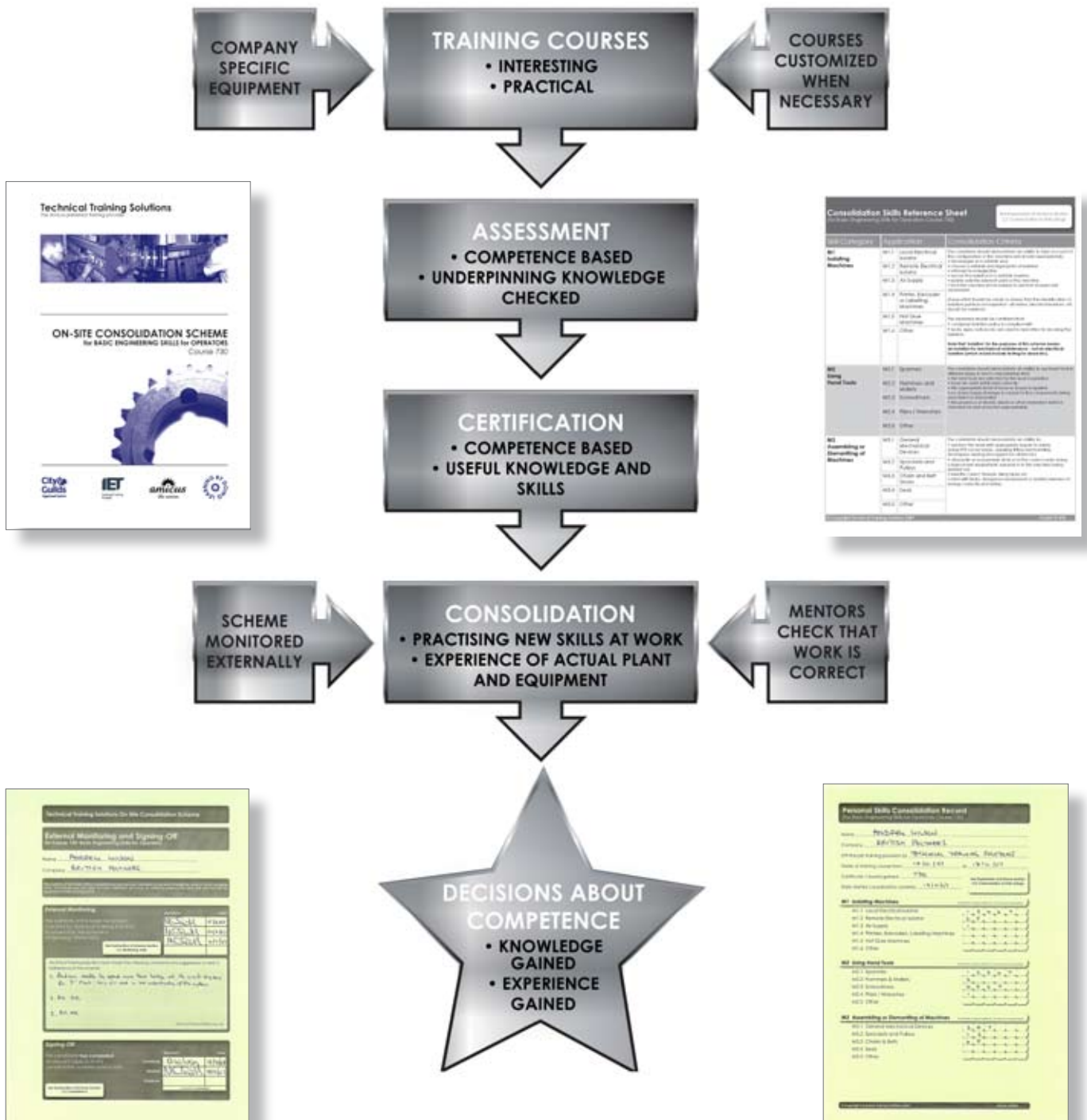
Candidates gain a competence-based certificate on successful completion of a course.

Certificates detailing the skills that candidates have gained have more value than any other type of certificate, particularly when dealing with decisions regarding an individual's competence to perform a given skill at work.

Competence-based certificates are recognized throughout industry as a fair and accurate assessment of an individual's skills.

# Consolidation Schemes

Technical Training Solutions offer a unique service which allows trainees to consolidate the new skills they have gained after attending a training course.

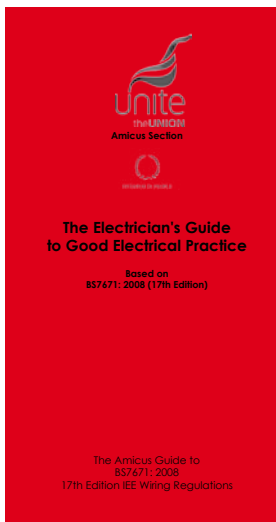


The consolidation scheme ensures that candidates get the chance to practice their new skills and apply their knowledge in a safe and controlled manner in the workplace, thereby gaining the maximum benefit from the training.

The courses which are most suitable for this scheme are those where some form of cross-skilling is involved, for example on the electrical maintenance skills course.

# Electrician's Guide Books

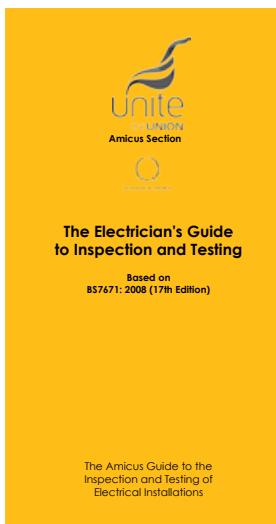
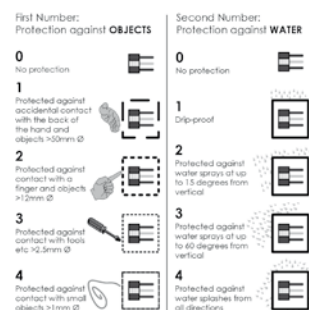
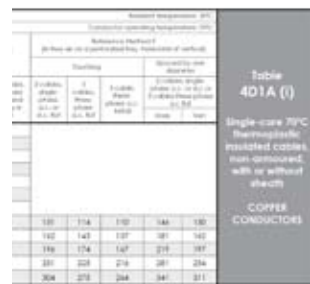
Technical Training Solutions is also responsible for producing and distributing the Unite / Amicus Electricians Guide Books, a publication more than 20 years old and long known as one of the best guides to the Regulations. The Guides are also used to complement the course notes for our wiring regulations (C&G 2382) and inspection and testing (C&G 2391) courses. Pocket sized for ease of use, they cover the subject areas in an interesting and informative way, without unnecessary technical theory. The books are written by experts in their fields in an easy to understand language and are complemented with drawings and illustrations.



# The Electrician's Guide to Good Electrical Practice

An indispensable reference book for help and guidance on the 17th edition of the IEE's Wiring Regulations (BS7671). The book is approved for use during several City & Guilds examinations (the 2330, 2351, 2360 and 2391-20\*) and is essential reading for all those involved in the design, installation, maintenance or inspection and testing of electrical installations.

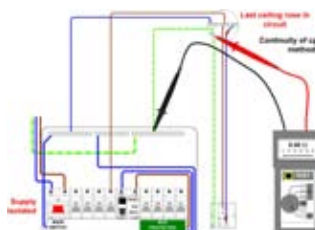
Updated in 2009 to incorporate the 17th Edition of  
the IEE Regulations  
Price £7.00



# The Electrician's Guide to Inspection and Testing

This book explains how electrical installations should be inspected and tested. It is an essential reference book for all those studying for the City & Guilds 2391-10 and 2391-20 examinations. The book describes and explains the checks required during the visual inspection, and provides guidance on how the electrical tests should be carried out. Explanatory colour drawings are included.

Updated in 2009 to incorporate the 17th Edition of the IEE Regulations  
Price £7.00



For an order form please visit our internet pages or call us.

\*2382-10, 2391-10 & 2391-20 are the C&G numbers for the qualifications previously known as 2381, 2391 & 2400



# Descriptions of the courses

## Making it clear what the courses will achieve

Technical Training Solutions describe their courses in straight-forward, clear terms, so that managers and prospective candidates can ensure that the courses are suitable and that they will lead to the acquisition of skills beneficial to their organisation.

**ELECTRICAL**

### ELECTRICAL MAINTENANCE SKILLS (INDUSTRIAL)

**COURSE 110  
12 DAYS**

This course is designed to provide basic electrical skills to those who need to perform first-line electrical maintenance tasks – including the safe isolation, replacement and testing of a range of common electrical devices (motors, sensors, heating elements, solenoids, etc.) – in a safe and effective manner. Importantly, the format of the course is specifically designed so that, when combined with suitable on-site consolidation of training (see section 'On-site consolidation'), it will assist the maintenance manager in meeting the legal requirements for employee competency in electrical work.

**WHO IS THE COURSE AIMED AT?**

**PARTICIPANTS**  
The structure and content of the course is aimed at those who currently fulfil a maintenance role, for example mechanical fitters. No prior electrical knowledge is assumed.

**HOW IS THE COURSE PRESENTED?**

**COURSE PRESENTATION**  
The course has an extensive 'hands-on' approach, placing emphasis on safe working practice and on the development of useful, practical skills. Comprehensive course notes are provided.

**WHAT SKILLS AND KNOWLEDGE WILL THE CANDIDATES GAIN?**

**COURSE OBJECTIVES**  
On completion of the course, participants will be able to:

- practice safe working methods on electrical systems
- understand the relevant regulatory requirements
- demonstrate an understanding of electrical principles and units
- identify a wide range of electrical equipment & devices and understand their principles of operation
- understand the principles of earthing / protection and associated protective devices
- demonstrate an understanding of electrical systems, switchgear and circuit types
- diagnose basic faults and recognise their associated symptoms
- work with a range of cable types and carry out correct terminations and connections
- recognise the most common industrial motor types and understand their operation, connections and maintenance requirements
- use electrical test equipment effectively and carry out testing of a range of motors, solenoids, cables, etc. (using insulation, continuity, tong testers, etc.)
- identify motor and power circuit faults
- use circuit diagrams as an aid to maintenance
- access electrical enclosures and replace fuses, reset overloads etc.
- perform electrical isolation, testing for dead, etc. on a wide range of devices and circuits safely.

**WHAT DO THE CANDIDATES GET AT THE END OF THE COURSE?**

Successful completion of the course leads to the award of the Unite / Technical Training Solutions competence certificate 110: Electrical Maintenance Skills (Industrial)

**10**

www.technicaltrainingsolutions.co.uk T: 01634 731470 E: tech.training@zen.co.uk

*Candidates with prior electrical knowledge may attend a shortened version of this course*

*Consolidation schemes are particularly suitable for details of this course*

**What is the course about?**

**Is the course suitable for on-site consolidation?**

The courses shown in this brochure are all described using the above methods.

Technical Training Solutions' Internet Pages provide more information on each of the courses shown in this brochure - often including photographs of the equipment used on the courses and extracts from the course notes - see pages 33 & 34.

This brochure contains descriptions of the most popular courses that we provide.



# THE COURSES

ELECTRICAL MAINTENANCE SKILLS (INDUSTRIAL)	110	12 DAYS	PAGE 10
ELECTRICAL MAINTENANCE SKILLS (BUILDING SERVICES)	140	12 DAYS	PAGE 11
PORTABLE APPLIANCE TESTING	160	1 DAY	PAGE 12
PROBLEM-SOLVING FOR ELECTRICIANS	230	4 DAYS	PAGE 13
17TH EDITION IEE WIRING REGULATIONS	310	3 DAYS +	PAGE 14
17TH EDITION UPDATE	300	1 DAY	PAGE 14
INSPECTION AND TESTING OF ELECTRICAL INSTALLATIONS	340	5 DAYS +	PAGE 15
DESIGN OF ELECTRICAL INSTALLATIONS	350	4 DAYS +	PAGE 16
BS7909: TEMPORARY ELECTRICAL SYSTEMS	370	1 DAY	PAGE 17
ELECTRICITY AT WORK REGULATIONS	380	1 DAY	PAGE 18
FIRE ALARM SYSTEMS	470	3 DAYS	PAGE 19

INSTRUMENTATION	510	3 DAYS	PAGE 20
PROGRAMMABLE LOGIC CONTROLLERS	520	3 DAYS	PAGE 21
THREE-TERM (PID) CONTROLLERS	550	2 DAYS	PAGE 22
AC INVERTER DRIVES	580	2 DAYS	PAGE 23
STEPPERS AND SERVOS	590	1 DAY	PAGE 24

HYDRAULICS	610	4 DAYS	PAGE 25
PNEUMATICS	660	4 DAYS	PAGE 26
MECHANICAL MAINTENANCE SKILLS	700	4 DAYS	PAGE 27
ABRASIVE WHEELS	720	1 DAY	PAGE 28
BASIC ENGINEERING SKILLS FOR OPERATORS	730	3 DAYS	PAGE 29
MAINTENANCE OF PLUMBING SYSTEMS	740	3 DAYS	PAGE 30
AIR CONDITIONING SYSTEMS	750	3 DAYS	PAGE 31
BASIC ENGINEERING FITTING SKILLS	780	3 DAYS	PAGE 32

OTHER COURSES & INTERNET COURSE DESCRIPTIONS PAGES 33 - 34

COURSE DATES AND COSTS PAGE 35

HOW TO FIND US BACK COVER



# ELECTRICAL MAINTENANCE SKILLS (INDUSTRIAL)

**COURSE 110**  
**12 DAYS**

This course is designed to provide basic electrical skills to those who need to perform first-line electrical maintenance tasks – including the safe isolation, replacement and testing of a range of common electrical devices (motors, sensors, heating elements, solenoids, etc.) – in a safe and effective manner. Importantly, the format of the course is specifically designed so that, when combined with suitable on-site consolidation of training (see section 'On-site consolidation'), it will assist the maintenance manager in meeting the legal requirements for employee competency in electrical work.

## PARTICIPANTS

The structure and content of the course is aimed at those who currently fulfil a maintenance role, for example mechanical fitters. No prior electrical knowledge is assumed.

Consolidation schemes are particularly suitable for this course • See page **6** for details

## COURSE PRESENTATION

The course has an extensive 'hands-on' approach, placing emphasis on safe working practice and on the development of useful, practical skills. Comprehensive course notes are provided.

## COURSE OBJECTIVES

On completion of the course, participants will be able to

- practice safe working methods on electrical systems
- understand the relevant regulative requirements
- demonstrate an understanding of electrical principles and units
- identify a wide range of electrical equipment & devices and understand their principles of operation and connections
- understand the principles of earthing / protection and associated protective devices
- demonstrate an understanding of electrical systems, switchgear and circuit types
- diagnose basic faults and recognise their associated symptoms
- work with a range of cable types and carry out correct terminations and connections
- recognise the most common industrial motor types and understand their operation, connections and maintenance requirements
- use electrical test equipment effectively and carry out testing of a range of motors, solenoids, cables, etc. (using insulation, continuity, tong testers, etc.)
- identify motor and power circuit faults
- use circuit diagrams as an aid to maintenance
- access electrical enclosures and replace fuses, reset overloads etc.
- perform electrical isolation, testing for dead, etc. on a wide range of devices and circuits safely.

*Candidates with prior electrical knowledge may attend a shortened version of this course*

**Successful completion of the course leads to the award of the Unite / Technical Training Solutions competence certificate 110: Electrical Maintenance Skills (Industrial)**



# ELECTRICAL MAINTENANCE SKILLS (BUILDING SERVICES)

**COURSE 140**  
**12 DAYS**

This course is designed to provide the skills necessary to carry out first-line maintenance on electrical installations in hospitals, universities, office blocks, etc. It will enable maintenance or estates personnel to deal safely with a wide range of tasks on circuits and equipment of the sort normally associated with lighting, small power and heating systems. Importantly, when supported by suitable on-site consolidation of training (see section 'Consolidation of training') provision of this course will assist estates managers in meeting the legal requirements for employee competency in electrical work.

## **PARTICIPANTS**

No prior electrical knowledge is required in order to benefit from this course. It is suitable for all non-electrical personnel in maintenance and estates departments.

## **COURSE PRESENTATION**

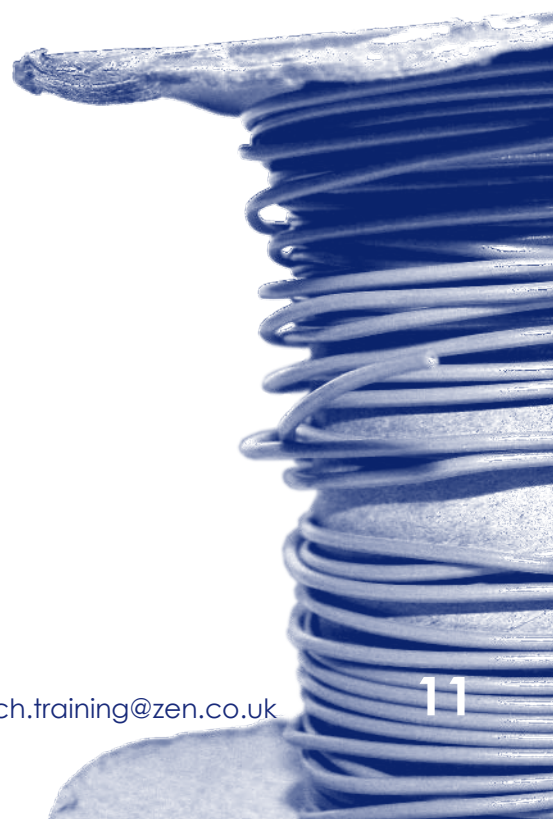
The emphasis is very much on 'learning by doing' and the development of useful, practical skills – with particular stress being placed upon safety. Comprehensive course notes are provided.

## **COURSE OBJECTIVES**

On completion of the course, participants will be able to

- practice safe working methods on electrical installations
- understand the relevant regulative requirements
- demonstrate an understanding of electrical principles and units
- understand the equipment, circuits and devices typically found in installations, and their principles of operation
- perform isolation, testing for dead, etc. in a safe and secure manner
- correctly remove and replace faulty electrical devices
- understand the principles of earthing / protection and associated protective devices
- access electrical enclosures and replace fuses, reset overloads etc.
- correctly terminate a range of cable types
- understand different motor types, their connections and typical faults
- use electrical test equipment to diagnose problems on circuits, motors and other devices
- read circuit diagrams and use them as an aid to fault-finding.

**Successful completion of the course  
leads to the award of the Unite / Technical  
Training Solutions competence certificate 140:  
Electrical Maintenance Skills (Building Services)**



# PORTABLE APPLIANCE TESTING

**COURSE 160**  
**1 DAY**

It is a legal requirement that all electrical equipment (including portable appliances) used at work shall be adequately maintained. In order to meet this requirement, appliances should be inspected and tested at regular intervals. This course provides participants with an understanding of the legal requirements and the expertise to carry out the inspection and testing competently.

## PARTICIPANTS

Ideally suited for participants with an appreciation of basic electrical concepts who are involved in either a maintenance or a contracting role and who need to undertake the inspection and testing of electrical equipment. The course is also suitable for participants with no electrical experience, as suitable guidance and support is provided.

## COURSE PRESENTATION

There is a high 'hands-on' content within the course, with ample opportunity for participants to use a wide range of leading PAT testers. Comprehensive course notes are provided.

## COURSE OBJECTIVES

On completion of the course, participants will be able to

- understand the dangers associated with PAT testing
- recognise the precautions necessary both for safety – and for the protection of equipment
- understand the legal requirement for testing portable appliances
- assess the required frequency of inspection and testing
- understand the importance of specific identification of equipment
- recognise the testing requirements for different classes of equipment
- carry out visual inspection of appliances and equipment
- carry out the following tests using a wide range of proprietary PAT testers:
  - earth continuity (low and high current)
  - insulation resistance
  - load test
  - earth leakage
- correctly interpret test results and determine appropriate pass levels
- maintain a system of record keeping.

**Successful completion of the  
course leads to the award of  
the Unite / Technical Training  
Solutions competence  
certificate 160: Portable  
Appliance Testing**





# PROBLEM-SOLVING FOR ELECTRICIANS

**COURSE 230**  
**4 DAYS**

Many modern electrical control systems incorporate programmable logic controllers, variable speed drives, safety relays and other complex control devices. Electricians working in industry have often had no formal training on these devices. This course provides candidates with the experience of problem-solving electrical control circuits which incorporate these complex control devices under the supervision of experts in their field.

## **PARTICIPANTS**

Suitable for all electrical maintenance personnel.

## **COURSE PRESENTATION**

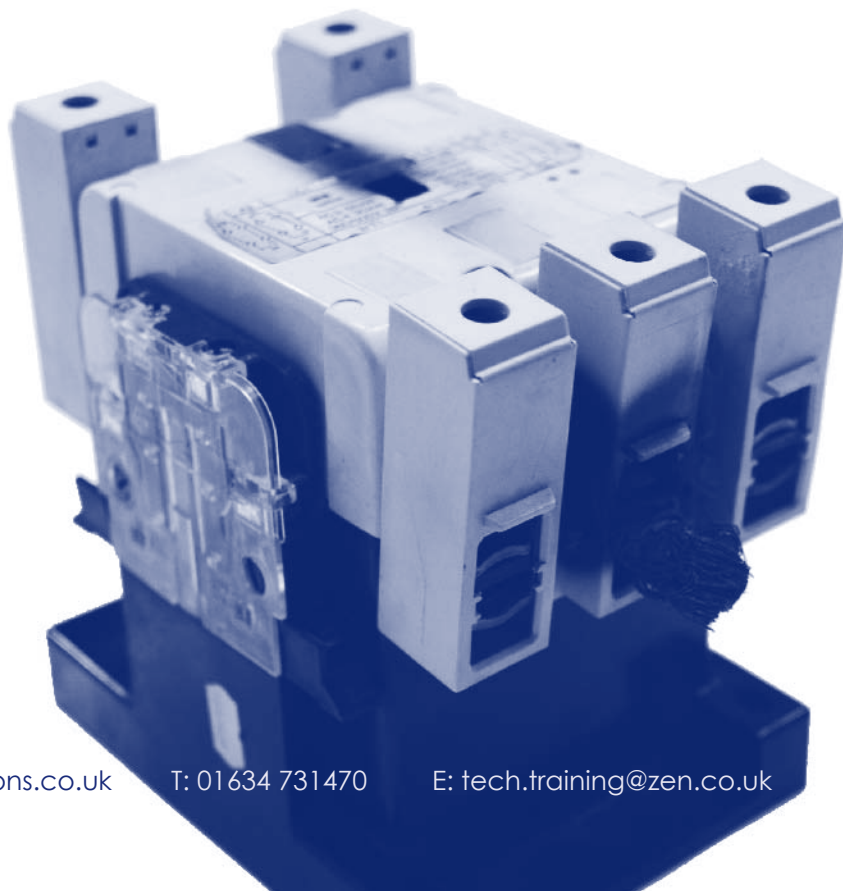
The course is presented using demonstration rigs, incorporating real industrial motors and control systems. Faults are introduced to the systems and participants are then guided on how the faults can be diagnosed and rectified. Particular emphasis is placed on the procedures necessary to prevent the simulated faults from recurring in real-world situations. Comprehensive course notes are provided.

## **COURSE OBJECTIVES**

On completion of the course, participants will be able to

- work safely on modern integrated systems
- apply a systematic and logical approach to fault-finding
- recognise, understand and deal with
  - faults that involve programmable logic controllers
  - faults that involve variable speed drives
  - faults that involve safety relays
- eliminate the root causes of electrical faults
- apply improvements to systems so that faults do not re-occur
- deal with complex faults on modern integrated systems more efficiently.

**Successful completion of the course leads to the award of the Unite / Technical Training Solutions competence certificate 230: Problem-Solving for Electricians**



# 17<sup>TH</sup> EDITION IEE WIRING REGULATIONS

## CITY & GUILDS 2382-10

**COURSE 310**  
**3 DAYS +**  
**EXAMINATION**

The industry-standard qualification for all installation electricians and also increasingly regarded as essential for those involved in (or supervising) electrical work. The legislation regarding employee competence in electrical work requires that anyone involved in certain electrical activities – for example, selecting sizes of cable or types or fuse – must be aware of the requirements of the Regulations.

### PARTICIPANTS

Ideal for all those involved in electrical work of any kind. Participants should have an understanding of electrical principles together with an appreciation of electrical installation work practice.

### COURSE PRESENTATION

The course is presented in a helpful and informative way, making frequent reference to typical electrical design problems and offering practical solutions. Students are loaned copies of the IEE 17th Edition Regulations and the IEE 'On-site Guide' for use during the course – and are provided with a free copy of the Unite / Technical Training Solutions publication: The Electrician's Guide to good electrical practice. Success rates in the City & Guilds examination are currently around 98%.

### COURSE OBJECTIVES

This course is designed to provide participants with the knowledge necessary to successfully sit the City & Guilds 2382-10 examination, as well as gaining useful information about the technical issues in the Regulations that will help in their work activities. The thorough grounding provided by this course will also properly prepare candidates to progress on to the other City & Guilds courses (the inspection and testing and design courses).

On completion of the course, participants will understand

- the regulative requirements
- the scope and object of the Regulations
- the fundamental requirements for safety
- the definitions and terms used in the Regulations
- how protection for safety is achieved
- the correct methods of selection and erection
- the requirements for special locations
- how inspection and testing should be carried out
- how to use the Regulations in the design, construction and maintenance of installations.

**Successful completion of the course leads to the award of the City & Guilds 2382-10: Level 3 Certificate in the Requirements for Electrical Installations (BS7671: January 2008)**

### 17<sup>TH</sup> EDITION UPDATE

**Course 300**

**(CITY & GUILDS 2382-20)**

**1 DAY**

The update course is for candidates who have already achieved the City & Guilds 2381 (16th edition), and need to possess the latest (17th Edition / C&G 2382) qualification.

To be eligible for this course, candidates must possess a 2381 certificate. These were issued from spring 2002 onwards.

*The 17th edition came into force on 1st July 2008. Changes to the Regulations include: Structure of the Regulations - Part 6 and Part 7 renumbered; Direct and Indirect contact protection redefined as Basic and Fault protection; Earth loop impedance values re-calculated for 230V; New special locations added; General use of RCDs and RCDs in bathrooms; New requirements for buried cables.*

**Successful completion of the course leads to the award of the City & Guilds 2382-20: Certificate in the Requirements for Electrical Installations Update (BS7671: January 2008).**

# INSPECTION & TESTING OF ELECTRICAL INSTALLATIONS

CITY & GUILDS 2391-10

**COURSE 340**  
**5 DAYS +**  
**EXAMINATIONS**

Aimed at electrical personnel who either carry out (or supervise) the testing and inspection of installations, this course is designed to meet the needs of those required to sit the City & Guilds 2391-10 examination. In addition, participants gain the skills and knowledge necessary to actually perform the inspection and testing procedures. The course also satisfies the NICEIC & ECA requirements for Qualified Supervisor status. The course is subdivided into two parts to help prepare candidates for the written and practical examinations separately.

## PARTICIPANTS

Prospective candidates should have recently completed the IEE Wiring Regulations (City & Guilds 2382) qualification, see course 310.

## COURSE PRESENTATION

The emphasis is on achieving success and Technical Training pride themselves on their success rate in the examinations. Participants are able to practice on purpose-built training rigs of simulated electrical installations. Full course documentation is provided.

### PRACTICAL INSPECTION & TESTING

Course 340P

#### 2 DAYS + PRACTICAL ASSESSMENT

The Practical Part of the course assumes no prior knowledge of inspection and testing, but candidates should be practicing electricians and should have already achieved the City & Guilds 2382 (17th Edition) qualification: See page 14.

*During the course, candidates learn how to inspect and test using various training rigs simulating real electrical installations, and are then given the opportunity to perform the initial verification, inspection and test individually. Candidates then attend a half-day C&G practical assessment.*

On successful completion of the practical part of the course a self-study package is issued to help prepare candidates for the theory part.

### THEORY of INSPECTION & TESTING

Course 340T

#### 3 DAYS + WRITTEN EXAMINATION

Candidates for the Theory Part of the course should be practicing electricians and need to have passed the City & Guilds Practical Assessment before attending this Part.

*During the course, candidates learn about the complex background technical information concerning the many issues associated with inspection and testing. Many practical examples of the sorts of questions that might come up in the examination are provided and advice on how these should be answered is provided. This prepares candidates to attend the 2½ hour 'closed-book' C&G written examination.*

**Successful completion of both parts of the course leads to the award of the City & Guilds 2391-10 - Level 3 Certificate in Inspection, Testing & Certification of Electrical Installations**

# DESIGN OF ELECTRICAL INSTALLATIONS

CITY & GUILDS 2391-20 (Previously known as C&G 2400)

**COURSE 350**  
**4 DAYS +**  
**EXAMINATIONS**  
**& PROJECT**

Whenever electrical systems are installed, the correct design of the installation will be paramount for ensuring the safety of personnel and the ongoing functionality of the installation. Even when fairly straight-forward installations are carried out, there is always a level of design work required - for instance in a small domestic installation it may be necessary to calculate the size of cable feeding a garage which is a long distance from the house. In larger commercial installations the 'standard circuits' often employed in small installations are no longer applicable, and each circuit would need design calculations to be performed. This course provides participants with all the necessary skills and knowledge to design electrical installations.

## PARTICIPANTS

The course is intended for candidates who have already attended the 17th Edition / C&G 2382 (Course 300 or 310) and the Inspection, Testing & Certification / C&G 2391-10 (Course 340). The course builds on the knowledge and skills that candidates have gained from these courses.

## COURSE PRESENTATION

Instructor-led practical examples of how electrical installations should be designed are given. The course consists of several design exercises for the candidates to carry out. A range of electrical installations from small domestic circuits to more complex commercial and industrial examples are used. Comprehensive course notes are provided.

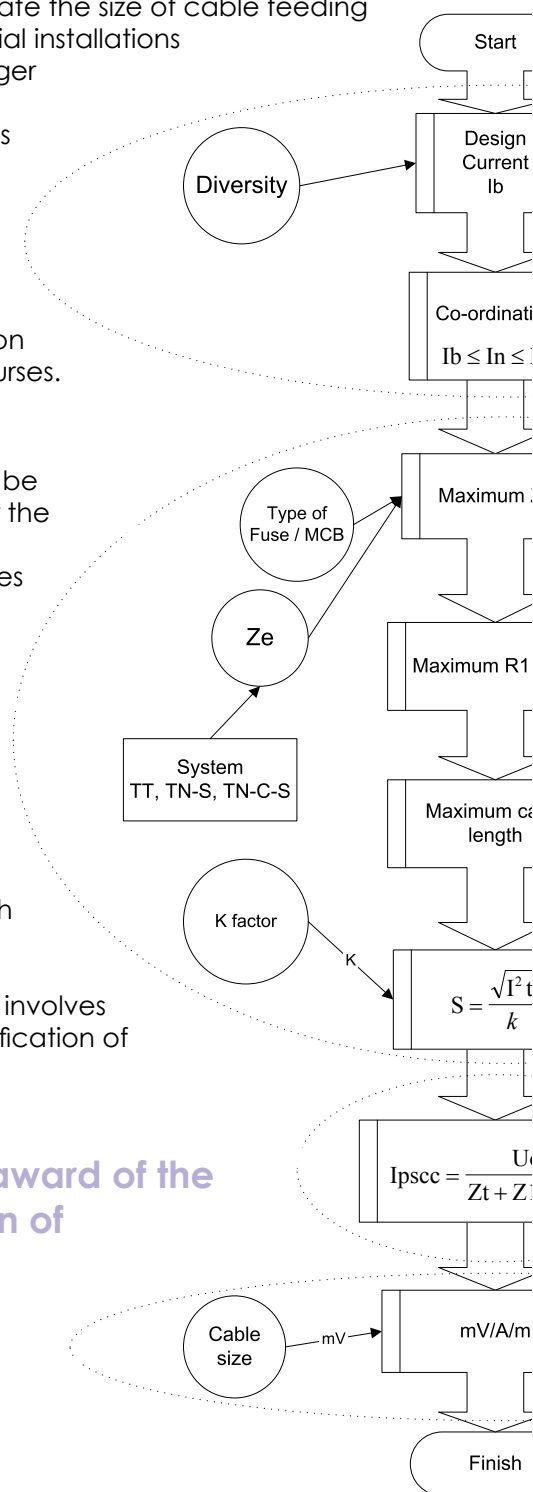
## COURSE OBJECTIVES

On completion of the course, participants will be able to

- design electrical installations, performing all necessary calculations
- verify that a design complies with the Regulations
- conduct an initial verification of a new electrical installation
- conduct an initial inspection of an electrical installation
- design, verify and inspect electrical installations in compliance with current safety legislation and BS7671.

Candidates are required to complete a 20-hour design project which involves the assessment of general characteristics, selection, erection and verification of an electrical installation.

Successful completion of the course leads to the award of the City & Guilds 2391-20 - Level 3 Certificate in Design of Electrical Installations





# BS7909: TEMPORARY ELECTRICAL SYSTEMS

**COURSE 370**  
**1 DAY**

This course deals with the new requirements of BS7909: 2008 - The Code of Practice for the creation and operation of Temporary Electrical Systems for Entertainment and Related Purposes. BS7909 is used in a huge range of events beyond the scope of the IEE Regulations. The Standard outlines the necessary management arrangements and the required range of electrical supplies, heavy-duty flexible cables and portable distribution units needed. The systems used range from very simple to highly complex and the Standard gives recommendations for all temporary electrical systems.

## PARTICIPANTS

The course is intended for those involved in all aspects of electrical work that is required to comply with BS7909. An understanding of electrical principles together with an appreciation of electrical installation working practices is required. Participants should possess a recent City & Guilds 2382 qualification (IEE Wiring Regulations, BS7671).

## COURSE PRESENTATION

The course is presented in a helpful and informative way, making frequent reference to the typical electrical problems encountered in these systems and offering practical solutions. Students are loaned copies of BS7909 for use during the course – and are provided with Technical Training Solutions' course notes which provide explanations of the various requirements.

## COURSE OBJECTIVES

This course is designed to provide participants with the knowledge necessary to successfully sit Technical Training Solutions' multiple-choice examination, as well as gaining useful information about the technical issues in the Standard that will help in their own work activities.

On completion of the course, participants will understand

- the scope of activities that require compliance with BS7909
- the relationship of BS7909 to other standards, regulations and the legislative framework
- the terms defined in BS7909
- the required management arrangements
- the meaning of 'small/simple' and 'large/complex' events
- the cables and connectors required
- the earthing and bonding arrangements required
- the requirements for RCDs
- the importance of compliance with maximum earth fault loop impedance values
- how cables and switchgear etc should be protected against damage
- how circuits should be identified and isolated
- how inspection and testing should be performed and the documentation required
- how completion certificates and schedules of test results should be completed.

**Successful completion of the course leads to the award of the Unite / Technical Training Solutions certificate in the Requirements for Temporary Electrical Systems (BS7909: 2008)**



# ELECTRICITY AT WORK REGULATIONS

**COURSE 380**  
**1 DAY**

What makes a person legally competent to do electrical work? In what way is the requirement for competency in electrical work more stringent than for other types of work? Who is responsible for ensuring that electrical tasks at work are carried out correctly? When is it legally permissible to work live? These are just some of the questions dealt with on this informative course – essential for all electrical engineers, electricians, supervisors – indeed anyone who works with electricity.

## PARTICIPANTS

This course is essential for anyone involved in any form of electrical work including those who are responsible for supervising the electrical work activities of others.

## COURSE PRESENTATION

This important subject is illustrated throughout by reference to real-life situations and practical applications. Comprehensive course notes are provided.

## COURSE OBJECTIVES

On completion of the course, participants will have a thorough understanding of the current legal requirements regarding

- the concept of 'duty holder'
- electrical systems, work activities and protective equipment
- the strength and capabilities of electrical equipment
- electrical equipment in adverse or hazardous environments
- the provision of insulation, barriers, etc.
- earthing, bonding and other means of protection
- the integrity of referenced conductors
- the suitability of electrical connections
- protection from overload and short-circuit currents
- disconnection and isolation of circuits
- precautions for safe isolation
- working live
- required working space, access and lighting
- the concept of 'competence' in electrical work.

*A shorter version of this course is available for office, admin and other non-electrical staff.*

**Successful completion of the course leads to the award of the Unite / Technical Training Solutions underpinning knowledge certificate 380: Electricity at Work Regulations**



# FIRE ALARM SYSTEMS

**COURSE 470**  
**3 DAYS**

Modern fire alarm systems require careful, validated installation and maintenance to ensure that false alarms are infrequent and that a real fire would be detected quickly without damage to property or loss of life. This course provides delegates with the knowledge and skills necessary to work on these systems competently.

## PARTICIPANTS

The course is designed for those who have an electrical background (for example maintenance electricians) or for those who have successfully completed course 110: Electrical Maintenance Skills.

## COURSE PRESENTATION

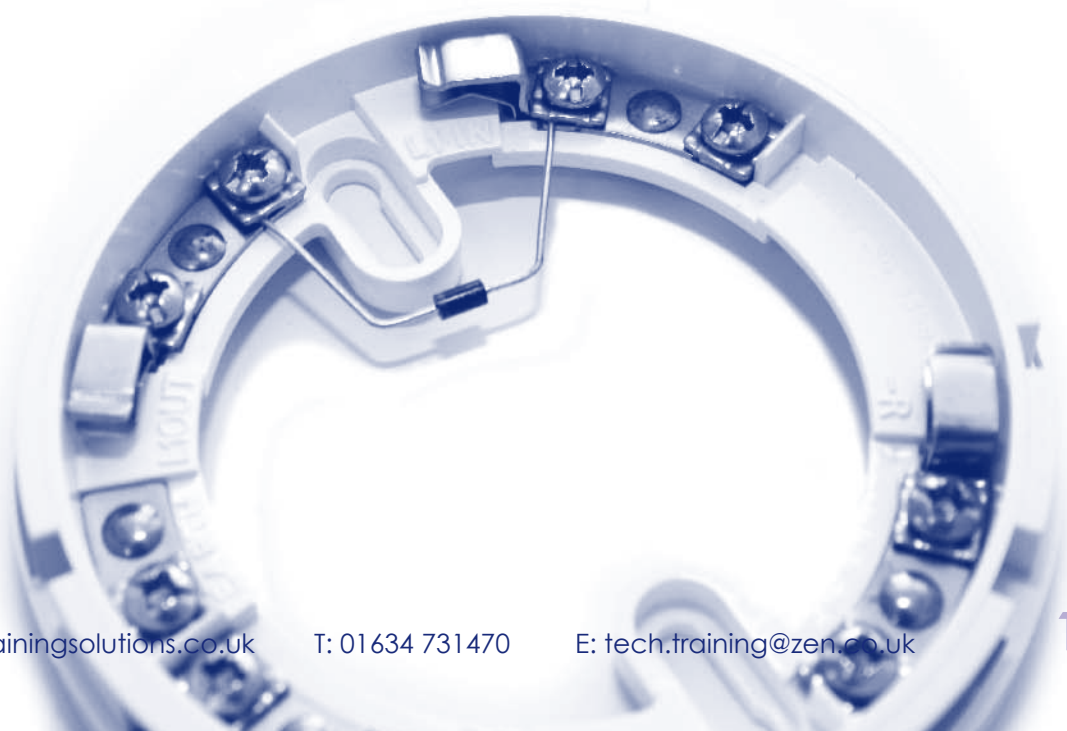
The course is presented using a range of industrial fire alarm panels and associated components so that candidates learn how the devices fit into the system, how they function and the way in which they should be configured, connected and tested. On-going assessments are used to ensure that the candidates are able to meet the objectives of the course. Comprehensive course notes are provided.

## COURSE OBJECTIVES

On completion of the course, participants will be able to

- understand the way in which a large fire alarm system would be connected and zoned
- specify the import of the British Standards and Regulations relating to fire alarm systems
- identify the main connections, component parts and indications on typical fire panels
- identify the required end of line (EOL) terminations and the cabling requirements for mains supplies and detectors etc
- recognise the various types of detectors used in fire alarm systems
- read and understand a typical schedule for a large fire alarm system
- identify the dangers involved in incorrectly connecting detectors and Break Glass Units (BGUs)
- connect a fire alarm panel (using EOLs) to a variety of detectors, sounders, BGUs etc
- find faulty detectors, cabling, configuration errors, etc on a simulated system
- commission a fire alarm system using walk tests, making measurements, testing for functionality of detectors etc
- complete the relevant certificates to validate a functional commercial system.

**Successful completion of the course leads to the award of the Unite/  
Technical Training Solutions competence certificate 470: Fire Alarm  
Systems**



# INSTRUMENTATION

**COURSE 510**  
**3 DAYS**

This course covers the key aspects of current instrumentation and process control technology and is designed to enable maintenance personnel to carry out commissioning, calibration and maintenance of the typical devices used for measurement and control in industrial systems.

## PARTICIPANTS

The course is ideal for those who presently possess some electrical knowledge, work in a maintenance environment and seek to expand their activities to include process control and instrumentation systems.

## COURSE PRESENTATION

The course is extensively 'hands on', giving participants considerable practical experience of the devices typically found in industry. Comprehensive course notes are provided.

## COURSE OBJECTIVES

On completion of the course, participants will be able to

- understand the health and safety implications of working with process control systems
- appreciate the operation of typical instrumentation systems
- identify the various methods of signal transmission
- correctly connect electrical or air-powered devices
- understand the equipment used in
  - temperature measurement (RTDs, thermocouples, etc.)
  - pressure measurement (air / electrical differential pressure cells)
  - level measurement (bubblers, pressure cells, ultrasonic, load cells)
  - flow measurement (orifice plates, mag-flow meters, weirs, flumes, etc.)
- correctly connect, commission and maintain these devices and their associated wiring
- understand the principles of turbidity, density, pH, proximity and weight measurement and apply relevant maintenance procedures required by each
- commission and calibrate I to P converters, chart recorders and process meters.

**Successful completion of the course leads to the award of the Unite / Technical Training Solutions competence certificate**  
**510: Instrumentation**





# PROGRAMMABLE LOGIC CONTROLLERS

**COURSE 520**  
**3 DAYS**

Programmable logic controllers are commonplace in all areas of industry. Accordingly it becomes ever-more important that maintenance personnel should be able to carry out effective maintenance tasks on these systems.

## PARTICIPANTS

This course will be invaluable to anyone involved in the maintenance of control systems which incorporate PLCs. Participants should ideally have an understanding of electrical principles.

## COURSE PRESENTATION

The emphasis throughout is on useful, practical skills and their application in the context of common industrial situations. Much of the course is given over to 'hands-on' experience and the maintenance skills that are required when working with PLCs.

The various main PLC manufacturers are represented on the course - Allen Bradley, Siemens, Mitsubishi and Modicon. Candidates gain experience of each of these types, and this generic knowledge helps to prepare them to deal with any type of PLC in the future.

Comprehensive course notes are provided.

## COURSE OBJECTIVES

On completion of the course, participants will be able to

- understand the safety issues involved with PLCs and appreciate the need for safe working practices
- understand how PLCs are incorporated into modern industrial control systems, and the typical applications they are put to
- understand the logic functions performed by basic PLC instructions
- understand the methods of addressing inputs and outputs of PLCs
- understand the various methods of transmitting signals to and from PLCs
- identify the range of I/O modules available
- understand the use of battery back-up and ROM
- interpret ladder diagrams, statement lists and control system flowcharts
- use hand-held programmers and personal computers to interrogate PLCs
- monitor I/O lines to determine correct operation
- safely modify program parameters to solve process problems
- safely use I/O forces as an aid to fault-finding
- carry out fault-finding on PLC-controlled systems
- use systematic methods of fault-finding using specially designed flowcharts
- back-up programs and restore them back to PLCs.

**Successful completion of the course leads to the award of the Unite / Technical Training Solutions competence certificate 520: Programmable Logic Controllers**



# THREE-TERM (PID) CONTROLLERS

**COURSE 550**  
**2 DAYS**

Three-term controllers continue to play an important role in many industrial processes and this course is designed to provide the skills and understanding necessary to effectively maintain control systems which utilise this technology. The course is ideal for those who have attended Course 510 (Instrumentation), or wish to further enhance their instrumentation skills.

## PARTICIPANTS

Those attending the course should preferably have an understanding of the input / output devices typically used in process control systems. No prior knowledge of electronic controllers is required.

## COURSE PRESENTATION

An extensively 'hands-on' approach is used throughout, with participants gaining substantial practical experience in the configuration, calibration and tuning of a range of industry-standard controllers. The course is supported by comprehensive course notes with the candidates gaining experience of Eurotherm, West and other manufacturer's controllers.

## COURSE OBJECTIVES

On completion of the course, participants will be able to

- understand the safety implications of working on closed-loop control systems
- understand the relevance of the three terms (PID) used in controllers
- identify the capabilities of controllers from their exterior markings
- correctly and safely configure and calibrate a range of industry standard electronic controllers
- manually tune electronic controllers
- appreciate the limitations of 'auto-tuning'
- determine when a controller is correctly tuned.

**Successful completion of the course leads to the award of the Unite / Technical Training Solutions competence certificate 550: Three-Term Controllers**



# AC INVERTER DRIVES

**COURSE 580**  
**2 DAYS**

Manufacturers of inverter drives report that of the units returned to them as faulty, up to 80% do not reveal any defects. Such returns are more a result of incorrect programming and/or fault diagnosis by maintenance personnel. This comprehensive course is designed to counter such difficulties by enabling the maintenance engineer to correctly set up, maintain and carry out effective fault-finding on inverter drive systems. Unlike some product-specific courses, this course is substantially generic - effectively covering most of the variable speed drive systems found in industry today and providing a thorough understanding of drive operation within the context of industrial systems.

## PARTICIPANTS

Suitable for anyone who is required to maintain or configure inverter drives (electricians, instrument technicians, etc.). Whilst a knowledge of basic electrical principles is desirable, no prior knowledge of motor theory or electronics is necessary.

## COURSE PRESENTATION

The practicalities of configuring, fault-finding and maintenance are demonstrated and then practised by participants on purpose-built training rigs allowing considerable experience to be gained on a representative range of proprietary drive systems. The course is supported by comprehensive course notes.

Candidates gain experience of using Danfoss, Siemens, Mitsubishi, Omron and Allen Bradley drive systems.

## COURSE OBJECTIVES

On completion of the course, participants will be able to

- apply safe working practices when working with variable speed drives
- demonstrate an understanding of the principles of operation of a range of inverter drive systems
- correctly configure, operate and monitor drive systems
- identify and correct configuration errors
- differentiate between drive faults, motor faults and power faults
- differentiate between control / power circuit drive faults
- appreciate the concepts of fieldbus communications and SCADA systems.

**Successful completion of the course leads to the award of the Unite / Technical Training Solutions competence certificate 580: AC Inverter Drives**



# STEPPERS & SERVOS

**COURSE 590**  
**1 DAY**

In all industries, the requirement for increasingly precise motion control has led to a vast increase in the use of stepper and servo systems. The apparent complexity of these systems often persuades maintenance managers to out source the maintenance requirement. This comprehensive course is designed to enable the maintenance engineer to correctly set up, tune, maintain and carry out effective fault-finding on both stepper and servo systems, without the need to out source. Unlike some product-specific courses, this course is substantially generic - effectively covering most of the stepper and servo systems found in industry today.

## PARTICIPANTS

Suitable for anyone who is required to maintain or configure stepper or servo systems (electricians, instrument technicians, etc.). Whilst a knowledge of basic electrical principles is desirable, no prior knowledge of motor theory or electronics is necessary.

## COURSE PRESENTATION

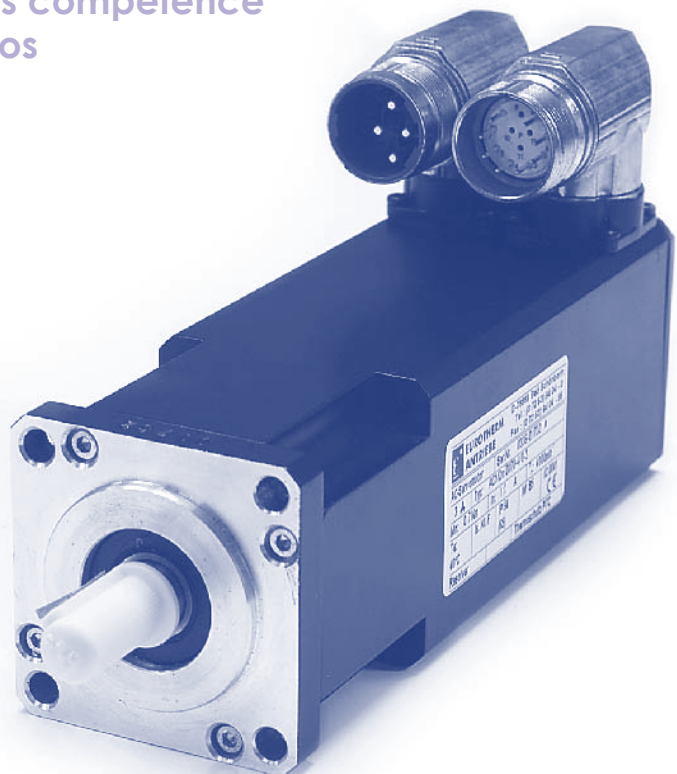
The practicalities of configuring, fault-finding and maintenance are demonstrated and then practised by participants on purpose-built training rigs allowing considerable experience to be gained on a representative range of proprietary motion control systems. The course is supported by comprehensive course notes.

## COURSE OBJECTIVES

On completion of the course, participants will be able to

- apply safe working practices when working with stepper or servo systems
- understand the principles of operation of stepper and servo systems
- correctly configure, operate and monitor stepper and servo systems
- identify and correct configuration errors
- differentiate between drive faults, motor faults and power faults
- differentiate between control / power circuit drive faults
- appreciate the concepts of fieldbus communications and SCADA systems.

**Successful completion of the course leads to the award of the  
Unite / Technical Training Solutions competence  
certificate 590: Steppers and Servos**





This course provides maintenance personnel and production operators etc. with the skills and knowledge necessary to carry out maintenance tasks on industrial hydraulic systems.

### PARTICIPANTS

This course is suitable for anyone who wishes to work on or maintain industrial hydraulic systems. No prior knowledge of hydraulics is necessary.

### COURSE PRESENTATION

Participants gain useful practical experience on purpose-built training rigs which make use of typical commercial components and are designed specifically to simulate the hydraulic systems found in industry. Comprehensive course notes are provided.

### COURSE OBJECTIVES

On completion of the course, participants will be able to

- apply safe working practices when working with hydraulic systems
- understand the relevant theory (units, flow, pressure, temperature, forces, etc.)
- understand the operation of hydraulic circuits and components typically used in industry
- understand how to carry out correct maintenance procedures on:
  - power units (fixed / variable delivery pumps, reservoirs, filters, strainers and gauges)
  - control elements (directional, sequence, pressure reducing, check and flow valves etc)
  - actuators (cylinders, rams and motors)
- understand how to use hydraulic test equipment to determine the nature and location of faults
- identify and rectify faults on cylinders and valves
- assess the condition of a hydraulic system by oil analysis
- use hydraulic circuit drawings and fault-finding charts as a systematic aid to fault-finding.

**Successful completion of the course leads to the award of the Unite / Technical Training Solutions competence certificate 610: Hydraulics**



# PNEUMATICS

**COURSE 660**  
**4 DAYS**

This course provides maintenance personnel and production operators etc. with the skills and knowledge necessary to carry out maintenance tasks on pneumatic and electro-pneumatic systems.

## PARTICIPANTS

Suitable for anyone who is required to maintain industrial pneumatic systems. No prior knowledge of pneumatic or electrical principles is necessary.

## COURSE PRESENTATION

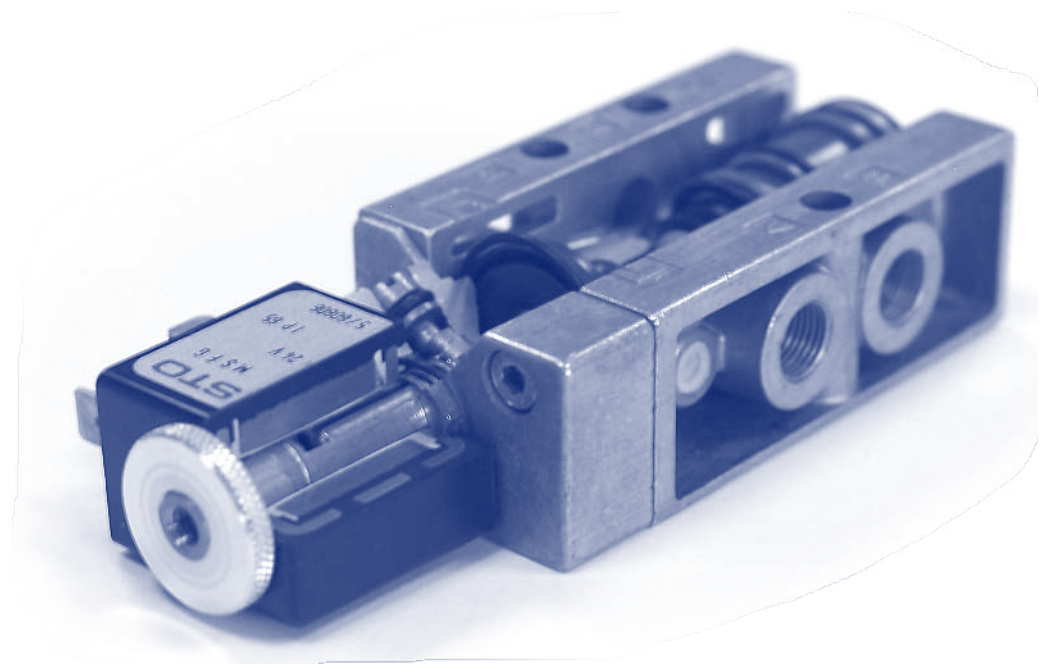
A practical approach is taken throughout this course with participants gaining valuable 'hands-on' experience on training equipment utilising industry-standard components designed to simulate industrial systems. Comprehensive course notes are provided.

## COURSE OBJECTIVES

On completion of the course, participants will be able to

- understand the need for safe isolation and be able to apply safe working practices when working with pneumatic and electro pneumatic systems
- demonstrate relevant underpinning knowledge (units, pressure, forces, etc.)
- identify, inspect and adjust / replace / repair the following components:
  - service units (filter, regulator, lubricators)
  - sensors (pneumatic valves and electrical switches, proximity sensors and switches)
  - valves (air and solenoid operated, sequence, directional control)
  - actuators (cylinders and rotary)
  - AND / OR elements, relays, timers, flow controls and quick exhausts
- use visual indicators and manual overrides to check operation of components
- carry out repairs to pneumatic systems, replace fittings, plastic pipe-work, etc.
- use pneumatic circuit drawings as an aid to systematic fault-finding.

**Successful completion of the course leads to the award of the Unite / Technical Training Solutions competence certificate 660: Pneumatics**



# MECHANICAL MAINTENANCE SKILLS

**COURSE 700**  
**4 DAYS**

This course provides personnel with the necessary skills to perform mechanical maintenance, including the removal and replacement and alignment of equipment (pumps, gearboxes, motors and power transmission systems) and identification and rectification of bearing faults within these systems.

## PARTICIPANTS

Designed to benefit anyone required to undertake mechanical maintenance on production/process equipment. This course is equally suitable for production operatives or for craft personnel already involved in maintenance activities.

## COURSE PRESENTATION

The course format is very much 'hands on' – the emphasis being on the development of sound practical skills within the context of safe working practices.

## COURSE OBJECTIVES

On completion of the course, participants will be able to

- apply safe working practices and understand the principles of preventative and first-line maintenance
- safely isolate mechanical systems when necessary to prevent danger
- correctly diagnose a range of mechanical faults and plan a suitable course of action
- understand the principles of power transmission systems; recognise, remove and refit taper-lock bushes, keyed shafts, belts, chains & couplings; install & align shafts; tension drive train components
- understand the function of lubricants and how to select correct lubricants for specific applications
- correctly remove and refit various types of bearings (roller, ball, etc.) identify various bearing types, understand their typical applications & recognise common defects
- correctly remove and replace seals, gaskets and gland packing
- correctly use measuring equipment to identify different types of screw threads by means of outside diameter, inside diameter, thread form and pitch
- understand the operation of various pumps (positive displacement, centrifugal, hydraulic and air) and state typical faults and their symptoms
- understand the operation of various gearboxes, (helical, spur and worm-wheel) and state typical faults and their symptoms
- understand the operation of variable speed drives
- correctly dismantle and replace drive belts
- recognise various types of conveyor systems and their main components
- identify typical faults and correctly remove, replace and track a conveyor belt.

**Successful completion of the course leads to the award of the Unite / Technical Training Solutions competence certificate 700: Mechanical Maintenance Skills**

Consolidation schemes are particularly suitable for this course • See page **6** for details



# ABRASIVE WHEELS

**COURSE 720**  
**1 DAY**

For those who work with abrasive wheels, appropriate training is absolutely essential for reasons of safety. It is a legal requirement that those involved in the mounting of wheels should receive suitable and sufficient training. This course is designed to meet this requirement.

## PARTICIPANTS

The course is suitable for anyone who works with abrasive wheels and is indispensable for anyone involved in the checking, dressing or replacement of wheels. No prior knowledge is assumed.

## COURSE PRESENTATION

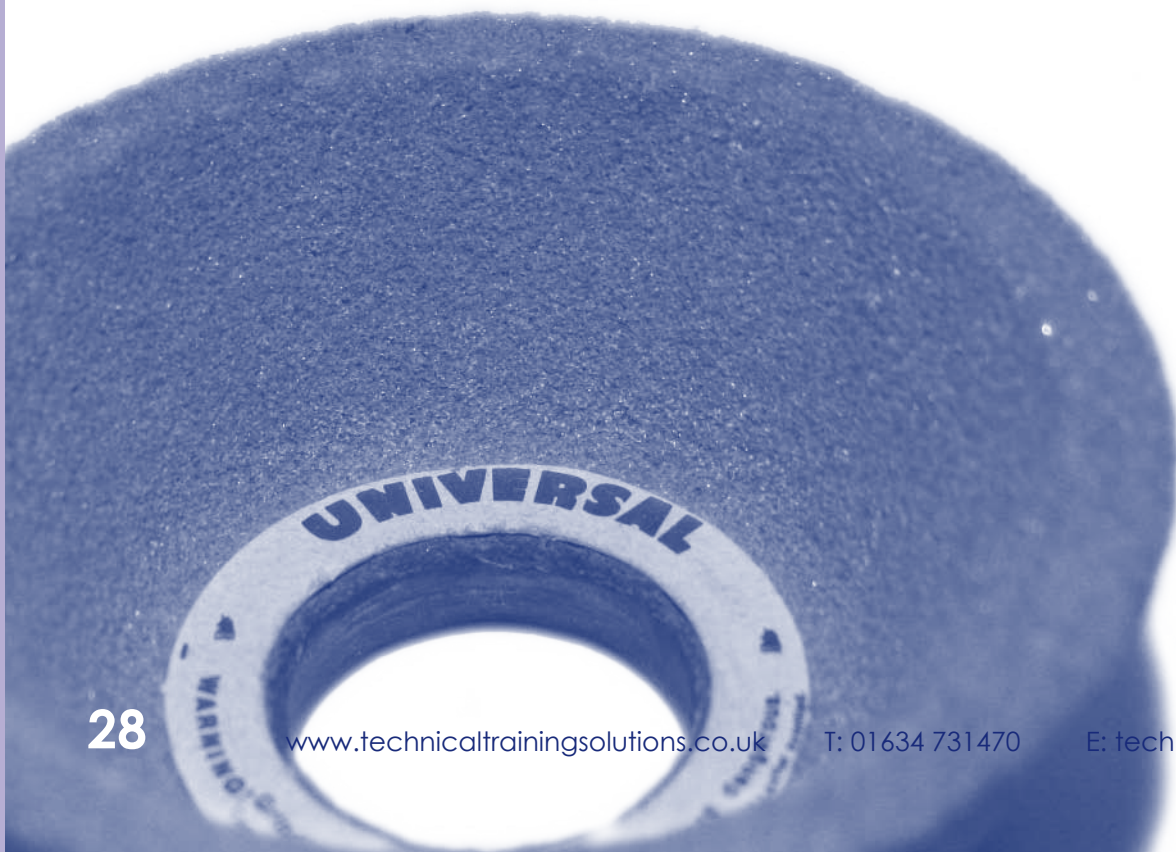
Participants are provided with the sound practical skills they need in the work place together with a thorough understanding of the relevant regulative requirements. Comprehensive course notes are provided.

## COURSE OBJECTIVES

On completion of the course participants will have a thorough understanding of

- the hazards arising from the use of abrasive wheels and precautions which should be observed
- the abrasive wheels regulations and HSE advisory literature
- methods of marking abrasive wheels as to type and speed
- how to determine the maximum safe speed of a wheel
- correct storing, handling and transportation of abrasive wheels
- proper methods of inspecting and testing abrasive wheels
- how to determine when wheels need replacing
- the components used with abrasive wheels and their correct assembly
- the correct balancing of abrasive wheels
- the proper methods of dressing wheels
- the correct adjustment of rests.

**Successful completion of the course leads to the award of the Unite /  
Technical Training Solutions competence certificate 720: Abrasive Wheels**





# BASIC ENGINEERING SKILLS FOR OPERATORS

**COURSE 730**  
**3 DAYS**

This course provides operators with the basic engineering skills necessary to perform routine maintenance tasks. These tasks include removal and replacement of components, cleaning, lubrication and inspection.

## **PARTICIPANTS**

Line operators with little or no engineering skills who wish to take on the responsibility of primary asset care.

## **COURSE PRESENTATION**

The course format is very much 'hands on' - the emphasis being on development of sound practical skills within the context of safe working practices.

## **COURSE OBJECTIVES**

On completion of the course, participants will be able to

- understand the principles of and apply safe working practices to routine maintenance
- safely isolate mechanical systems when necessary to prevent danger
- understand machine manufacturer's recommended routine maintenance tasks
- select appropriate hand tools and use them correctly and safely
- recognise faulty/worn components
- remove and replace components that require cleaning, lubrication and/or inspection
- identify basic faults
- adopt a logical approach to fault finding.

**Successful completion of the course leads to the award of the Unite / Technical Training Solutions competence certificate 730: Basic Engineering Skills for Operators**



# MAINTENANCE OF PLUMBING SYSTEMS

**COURSE 740**  
**3 DAYS**

Estates departments responsible for the upkeep of the services of buildings used as office blocks, hospitals and educational establishments etc., often seek to improve the department's overall effectiveness by extending the range of skills possessed by their maintenance personnel. This course is specifically designed to provide non-mechanical specialists with the skills needed to carry out first-line mechanical maintenance on low pressure hot water (LPHW) heating systems, hot and cold water services, and drainage systems – together with associated pipe-work, pumps, valves and other ancillary equipment.

## PARTICIPANTS

Estates or maintenance personnel of all kinds will benefit from this course. No prior knowledge is assumed.

## COURSE PRESENTATION

The emphasis throughout is on the practical application of skills necessary to deal effectively with first-line maintenance tasks. Comprehensive course notes are provided.

## COURSE OBJECTIVES

On completion of the course, participants will be able to

- apply safe working practices and meet relevant regulative requirements when working with mechanical building services
- identify the safety issues associated with legionella
- understand different types of LPHW system
- diagnose faults on LPHW systems
- carry out bending of copper tube
- correctly fabricate soldered pipe-work joints
- remove and replace radiators, radiator valves and taps
- dismantle thermostatic mixer units and replace defective parts correctly
- recharge pressure vessels
- make joints in PVC soil piping using either solvent or 'O' ring type joints.

Consolidation schemes are particularly suitable for this course • See page **6** for details

Successful completion of the course  
leads to the award of the Unite /  
Technical Training Solutions competence  
certificate 740: Maintenance of Plumbing  
Systems



# AIR CONDITIONING SYSTEMS

**COURSE 750**  
**3 DAYS**

This course provides an introduction to the maintenance requirements of split-system air conditioning units. Candidates gain the knowledge and skills needed to perform the most commonly occurring first line maintenance tasks on these systems so that they can inspect them for damage and functionality, clean them, maintain them and recognise when an engineer needs to be called out.

## **PARTICIPANTS**

Building services staff, caretakers, and those responsible for maintenance of hospitals, schools and care homes are ideally suited to this course. No prior air conditioning knowledge is required.

## **COURSE PRESENTATION**

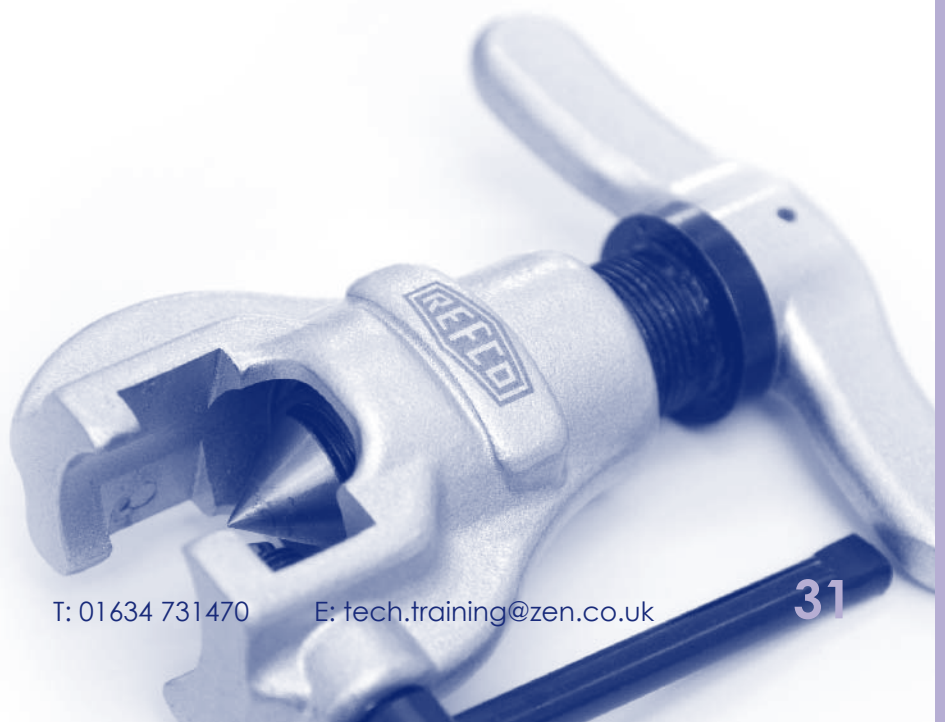
Candidates are given the opportunity to investigate all of the major components of a split system air conditioning unit, and to practice some of the first-line maintenance tasks. As with all of the courses that Technical Training Solutions provides, the emphasis is on safety with plenty of hands-on practicals.

## **COURSE OBJECTIVES**

On completion of the course, participants will be able to

- understand the safety precautions and gain an awareness of the EU laws concerning the use, handling and disposal of refrigerants.
- state the impact of CFCs and HFCs on the environment
- understand the principals of air conditioning systems
- recognise the major components used in split system air conditioning systems
- carry out routine inspections of filters and understand the need to maintain hygiene and system efficiency
- demonstrate an understanding of the F-Gas regulations
- state the methods of leak detection
- understand the terminology used within split system air conditioning systems
- describe what is meant by 'Superheated' and 'Subcooled' liquids
- understand how to use a digital thermometer to check the correct functioning of a split system air conditioning unit.

**Successful completion of the course leads to the award of the Unite / Technical Training Solutions competence certificate 750: Air Conditioning Systems**



# BASIC ENGINEERING FITTING SKILLS

**COURSE 780**  
**3 DAYS**

This course provides candidates with the basic fitting skills necessary to maintain and repair mechanical equipment through the use of good workshop practice.

## **PARTICIPANTS**

The course is designed to complement course 700: Mechanical Maintenance Skills and is suitable for craft personnel already involved in maintenance activities.

## **COURSE PRESENTATION**

Designed to benefit anyone required to undertake basic mechanical maintenance on production/ process equipment. This course is equally suitable for production operatives or for craft personnel already involved in maintenance activities.

## **COURSE OBJECTIVES**

On completion of the course, participants will be able to

- apply safe workshop practices when performing basic fitting skills
- read and interpret engineering drawings
- correctly use measuring and marking out equipment
- practice the correct use of hand tools
- manufacture items within tolerance using hand tools
- select the correct drilling speeds for various materials
- identify a range of metric and imperial thread forms
- drill and tap holes
- practice methods of removing broken studs
- recognise stripped threads and correctly use thread repair equipment
- remove and refit bearings and seals
- produce drive keys
- safely operate a pillar drill
- understand how to sharpen drill bits.

**Successful completion of the course leads to the award of the Unite / Technical Training Solutions competence certificate 780: Basic Engineering Fitting Skills**





# Internet Pages

Providing detailed descriptions of the courses

The power of the internet allows further information about the courses described in this brochure to be shown. We have used this to provide extracts from the course notes for each course and photographs of the equipment used.

This provides potential candidates and employers with an opportunity to see exactly what a given course entails, ensuring that the correct courses are chosen for the candidates.

Course description

Description of what candidates actually do on the course

Extracts from the course notes

Photographs of the equipment used on the course

## Internet Explorer: Technical Training Solutions

File Edit View Format Print Info

### AC INVERTER DRIVES

#### COURSE 580 - 2 DAYS

Manufacturers of inverter drives report that of the units returned for drive faults, up to 50% do not mount and defects. Such returns are more a result of incorrect programming rather than fault diagnosis for maintenance personnel. This competence course is designed to enable such staff to enable the maintenance engineer to correctly set up, maintain and carry out effective fault finding on inverter drive systems. Unlike some product specific courses, this course is substantially generic - effectively covering most of the variable speed drive systems found in industry today and providing a thorough understanding of drive operation within the context of industrial systems.

#### PARTICIPANTS

Suitable for anyone who is required to maintain or configure inverter drive systems (automation, equipment maintenance, etc.). Whilst a knowledge of basic electrical principles is desirable, no prior knowledge of inverter theory or electronics is necessary.



#### COURSE PRESENTATION

The presentation of configuring, fault finding and maintenance are demonstrated and then practised by participants on purpose-built training rigs allowing considerable experience to be gained in a representative range of practical problems. The rig is supported by comprehensive course notes.

#### COURSE OBJECTIVES

On completion of the course, participants will be able to:

- explain with working precision what is meant by variable speed drives
- demonstrate an understanding of the principles of operation of a range of inverter drive systems
- correctly configure, maintain and monitor drive systems
- identify and correct configuration errors
- differentiate between drive faults, motor faults and power faults
- differentiate between control (power) and speed drive faults
- appreciate the concepts of feedback communications and CANA systems.

Successful completion of the course leads to the award of Inverse / Technical Training Solutions competence certificate 580: AC Inverter Drives.



#### What do candidates on the ac inverter drives course actually do?

The ac inverter drives course provides an extensive understanding of the relationship between speed torque and voltage frequency of industrial motors.

The course notes provide extensive and explicit detail on drive control the most output signal on a method of setting a variable voltage variable frequency inverter, without getting involved in the underlying theory. For the candidate to understand the principles of operation of a drive, they will only benefit if they understand the electronics work. Some sample pages from the course notes give an indication of this approach.



Candidates on this ac inverter course have the opportunity to configure an industrial drive connected to a real three phase motor on one of our specially designed training rigs. Each of the major manufacturers of drive units are represented. Candidates can monitor how changing the parameters of the drive affects drive behaviour at start-up, while running at no-load speeds, and at switch-off. All of this can be done in perfect safety - no opportunities there are available to lose with the drive that have in their application.



Candidates will receive some of the equipment throughout the course. Standard digital multimeters are used to test the permeability of a drive's power module (the most common fault part in any drive unit), before are used to measure the motor speed accurately, current clamp meters are used to monitor the current flow to the motor and a digital oscilloscope is used to access the drive's PWM output waveform.



Before tests are, of course, parameter considerations, and the dangers of incorrect parameter settings, the dangers of electric shock whilst working (and the associated consequences, particularly with regard to the high energy capacitors found inside inverter drives), as well as the physical dangers associated with unattended motor movement are all covered on the course, as are the important issues of arc and insulation testing and suppression components.

If you would like to see some of the equipment used on the ac inverter drives course for yourself, then please call us to arrange a visit to our base in Kent. Alternatively, our customer liaison staff can visit you with demonstration parts anywhere in the British Isles.

# Internet Pages

## Information on courses not shown in this brochure

We have only been able to fit a selection of our courses in this brochure. Our internet pages provide details of several other courses.

**Please visit our internet pages to see the other courses available and for other information about Technical Training Solutions.**



# Customised Courses

The courses can be tailored to meet specific company requirements, or completely new training courses can be created.

## Examples of custom-designed training courses are:

- Electrical appreciation for building trades and maintenance assistants
- Electrical maintenance of Loram railway track grinding machines
- Hand-soldering and assembly of electronic circuit boards
- Safe use of electrical equipment on film & TV locations
- Mechanical safety overview
- Electrical safety overview.

# Course dates and costs

This list updated Sep 2009.  
Please call for latest dates.

The following is a list of currently available dates for the courses.

Please call for the latest information - courses fill up quickly and extra dates are often scheduled.

For courses held on clients' premises, costs are based on a daily rate of £1200 + VAT for up to 8 candidates. Our instructor's expenses are met by us.

Unite members: Costs are reduced by 5%

Each course cost is inclusive of course notes & refreshments. VAT and C&G examination fees (for C&G courses) are additional.

**110 Electrical Maintenance Skills (Industrial)**  
**£2,640 12 days**  
9 to 26 November 2009  
18 January to 4 February 2010  
15 March to 1 April  
12 to 29 April  
14 June to 1 July  
13 to 30 September  
25 October to 11 November

**120 Electrical Maintenance Skills for Instrumentation Personnel**  
**£1,760 8 days**  
16 to 26 November 2009  
25 January to 4 February 2010  
22 March to 1 April  
19 to 29 April  
21 June to 1 July  
20 to 30 September  
1 to 11 November

**140 Electrical Maintenance Skills (Building Services)**  
**£2,640 12 days**  
9 to 26 November 2009  
14 June to 1 July  
25 October to 11 November

**160 Portable Appliance Testing**  
**£220 1 day**  
20 October 2009  
12 January 2010  
8 April  
5 May  
22 June  
7 September  
30 November

**210 Maintenance of Electronic Equipment**  
**£1,760 8 days**  
9 to 19 August

**220 Basic Electrical Faultfinding**  
**£220 1 day**  
21 October 2009  
13 January 2010  
9 April  
23 June  
8 September  
1 December

**230 Problem Solving for Electricians**  
**£880 4 days**  
16 to 19 November 2009  
24 to 27 May 2010  
18 to 21 October

**300 IEE Wiring Regulations 17th Edition Update**  
**£220 1 day**  
6 November 2009  
26 March 2010  
7 May  
10 September

**310 17th Edition IEE Wiring Regulations**  
**£550 3.5 days**  
2 to 5 November 2009  
14 to 17 December  
11 to 14 January 2010  
22 to 25 February  
22 to 25 March  
26 to 29 April  
10 to 13 May  
7 to 10 June  
12 to 15 July  
16 to 19 August  
6 to 9 September  
11 to 14 October  
22 to 25 November

**340 Inspection & Testing of Electrical Installations**  
**£765 5 days + exams**  
30 Nov to 3 December 2009  
**Practical Part (340P)**  
18 to 19 January 2010  
15 to 16 February  
12 to 13 April  
10 to 11 May  
5 to 6 July  
4 to 5 October  
15 to 16 November  
**Theory Part (340T)**  
8 to 10 February 2010  
8 to 10 March  
24 to 26 May  
19 to 21 July  
18 to 20 October  
29 November to 1 December

**350 Design of Electrical Installations**  
**£880 4 days**  
16 to 19 November 2009  
22 to 25 February 2010  
17 to 20 May  
20 to 23 September  
22 to 25 November

**360 Building Regulations**  
**£220 1 day**  
29 October 2009  
11 June  
20 December

**370 BS7909: Temporary Electrical Systems**  
**£220 1 day**  
9 October 2009  
26 February 2010  
6 May  
16 July  
15 October

**380 Electricity at Work Regulations**  
**£220 1 day**  
19 October 2009  
11 January 2010  
7 April  
4 May  
21 June  
6 September  
29 November

**390 Hazardous Areas and the ATEX Directive**  
**£220 1 day**  
14 January 2010  
25 June

**460 Installation of Renewable Energy Systems**  
**£660 3 days**  
17 to 19 May 2010  
20 to 22 September

**470 Fire Alarm Systems**  
**£660 3 days**  
9 to 11 November 2009  
1 to 3 March 2010  
7 to 9 June  
27 to 29 September

**480 Emergency Lighting**  
**£220 1 day**  
12 November 2009  
4 March 2010  
10 June  
30 September

**510 Instrumentation**  
**£660 3 days**  
12 to 14 October 2009  
7 to 9 December  
1 to 3 February 2010  
19 to 21 April  
12 to 14 July  
11 to 13 October  
13 to 15 December

**520 Programmable Logic Controllers**  
**£660 3 days**  
5 to 7 October 2009  
4 to 6 January 2010  
29 to 31 March  
14 to 16 June  
13 to 15 September  
6 to 8 December

**530 PLC Programming**  
**£880 4 days**  
1 to 4 March 2010  
23 to 26 August

**550 Three Term Controllers**  
**£440 2 days**  
15 to 16 October 2009  
4 to 5 February 2010  
22 to 23 April  
15 to 16 July  
14 to 15 October  
16 to 17 December

**580 AC Inverter Drives**  
**£440 2 days**  
2 to 3 November 2009  
10 to 11 March 2010  
5 to 6 July  
25 to 26 October

**590 Steppers and Servos**  
**£220 1 day**  
4 November 2009  
12 March 2010  
7 July  
27 October

**610 Hydraulics**  
**£880 4 days**  
12 to 15 October 2009  
25 to 28 January 2010  
12 to 15 April  
2 to 5 August  
15 to 18 November

**660 Pneumatics**  
**£880 4 days**  
30 Nov to 3 December 2009  
15 to 18 March 2010  
26 to 29 July  
4 to 7 October

**700 Mechanical Maintenance Skills**  
**£880 4 days**  
2 to 5 November 2009  
8 to 11 March 2010  
7 to 10 June  
4 to 7 October  
6 to 9 December

**720 Abrasive Wheels**  
**£220 1 day**  
23 October 2009  
15 January 2010  
24 June

**730 Basic Engineering Skills for Operators**  
**£660 3 days**  
26 to 28 October 2009  
15 to 17 February 2010  
14 to 16 June  
2 to 4 August  
22 to 24 November

**740 Maintenance of Plumbing Systems**  
**£660 3 days**  
12 to 14 October 2009  
8 to 10 February 2010  
27 to 29 September

**750 Air Conditioning Systems**  
**£660 3 days**  
19 to 21 October 2009  
18 to 20 January 2010  
10 to 12 May  
13 to 15 September

**780 Basic Engineering Fitting Skills**  
**£660 3 days**  
4 to 6 January 2010  
24 to 26 May  
6 to 8 September  
29 November to 1 December

**830 Working at Height Regulations**  
**£220 1 day**  
25 June 2010

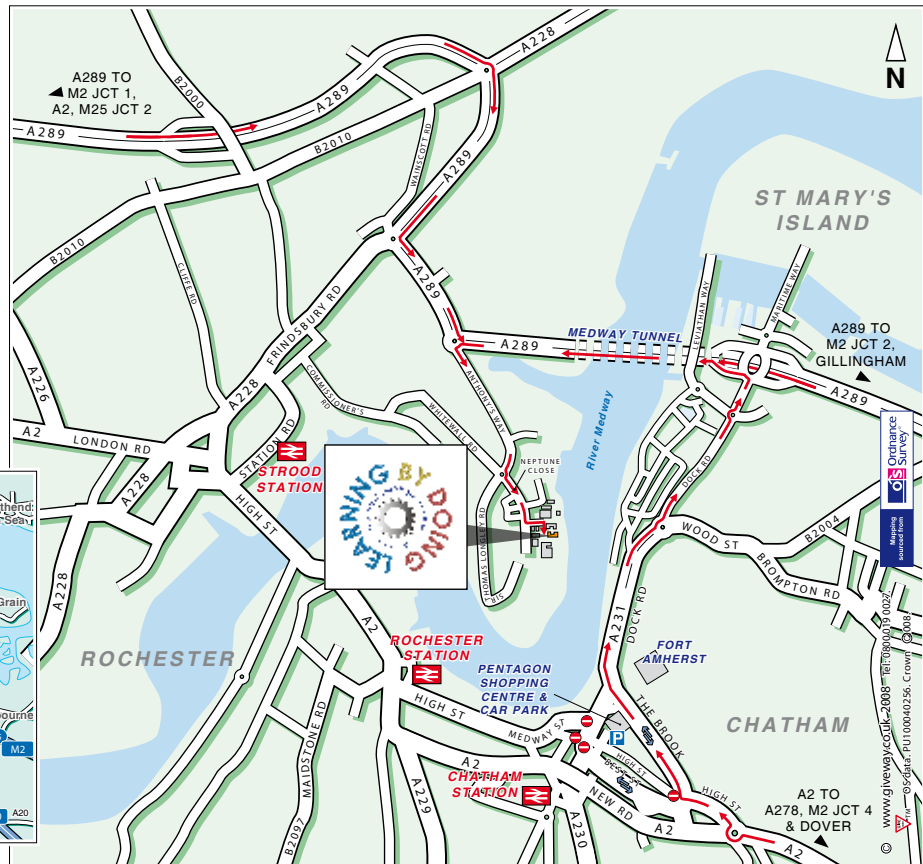
Prices held at  
2008-9 levels



**Technical Training Solutions**  
Norwich House, Waterside Court  
Neptune Close, Rochester ME2 4NZ

Tel: 01634 731470

Fax: 01634 714467



## By Public Transport

Trains from central London (Charing Cross and London Bridge) run to Strood and Rochester. Taxis from Strood and Rochester to the Medway City Estate are available.

## By Road from the North, South or West

(M40, M4, M1, M11 etc.)

Join the M25 heading towards the Dartford crossing. Leave the M25 on the A2 at junction 2 travelling towards Canterbury. Leave the A2 on the A289 and follow the Medway City Estate signs.

## By Road from the Southeast

(M2, A2 etc.)

Join the M2 travelling towards Rochester and leave at junction 1 onto the A289. Follow the Medway City Estate signs.

## Directions from Your Location

Please visit our Internet Pages to view customised directions from your location to us.

