

Construction Quality Management & Awareness Courses

What would we like to achieve

For any role in the construction industry, there must be an appropriate level of competence not only with respect to technical ability but also health & safety and environmental aspects. This is represented in Figure 1. For example, a discipline expert generally requires a greater level of competence in relation to H & S or environmental (HSE) aspects but less technical knowledge and vice versa for project managers.

Courses such as IOSH Managing Safely, IOSH Supervising Safely, and CITB Site Environmental Awareness Training (SEATS) provide a mechanism to increase competence levels where a 'gap' is identified as indicated in Figure 1.

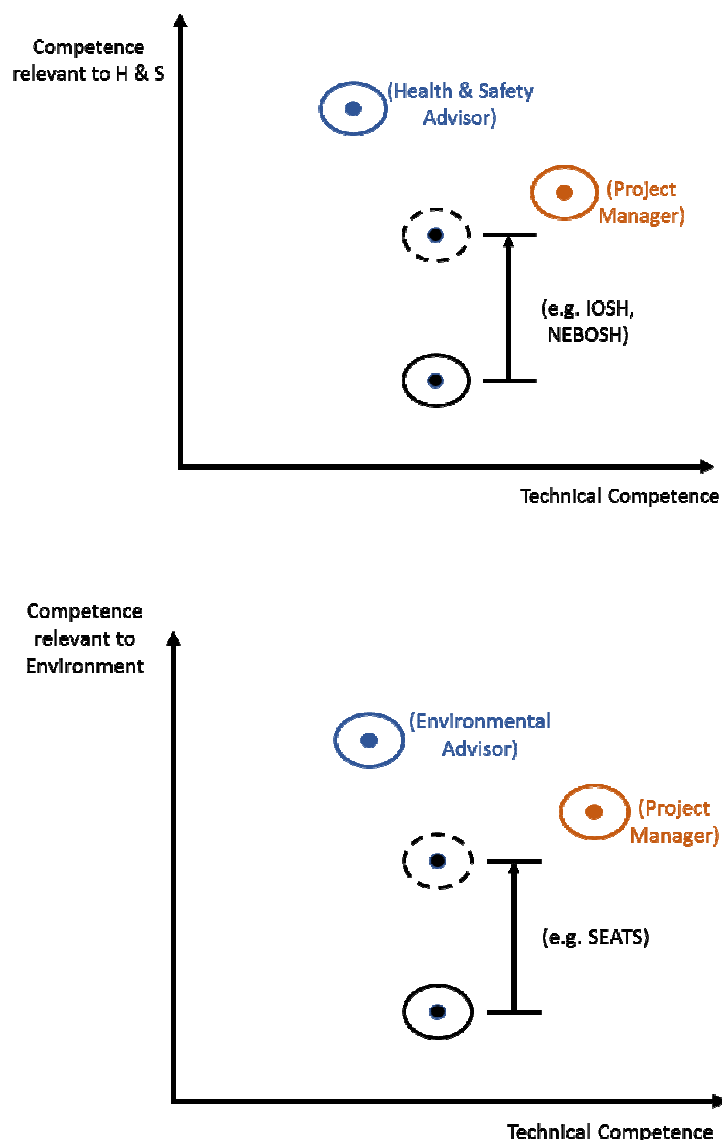


Figure 1: HSE vs Technical Competence Level corresponding to role

Objective

In early-2014, the Construction Special Interest Competency Working Group (ConSIG CWG) membership reached a consensus that one of the greatest barriers to the achievement of 'quality' in construction is a lack of awareness of the value and practices of quality management. Furthermore, this lack of awareness is manifested

not just at operations level - but at all business and project levels. This is represented in Figure 2, whereby the courses noted above for HSE do not exist for quality.

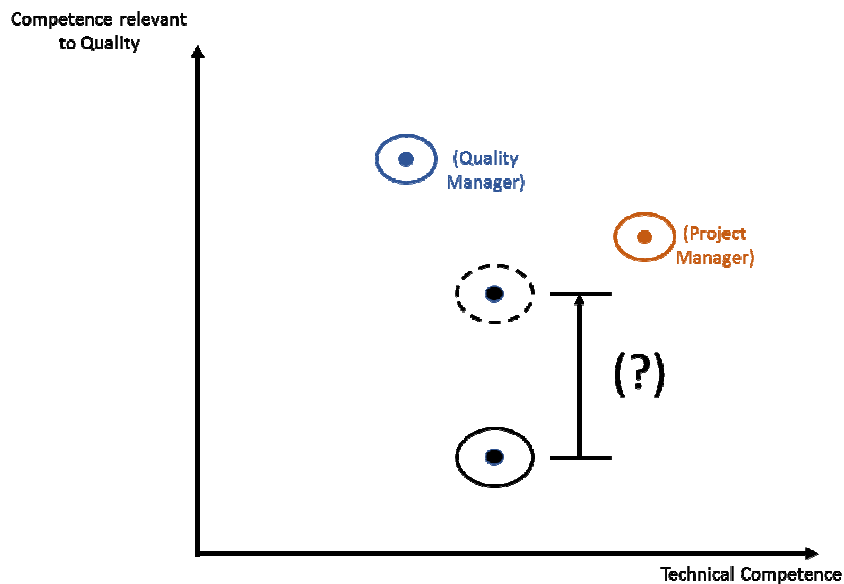


Figure 2: Quality vs Technical Competence Level corresponding to role

It was therefore proposed that the ConSIG CWG be the catalyst for the development of a range of courses for public or in-house delivery.

Thus, the ConSIG CWG set up the 'Construction Quality Awareness' workstream. The objective of the workstream was to develop a series of courses for the construction industry which would help resolve the issue identified above.

A wide-ranging discussion of the potential structure, format and content of the courses settled upon the analogy of IOSH's and CITB's Health & Safety courses that provide a graduated range of awareness training modules for construction personnel. Thus, the ConSIG CWG resolved to pursue the development of a similar range of course structures.

Concept of ConSIG CWG Quality Awareness Courses

Courses such as IOSH Managing Safely, IOSH Supervising Safely, and CITB Site Environmental Awareness Training (SEATS) are recognised to provide a basis upon which the required standards of HSE can be brought about and which can thus drive continual improvement.

As shown in Figure 2, the same principle applies to quality. Thus, the proposed Quality Awareness Courses aims to deliver the equivalent of these HSE courses providing an industry wide recognised qualification specific to quality.

Consequently, just as it is the aspiration that the Construction Industry achieves appropriate Health & Safety leadership, behaviours and culture, these courses aim to provide a foundation for:

- Quality leadership within the context of role
- Quality culture across construction projects and within construction organisations
- The right behaviours to bring about Right First Time, Defect Free, Excellence and reduce errors.

The syllabus of each course is based on a Quality Awareness Course Framework developed by the ConSIG CWG whose members include senior construction quality professionals representing major UK Construction Industry organisations.

Courses

The ConSIG CWG proposes that a graduated range of quality awareness training course profiles and courses be developed; the individual courses would be:

- Quality Awareness for Directors
- Quality Awareness for Managers
- Quality Awareness for Engineers
- Quality Awareness for Supervisors
- Quality Awareness for Operatives

A rough outline of each of the courses is appended. An example of the syllabus for the Supervisors Competency Awareness Course is also attached.

It is planned that the range of courses then be extended to cover more specialised professional groups which may include the following:

- Quality Awareness for Clients
- Quality Awareness for Designers
- Commercial Quality Awareness

Style and Structure

The content, duration and verification regime for the courses would be developed to be very similar to IOSH Directing/Managing/Working Safely and CITB's SMSTS/SMSTS/SEATS courses that have become embedded in construction. This approach has several advantages, for example, directors and managers are familiar with the type/style of the courses, and HR teams are familiar with the planning and graduated director/manager/supervisor/worker levels of the courses.

Accreditation Requirements

To facilitate an industry recognised qualification such as IOSH Managing Safely, each course will need to be approved by an appropriate industry body. Training providers may also be required to be approved by the industry body to deliver training. For example, the Chartered Quality Institute offer a mechanism for courses whereby Approved Training Partners deliver courses which have been verified to meet relevant standards.

Course Delivery

To provide flexibility, the courses are designed to be delivered by means such as the following:

- 1) **'Off the Shelf'**: The services of a training provider would be procured to deliver predeveloped and accredited courses.
- 2) **Bespoke Organisation Course**: An organisation may use the syllabus to develop a bespoke training course which meets the minimum requirements of the syllabus. The course would need to be approved by an accreditation body. Where appropriate, the training organisation would also need to be approved to deliver the training by the accreditation body. (This enables an organisation to develop a course covering the fundamental aspects but, for example, tailor it specifically to the company.)
- 3) **Bespoke Course delivered by organisation trainers**: An organisation may use the syllabus to develop a bespoke training course which meets the minimum requirements of the syllabus. The course would need to be approved by an accreditation body. Where appropriate, the organisation may need to obtain approval with the accreditation body to be authorised to deliver the training. (This enables an organisation to not only develop a course covering the fundamental aspects and tailor it specifically to the company but also deliver the course via trainers employed within the organisation. This may reduce

costs in the long run especially for large companies with significant numbers of employees who require training.)

Delegate Assessment

The knowledge gained by delegates would be assessed via means appropriate to the course. For example:

- The Operatives and Supervisors Quality Awareness courses would likely be assessed via a multi-choice question paper to verify understanding of the principles learned.
- The Quality Awareness for Managers and the Quality Awareness for Engineers, being more involved, could require a coursework exercise be completed which would verify understanding and the ability to practically apply the principles learned.

Training organisations would be required to mark the assessments against a specified criteria. Marked assessments would then be moderated by the ConSIG CWG.

Upon successful completion of the course, it is proposed that a recognised industry body would maintain a register of all those who pass and issue Certificates of Completion.

Background to Course Development

In mid-2014, a brainstorm session identified a wide range of topics that ought to be included in the potential courses. In late-2014, ConSIG members were asked to identify, via a simplistic SurveyMonkey poll, which of the identified topics should be included in prospective courses for directors, managers, engineers, supervisors and operatives. Members' responses were analysed to provide a profile of the degree to which a particular topic should be covered in each of the prospective courses. The results were distributed to ConSIG members and discussed at CWG meetings in early-2015. The CWG concluded that the analysis provided a reasonable guide to the importance of each topic for inclusion in each of the prospective courses. During mid-2015, CWG members discussed outline information for the prospective courses.

A Quality Awareness Course Framework for the quality awareness courses was subsequently developed 2016 – May 2017 via workshops attended by members of the ConSIG CWG. The Framework was approved by the ConSIG CWG and the syllabus for the Supervisors' Quality Awareness Course subsequently developed.

A proposal document with the syllabus for the Supervisors Quality Awareness Course was sent to a number of key construction companies for comment during July 2017. Feedback to date has been very positive.

Next Steps

The concept for the courses has been determined, the Quality Awareness Course Framework developed, and the corresponding Supervisors Quality Awareness Course produced as an example. Positive feedback has been received to date. The ConSIG have therefore concluded that the workstream has successfully achieved an appropriate output pending one of the following:

- 1) An organisation with appropriate resource may (with the authorisation of the ConSIG) utilise the syllabus provided by the ConSIG CWG to develop courses as per the above proposal. The ConSIG CWG would, if requested, provide the syllabi for the other courses which would be based on the ConSIG Quality Awareness Course Framework.
- 2) An organisation may partner with the ConSIG CWG to utilise the ConSIG CWG Quality Awareness Course Framework to develop syllabi and courses aligned with the above proposal.

Subject to either option (1) or (2), it is proposed that a pilot scheme for the courses be developed. This would prove the concept and determine any amendments to the initial course structures and control processes prior to going fully 'live'.

ConSIG Competency Working Group



The work to date has been championed by (alphabetically): Hellen Ball, Mike Buss, Paul Greenwood, Tony Hoyle, Louise Jones, Karen McDonald, Neil Mellor, Ian Mills, and David Myers.

Rev 1.0: Original article written by Mike Buss, Chair of the ConSIG CWG (20/11/17). Article reviewed by Karen McDonald, Deputy Chair of the ConSIG CWG and lead for Workstream 2 Construction Quality Awareness Training (22/11/17).

Competencies Working Group



APPENDIX 1

The Proposed Courses

	Introduction	Content Guide ... for further development	Duration
1	<p>The 'Directing Quality' course is intended primarily for directors and other business leaders with strategic responsibility in the Construction Sector; i.e. those who define the overall policy and direction of the business, provide resources and ensure effective implementation.</p> <p>Such individuals may include: Managing Director, Chief Executive Officer, Finance Director, Chief Operating Officer, Programme or Project Director, Construction Director, Commercial Director, etc.</p>	<p>Understand the importance of a quality culture and the costs and benefits of a systematic approach to the management of risk and quality - and the need for the integration of 'quality' with other business management aspects within a Construction context.</p> <p>Have an appreciation of:</p> <ul style="list-style-type: none"> - What is 'quality' in a business context - How leadership frames the business' governance, assurance and improvement - How 'quality' affects reputation, profitability and value, systematic business transformation - How competence, resources and materials affect quality - The legislative and standards requirements for quality - The benefits of managing quality - The consequences (cost++) of failing to manage quality effectively - ... 	0.5 -1 day
2	<p>The 'Managing Quality' course is intended primarily for operational managers in the Construction Sector; i.e. those required to define operational processes and manage quality, in order to meet their organisation's objectives and comply with their clients', customers', regulatory and other stakeholders' requirements.</p> <p>Such individuals include: Project Managers, Contract Managers, Site Managers, Site Agents, etc</p> <p>Others who may have an interest include: Quality Graduates, Quality Engineers, Quantity Surveyors, Supply-Chain Managers, Procurement/Purchasing Managers, Estimators, Planners, Temporary Works Managers, H&S Managers, Environmental Managers, etc.</p>	<p>Understand the principles of quality management, assurance and control, and the common components of a recognised management system (e.g. ISO 9001) within a Construction context.</p> <p>Have an appreciation of:</p> <ul style="list-style-type: none"> - What is 'quality' in an operational management context - The effect of risk and variability on quality - Legislation and standards requirements for quality - How competency and the working environment affect work - Operational planning and process management - Verification and validation - Review, audit, certification and accreditation - Non-traditional management methodologies, tools and techniques (lean, 6σ, TOC, etc) - ... 	3-5 days Day or block based

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	Introduction	Content Guide ... for further development	Duration
3	<p>The 'Engineering Quality' course is intended for managerial and supervisory staff who have a greater technical responsibility for delivery of the works in the Construction sectors; ie. those who define, plan and/or verify the conformity of the works with contract or other technical requirements.</p> <p>Such individuals may include: Site Engineers, Sub Agents, Package Managers, M&E Managers, Temporary Works Engineers/Supervisors, Technical Advisors, Technicians, etc.</p>	<p>Understand the principles of quality management, quality assurance and quality control, and the common components of a quality control system within a Construction context.</p> <p>Have an appreciation of:</p> <ul style="list-style-type: none"> - What is 'quality' in an engineering/technical context - The effect of risk and variability on quality - Legislation and standards requirements for quality - Planning for quality control - Controlling materials, including quarantine - Ensuring competence - Monitoring, inspection, testing, calibration and commissioning - Controlling and analysing non-conformities - Records, certification and archival - ... 	<p>3-5 days Day or block</p>
4	<p>The 'Supervising Quality' course is designed for operational supervisors, team leaders or junior managers in the Construction Sector.</p> <p>Such individuals may include: Trade Supervisors, 'black hat' Supervisors, Foreman, Site Supervisors, assistant managers, etc.</p>	<p>Understand the principles of quality assurance and quality control on construction site.</p> <p>Have an appreciation of:</p> <ul style="list-style-type: none"> - What is 'quality' in a site supervisory context - Operational planning - Planning for quality control - Materials control - Competency verification schemes - Monitoring, inspection, testing, control of non-conformity - Improving quality - ... 	<p>2-2 days Day or modules</p>
5	<p>The 'Operating Quality' course is intended for all those who carry out tasks on construction sites that may have an effect upon the quality of work or the works (and who are not within the scope of one of the above courses).</p> <p>Such individuals include: site operatives either directly or subcontract employed electricians, carpenters, ground workers, etc.</p>	<p>Understand the principles of planning for and achieving good workmanship and operational performance on construction sites.</p> <p>An appreciation of:</p> <ul style="list-style-type: none"> - What is 'quality' (acceptance criteria) - Controlling your own work - Pride in work well done - The need for verification - Improving quality - ... 	<p>½ - 1 day Day or modules</p>

Course title:	Quality Awareness for Supervisors	
Learning Hours (indicative):	15 hours (target)	Course Description / Learning Aims
Target Audience	Construction Supervisors	The Supervisors Quality Awareness course is aimed at those with responsibility for quality of the works on construction sites particularly when supervising others on a day to day basis. This includes both working supervisors and those who are supervising trades.
Level		This course aims to provide the learner with an appreciation for the principles related to quality in the construction industry and the relevance to their role. It should provide the user with the knowledge and skills required to supervise the works on construction sites.
Assessment:	Multi choice test (20 questions)	The course assumes a level of responsibility where attendees are not required to produce ITP's, plans and other information but may review and work with the information on a day to day basis.
Course pre-requisites	Site work experience (not necessarily as a supervisor)	Assumptions: The Supervisors Quality Awareness course should focus on key messages rather than too greater detail and be presented in the format of pictures and diagrams, bullet points, discussions, and relating topics to the learner's role.
	Trainer Guidance:	

Heading Topic	Subtopic	Learning Outcome	Enabling Objective	Trainer Guidance	Recommended Time	Recommended Time
Introduction		Trainer and participant introduction			30 mins	0.5
What is construction quality & why?		The learner will understand the relevance of quality with respect to construction, different quality perspectives and appreciates how this relates to their role.	The learner appreciates the reasons why quality is important to the construction industry (influences cost, reputation, H & S, environment, legal / contract compliance, Building Regulations etc.). The learner understands the reasons why improvement is required (current cost of defects, bad reputation of the industry etc.). The learner appreciates that quality can be viewed from different perspectives (i.e. the 'product' but also a 'service' and may be subjective opinions of people). The user appreciates how quality relates to their role and the impact of their actions with respect to quality.	* A powerpoint slide which explains 'Take TIME to Save TIME' principle * Trainer facilitates a discussion on the impact of poor quality. * Trainer every day examples to think about quality from their own experiences (e.g. internet product ratings)	1 hour	1
Quality Assurance & Quality Control		The learner will appreciate the principles of quality assurance as a proactive strategy and quality control as inspection to error detect / correct and as a subset of QA	The learner understands the importance of planning for quality before starting the works. The learner appreciates the principles of quality assurance as ensuring the works are correct but also providing the required confidence to relevant parties / persons. The learner understands the role of inspection and testing to error detect but also assure the compliance of the works. The learner appreciates that there must be a distinct process to resolve issues which are not right (Error & Defect Management). The learner appreciates that quality assurance will also provide opportunity for improvement.		45 minutes	0.75
Quality Principles		The learner will appreciate the high level principles for quality management and the influence of them relevant to their role.	The learner appreciates leadership within the context of their role. The learner appreciates that other parties and individual influence their ability to achieve their quality objectives (operatives under their supervision & manager & engineers who define the requirements of their role). The learner appreciates that a process is transformation of input to outputs & understands that correct and sufficient inputs (e.g. competent people, time, equipment, lighting, temperature, humidity and materials) are required to achieve the desired output. The learner appreciates that there is a structured process for continual improvement and the role they play. The learner understands that decisions must be based on factual information and the need to maintain appropriate records (e.g. change control approvals). The learner appreciates the need to focus on other parties beyond their immediate customer (including understanding the concept of internal customers within a project). The learner appreciates their role with respect to achieving a quality culture (e.g. Don't Walk By). The learner understands how the principles of risk management apply within their role (same as H & S). The learner appreciates the existence of standards for management of quality including ISO 9001 (Quality Management System standard). The learner appreciates the principle of the PDCA cycle.	* Use discussion and pictorial representations to develop appreciation and understanding (e.g. Diagram showing process inputs --e.g. competent people, right equipment, correct materials--to produce correct outputs) * Undertake an exercise to evaluate the inputs required to successfully achieve a simple operational task (e.g. competence, information, materials, equipment, environment)	2 hours	2
Governance	General	The learner appreciates that projects establish management systems, why and the main elements which are relevant to quality including how method statements also relate to quality.	The learner appreciates that plans are established for a project to manage delivery of the works and the reasons why (e.g. Project Execution Plan). The learner appreciates the (governance) framework for achieving quality (e.g. Quality Management Plan, Standard Operating Procedures / Work Instructions, ITP's, checklists, etc.). The learner understands the principle of planning, working to the plan and record evidence. The learner appreciates that the purpose and content of the method statement, from a quality perspective (e.g. sequence, level of detail, referencing the inputs etc.)	* The quality systems triangle (policy, manual, forms / records) (Governance with the context of this course refers to the management systems for the construction project.)	30 minutes	0.5
Control of Site Works	ITP's	The learner will be able to review an ITP, assess its adequacy, and communicate and implement the requirements	The learner understands the purpose of an ITP. The learner understands their role in relation to the ITP. The learner appreciates the stages of a task: Pre Commencement, Off Site Manufacture, Material Management, Physical construction, Testing / Commissioning & Post Completion. The learner can evaluate an ITP and ensure it contain sufficient information and knows what to do if it does not The learner can communicate the requirements of the ITP to relevant persons (e.g. operatives). The learner can apply the information and ensure inspections & tests occur as required including different mechanisms for assurance (e.g. hold points, inspection and witness). The learner can ensure appropriate people are involved in inspections and testing. The learner can ensure that evidence is produced 'as it happens'	* A powerpoint slide with examples to explain the purpose of an ITP, the structure, people involved etc. * An exercise with an example ITP providing the learner the opportunity to identify shortcomings * A exercise in which the learners review an ITP and present how they would implement the ITP (or part of it) including communication to relevant parties.	2.5 hours	2.5
Control of Site Works	Checklists	The learner will be understand the purpose of checklists and how to complete correctly	The learner appreciates the checklist is a list of items to be checked, provides evidence that items have been checked and confirmed compliant by relevant parties, can be used to collect relevant information, and can be used as a control mechanism (e.g. for hold points). The learner appreciates the link between ITP's and checklists. The learner understands how checklists should be completed (e.g. hold points signed before continuing, all field completed, signed off by relevant parties). The learner understands that the checklist can be used as a tool to check that works are within required parameters.	* Examples of checklists to be reviewed. * An exercise in which the learners completes a checklist.	1 hour	1
Control of Site Works	Benchmarks (& mock ups) (with respect to the Construction industry)	The learner understands the purpose of a benchmark, what should be benchmarked, when and how	The learner appreciates the meaning of the term 'benchmark' within the construction industry and the difference between 'benchmark' and 'mock-up'. The learner understands the benefits of benchmarking the works (e.g. common standard agreed between all parties inc. client, reference for standard of workmanship etc.). The learner understands the benefits of mock ups and how these should be used differently to 'benchmarks' (e.g. focused on constructing the works correctly). The learner appreciates when and how a benchmark should be produced, presented, and maintained	(NOTE: A 'benchmarks' is generally considered to be first of type and used as a reference for the completed works, part of works, works in progress and / or interface elements. A 'mock-up' could be separate	30 minutes	0.5
Practical application		The learner will understand the practical application of the ITP and quality principles.	The learner understands the importance of evidence and what this may consist of (photos, films, documents, red-line drawings), the level of detail required and need to ensure it can be related to location / date / time and able to be retrieved easily and appreciates the concept of self-certification. The learner understands the importance of calibration as a key input for the quality of the results. The learner understands their role in ensuring and maintaining quality competence on site (e.g. revisiting benchmarks, quality toolbox talks, daily briefings etc.) and maintaining appropriate and accurate records. The learner appreciates the importance of having access to the latest information and effectively communicating to relevant parties (e.g. operatives). The learner appreciates the importance of ensuring the work environment is fit for purpose (e.g. adequate lighting, good housekeeping, temperature / humidity within correct parameters etc.) and implementing appropriate controls if required. The learner appreciates the importance of ensuring adequate protection of completed works and the works area including management concepts such as 'just in time'. The learner understands the importance of adequate material management including correct storage and location, compliance to specification, transportation / delivery, checking for damage etc. The learner appreciates the importance of temporary works and that temporary works should be managed using the same principles as permanent works (e.g. inspection records in place). The learner understands the important of ensuring the right tool / equipment for the job with appropriate training. The learner appreciates the importance of ensuring all tasks are completed in relation to the ITP; inspections and records are complete; and the work area is fit for following trades.	* Helmet CAM: Examples * Site visit	2.5 hours	2.5
Error & Defect Management		The learner appreciates the principles relevant to error detection and management, link to continual improvement and importance of prevention.	The learner appreciates the need to identify errors, the methods to report (e.g. electronic reporting systems, snagging lists, Nonconformity Reports) and when the different methods should be used. The learner appreciates the need to report errors to help with continual improvement. The learner appreciates the principles relevant to a nonconformity report. The learner appreciates the need to achieve 'Right First Time' and reduce rework. COURSE WRAP UP: The learner appreciates the potential implications of errors and how effective quality management can prevent the occurrence and / or impact (e.g. early detection).	* An example of a Nonconformity Report which identifies root cause categories. * This section should be used to 'wrap up' the content of course by referring back to the reasons for quality management (e.g. cost, time etc.) and how the tools and techniques used assist in both preventing errors occurring or facilitate early detection to reduce impact.	1 hour	1
TEST					1 hour	1
Total Time						13.25