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PROJECT CONTROLS CAREER ENTRY AND PROGRESSION PATH

Project controls career entry and progression path

Why project controls?

The last 5 years I have led Project Controls in Qatar, South Africa and now, with CH2M, across Europe. It's been a great career for me that just gets more interesting. And that's what keeps me here, new projects in new places with new challenges that force me to change and adapt and there is always more to know.
Simon Springate, CH2M

A local company was advertising for Planning Engineers on major capital projects, the money was similar, and I was offered the job so I thought I will give it 3 years and then move on. In reality I found the job so exciting and stimulating I progressed over 15 years and several major projects into Project Control Management, becoming functional head. What kept me enthralled was the engineering challenges, and how best could we deliver them, even though I was not a designer I was at the heart of many key decisions and the Project Manager or Director's right hand man!!
Nigel Hibberd

I wasn't sure what I wanted to do when I got to my late teens - a friend's father was looking for a 'recorder' (junior cost engineer) on a big refinery project - took me along and showed me all of the big cranes , vessels etc and said if you go into building you'll never see anything big like this ! So that was me hooked. Working for a contractor on project controls related stuff also meant I could be in the office when it was cold and wet and out when it was sunny!
Dave Armstrong, ACSL

Project controllers play an essential part in ensuring that complex projects are successfully delivered to time, budget, specification and quality. There's a shortage of skilled professionals and there are great career opportunities if this is the right career for you.

As a project controller (which also includes being a cost engineer or estimator or planner) you can have a secure, fulfilling career – playing a part in ensuring the successful, quality delivery of key projects in oil and gas, power generation, nuclear energy, renewable energy, chemicals, pharmaceuticals, water treatment, food and drink, steel, glass and paper making businesses.

These businesses operate at the cutting edge of developments in society and technology and are engaged in some of the most important work happening in the World today. Project controllers are vital to the delivery of essential infrastructure for sustainable energy, for transport and for complex projects that can make the news headlines and often require the co-ordination and control of resources in many parts of the World.

What is project control?

Project control is the defining and planning of project costs, schedules, resources and quality needed to deliver a project and then 1) creating a baseline 2) monitoring cost and time versus the baseline plan or budget, 3) forecasting trends and probable time taken and cost and 4) recommending corrective actions to ensure successful delivery. It includes the specific technical disciplines of cost engineering, estimating and planning.

Within this document the term project control excludes: expeditors, commercial support, document controllers and quantity surveyors (UK definition).

Getting started in project control, estimating, planning, scheduling and cost control

Different companies employ trainee project controllers at differing levels of academic experience ranging from trainees with good GCSEs to those with a Master's degree. Sometimes it is possible to move into this occupation from another department within a company. Potential entry routes are:

From age 16 -18	often employed as an apprentice *
Post A level	may be employed and start work as a technician and may start an apprenticeship *
At graduate level (and with post-graduate qualifications)	with either an engineering or non-engineering degree as long as you meet the main attributes outlined below, may start as an apprentice **
Internal moves	in some companies it may be possible to move from a different department into project controls e.g. from administration, finance, craft supervision, engineering or project management
Armed forces	companies will consider people reskilling from the Armed forces

* = Project controls technician apprentice standard ** = Project controls professional apprentice standard (Apprentice standards in England)

Companies look for specific attributes when considering someone for a project control, cost engineering, estimating or planning role:

who have	and are
<ul style="list-style-type: none"> • good analytical and numeracy skills • good verbal and written communication skills • good problem-solving skills • good interpersonal skills • good organisational skills • an eye for detail and ability to meet deadlines • enthusiasm with a willingness to learn and develop further 	<ul style="list-style-type: none"> • logical thinkers • computer literate • tenacious and resilient • self-motivated and curious • confident with the ability to speak-up not speak-out • a team worker • prepared to take responsibility • able to cope with change including in terms of work location

Engineering construction and related sectors employing project controllers (cost engineers, estimators and planners)

Upstream oil and gas	✓	Renewable energy	✓	Sewage and water treatment	✓
Downstream oil and gas	✓	Power	✓	Railways and transport	✓
Nuclear decommissioning	✓	Petrochemical	✓	Manufacturing	✓
Nuclear new build	✓	Pharmaceutical	✓	MOD	✓

Project controls careers and career progression

In most cases, you will start your career as a project control trainee or apprentice and will usually have the opportunity, at a later date, to decide which of the four main disciplines you are best suited to (see table below for a summary of each):

1. project controls generalist
2. cost engineering
3. estimating
4. planning and scheduling

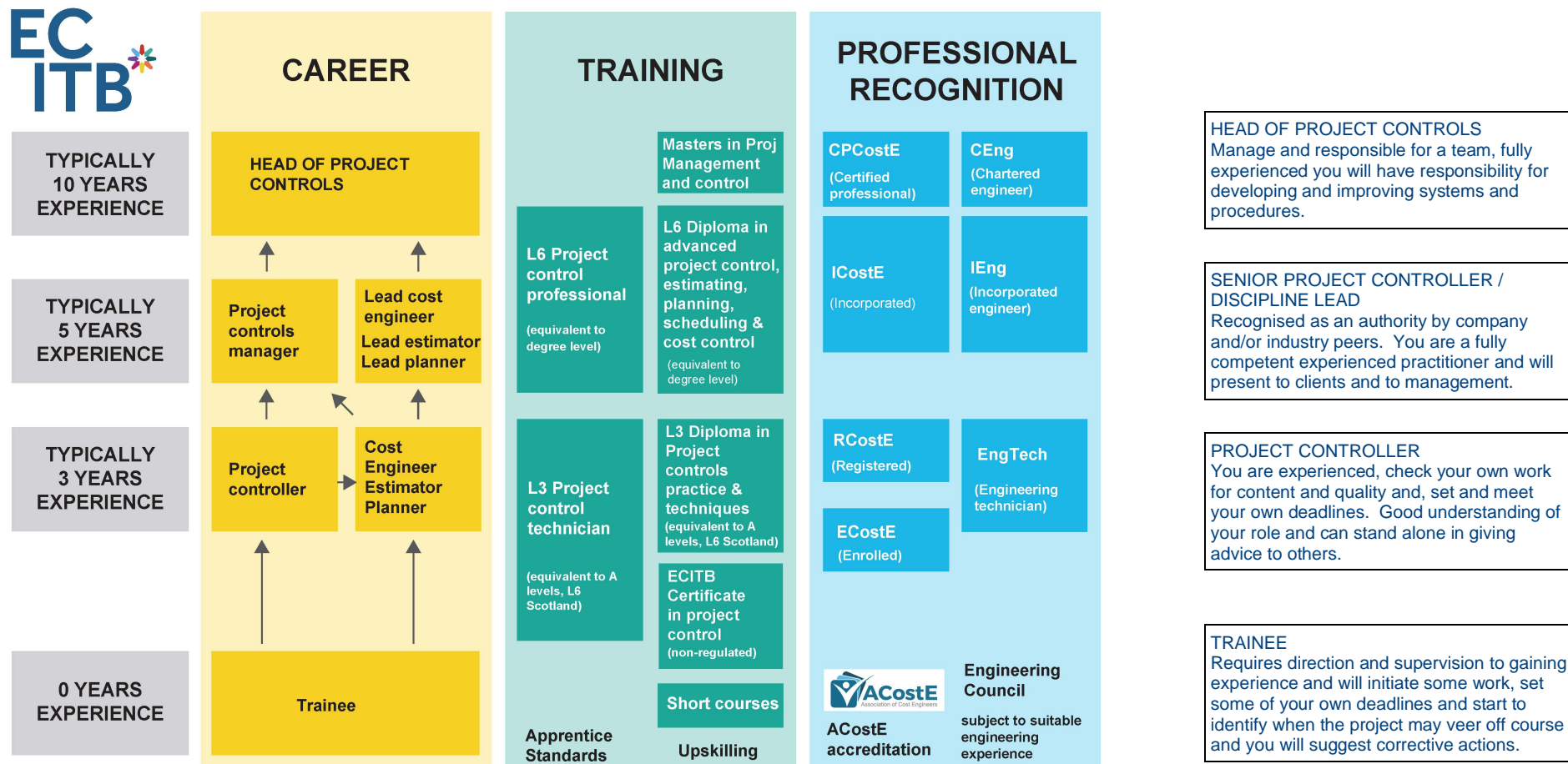
Project control generalist with responsibility for

A project control generalist uses IT and other systems to pull together information into a plan and roadmap with milestones for completion. S/he assesses the plan, where the business is at with this plan, where slippage is happening and what effect this will have. S/he will then recommend corrective courses of action.

To do this the project control generalist will use IT, cost management techniques, earned value management techniques, data analysis and risk management processes.

Estimator	Planner/Scheduler	Cost engineer
<p>An estimator works out how much it will cost to deliver the project in terms of time, resources and materials needed. Usually involved in a project during the early stages an estimator compiles estimates, assesses material, labour and equipment required and analyses different quotes from sub-contractors and suppliers. Often there is little information to base estimates on and so an estimator has to use a variety of tools and techniques to generate a realistic estimate. An estimator is concerned with working out the most realistic forecast of project cost, while ensuring that the contract can be carried out profitably. S/he uses techniques and processes such as: data analysis, estimating methods, risk analysis, and uncertainty modelling.</p>	<p>A planner compiles project plans, schedules and forecasts at commissioning, start-up and throughout the project. This includes reviewing and assisting in developing contractor schedules and ensuring contractor plans are realistic and achievable. S/he will be involved throughout the project monitoring monthly progress in terms of schedule, progress and manpower data, reviewing contractor performance, analysing the schedule, reviewing risk, reviewing assumptions, and recommending corrective action(s).</p> <p>A planner is critical in terms of ensuring deadlines are met and work is progressing to meet critical milestones and uses techniques such as earned value analysis and performance factor calculations.</p>	<p>A cost engineer produces the best forecast of final cost and revenue for the project - working out how much time, money and resource a project is going to use, then controls the project costs and revenue using techniques and processes such as: value engineering, value analysis, profitability analysis, cost analysis/cost assessment and design-to-cost. S/he keeps a close eye on project finances and contractual relationships, making sure that the financial position of construction projects is accurately reported and controlled effectively. To do this s/he uses concept engineering, detailed designs, productivity analysis and quantity analysis.</p>

Figure 1 – summary career path



The minimum years are an indicator and will not always be the case. Experience needed is dependent on the nature and complexity of the projects that you would be working on.

It can be possible to specialise and then to move back into general project control as your career progresses and to specialise later in your career. In larger companies there are often opportunities to become a senior manager in a specific discipline.

Project controller	The project controller knows how to...
Controlling projects	Apply and use relevant IT systems Apply relevant methods, systems and processes Retrieve, record and present information at appropriate levels of detail Identify, manage, monitor and analyse risks, opportunities, uncertainties and assumptions Define requirements and the boundaries of the scope
Planning and cost	Identify constraints and interfaces Set priorities and interdependencies Prepare the time and cost baselines and a simple estimate (understand overheads and rates) Develop the work breakdown structure and the cost breakdown structure Monitor and control the schedule including the project critical activities Monitor and control costs and cashflow Interpret engineering drawings and specifications to ensure that the design is in accordance with the estimate Identify and incorporate key considerations such as constructability, resources, norms, design process etc. Understand maintenance requirements
Forecasting/analysis	Generate and use statistical data – creating benchmarks and using norms Monitor performance and forecast outcomes Identify and quantify changes Recommend corrective actions and adjust budgets and schedules
Quality control, assurance and internal procedures	Establish budgets and schedules that support desired quality outcomes Administrate and manage change effectively Work to improve or develop organisational processes Improve efficiency through time and cost savings Understand and apply relevant legislation (safety, environmental etc.)
Commercial procedures	Understand the different contract types and procurement processes Track performance of all project participants Support and input to commercial performance, invoicing, overheads, rates, budgets, cash flow, resource use, procurement, accruals, forecasting and auditing
Working with people and personal development	Effective stakeholder engagement Contribute to effective work relationships Develop personal competencies Follow the company's ethics and procedures
How your career might progress	You will progress from basic awareness of project control and supporting the development of plans, schedules, costs and budgets to: <ul style="list-style-type: none"> • providing information for weekly and monthly reporting and raising any issues or opportunities related to deviations from the plans • developing baselines and analysing data, setting up systems to control and measure progress • leading the project control team, initiating the risk management process, taking responsibility for ensuring the right corrective actions are recommended and that the project is effectively controlled

Cost engineer	A cost engineer knows how to...
Controlling projects	<p>Apply and use relevant IT systems</p> <p>Apply relevant methods, systems and processes</p> <p>Retrieve, record and present information (weekly and monthly cost reports)</p> <p>Identify, manage, monitor and analyse risks, opportunities, uncertainties and assumptions</p>
Planning and cost	<p>Establish the project budget</p> <p>Create an easily understood cost breakdown structure that is compatible with the work breakdown structure</p> <p>Interpret engineering drawings and specifications to ensure that the design is in accordance with the estimate</p> <p>Provide cost input to the design</p> <p>Develop and control project codes for monitoring the spend / use and/or set up charging processes and systems</p> <p>Understand constructability and its impact on project performance and cost</p>
Forecasting/analysis	<p>Establish a 'cost-to-complete' forecast</p> <p>Analyse project performance and recommend appropriate corrective actions to cost and schedule.</p> <p>Review the budget, and financial reports – cost, revenue, accruals, project hours, commitments and costs</p> <p>Evaluate the impact of variances and project performance on the cost</p> <p>Generate creative solutions to issues</p>
Quality control, assurance and internal procedures	<p>Apply quality assurance</p> <p>Manage change effectively</p> <p>Work to improve or develop organisational cost engineering, cost control and cost forecasting processes</p> <p>Improve efficiency through time and cost savings</p> <p>Develops systems to capture costs and progress on a project</p> <p>Understand and apply relevant legislation (safety, environmental etc.)</p>
Commercial matters	<p>Understand contract terms and conditions and how these impact the budgets</p> <p>Select vendors or subcontractors</p> <p>Determine cost effectiveness of subcontracts</p> <p>Ensure contractor costs and cost flow plans are realistic and achievable</p>
Working with people and personal development	<p>Effective stakeholder engagement</p> <p>Contribute to effective work relationships</p> <p>Develop personal competencies</p> <p>Follow the company's ethics and procedures</p>
How your career might progress	<p>Initially you would support others in the development of budgets, costs, cashflows and invoicing – providing information for weekly and monthly reports against cost plan. As you gain in experience and competency you will be responsible for:</p> <ul style="list-style-type: none"> • developing the overall cost budget, monitoring and controlling all project cost developments and deviations • ensuring the project cost objectives are aligned with the project objectives • establishing and developing cost engineering reporting and cost forecasting systems • reviewing contractor cost and cash flow reports • leading the development of project codes of accounts • reviewing overall project cost performance and lessons learned

Estimator	An estimator knows how to...
Controlling projects	<p>Apply and use relevant estimating tools/software systems</p> <p>Apply relevant methods, systems and processes - using different levels and classes of estimates</p> <p>Retrieve, record and present information</p> <p>Identify, manage, monitor and analyse risks, opportunities, uncertainties and assumptions</p>
Planning and cost	<p>Understand and interpret customer requirements and project scope</p> <p>Plan the approach to estimating and create the estimate</p> <p>Establish estimating benchmarks and norms</p> <p>Support the development of work breakdown structures</p> <p>Interpret engineering drawings and material specifications in the development of the estimate</p> <p>Understand constructability - visit sites to ensure all key elements of the project are included in the estimate</p>
Forecasting/analysis	<p>Generate and use statistical data – creating benchmarks and using norms and trends</p> <p>Monitor performance</p> <p>Identify and quantify changes</p> <p>Recommend corrective actions</p>
Quality control, assurance and internal procedures	<p>Establish the basis of the estimate</p> <p>Apply quality assurance</p> <p>Manage change effectively</p> <p>Work to improve or develop organisational processes</p> <p>Improve efficiency through time and cost savings</p> <p>Understand and apply relevant legislation (safety, environmental etc.)</p>
Commercial matters	<p>Consider commercial arrangements and subcontractor arrangements</p> <p>Understand contract terms and conditions and how these impact the estimate</p> <p>Understand the needs and requirements of bids and tenders</p>
Working with people and personal development	<p>Effective stakeholder engagement</p> <p>Contribute to effective work relationships</p> <p>Develop personal competencies</p> <p>Follow the company's ethics and procedures</p>
Progression	<p>As an estimator you are able to select appropriate estimating methodology based on scope definition and you understand the relationship between scope and estimating. As you progress you will grow in confidence and become confident in:</p> <ul style="list-style-type: none"> • challenging the scope to ensure you have sufficient information to prepare estimates • benchmarking the cost data against other projects • challenging the cost data used to ensure it reflects the scope of what is being delivered • successfully preparing the estimates on several key projects that have multiple work packages.

Planner/Scheduler	A planner knows how to...
Controlling projects	<p>Apply and use relevant planning software</p> <p>Apply relevant methods, systems and processes – understand planning processes</p> <p>Retrieve, record and present information –understand the information needed to put into planning software</p> <p>Monitor risks, opportunities and assumptions - facilitate and input to risk and assumption workshops</p> <p>Manage uncertainty</p>
Planning and cost	<p>Create a plan using critical path analysis / network development</p> <p>Resourcing the schedule and baseline it</p> <p>Create plans at different levels - from high level to detailed, identifying milestones and critical tasks</p> <p>Set planning benchmarks and norms</p> <p>Develop work breakdown structures</p> <p>Interpret engineering drawings and specifications</p> <p>Understand client construction needs</p> <p>Understand constructability - visit sites to ensure all key elements of the project are included in the plan and schedule</p>
Forecasting/analysis	<p>Generate and use statistical data, create benchmarks and forecasting of expenditure, productivity, earned man hours etc.</p> <p>Produce Gantt charts, bar charts, resource histograms, reports, analyse them and highlight problem areas</p> <p>Monitor performance</p> <p>Identify and quantify changes</p> <p>Recommend corrective actions</p>
Quality control, assurance and internal procedures	<p>Apply quality assurance</p> <p>Manage change effectively</p> <p>Work to improve or develop organisational processes</p> <p>Improve efficiency through time and cost savings</p> <p>Understand and apply relevant legislation (safety, environmental etc.)</p>
Commercial matters	<p>Understand invoicing, how this works, information flow, penalties that could be involved</p> <p>Consider subcontractors and commercial arrangements (delivery lead times, critical milestones etc.)</p> <p>Ensure contractor plans and schedules are realistic and achievable</p>
Working with people and personal development	<p>Effective stakeholder engagement</p> <p>Contribute to effective work relationships</p> <p>Develop personal competencies</p> <p>Follow the company's ethics and procedures</p>
Progression	<p>As a planner you support the development of plans and schedules and provide information for reports and, as you progress you would:</p> <ul style="list-style-type: none"> • prepare and maintain the main project schedule and co-ordinate contractor schedules • interact regularly with the Project Managers and contractors to achieve critical milestones • visit site(s) to assess progress and potential risk of deviation from the plan, flagging up any impacts on the critical path • provide reports both internally and to clients – making sure they accurately reflect actual progress • monitor engineering schedules to ensure the engineering deliverables are scheduled to meet construction requirements • supervise and direct the activities of the planning function.

Qualifications and training related to project controls, cost engineering, estimating and planning

ECITB qualifications	<p>Nationally recognised RQF diplomas that provide evidence of competence and knowledge. Developed jointly with companies, these vocational qualifications test an employee's performance, application of knowledge and understanding of their occupation in the workplace. Qualifications available:</p> <p>Level 3 Diploma in Project controls practice and techniques</p> <p>Level 6 Diploma in Project controls techniques (currently in development)</p>
Project controls technician apprentice standard (Level 3)	<p>Project Controls apprentices will often undergo a period of college/training provider-based training usually lasting one full year. Apprentices are trained in all fundamental aspects of project controls, such as the project process and project controls, document controls, the procurement process, estimating, planning and scheduling, cost control and monitoring, commissioning and handover. In addition, engineering construction apprentices will be trained in the principles of engineering construction craft skills, including measuring and marking out, welding, fabrication, installation (pipes, plate, mechanical), electrical wiring and slinging and lifting. In the second, third and final years of the apprenticeship, further experience in project control processes will be gained in the setting of an engineering construction company's head office with visits on-site.</p>
Project controls professional apprentice standard (Level 6)	<p>The Institute for Apprenticeships and Technical Education has approved this level 6 project controls professional apprentice standard and many companies are working together with the ECITB and ACostE to develop this so that will be available for use during 2021 (currently in the final stages of development)</p> <p>Project controls professional apprentices will be trained to provide essential insight into the requirements (cost/time/resource i.e. estimating, planning and scheduling) and health of projects, programmes, and portfolios and in making recommendations to control the project (including project recovery and improved delivery). This includes gaining a comprehensive understanding of the component parts of the project across the life cycle, in estimating, planning, scheduling, cost control, performance and progress monitoring and forecasting, analysis of data and the impact of recommendations and decisions based on the data. They will have the confidence to challenge and interpret data reports, to interrogate and question the assumptions, the risks etc. They will be trained to have an in-depth understanding of technical data, what it means in detail and will be able to apply technical knowledge and project controls skills to play a critical part in successful project delivery.</p>
ECITB Certificate in project controls	<p>This ECITB Certificate in Project Controls is widely used and well-respected. It is a training programme spread over 8 modules that is delivered through day-long workshops alongside individual and group learning. Learners undertake assignments based on a simulated industrial project and, assessments that encourage them to find out more about how their own company undertakes specific aspects of project control that they are learning about. The simulated industrial project assignments are pulled into a project execution plan (PEP) which they submit for marking at the end of the course.</p> <p>The programme takes the learners through the fundamentals of project controls: basic terminology, project context and general approaches to projects and project controls; project initiation, risk and change management; techniques for estimating and scope definition; planning and scheduling; cost control and project monitoring; contract and procurement strategies; data collation and processes related to sub-contract management; communication planning; and development of a project execution plan.</p>

ECITB courses related to project control, cost engineering, estimating and planning

An introduction to project control (3 days)	The basics of project control including: work breakdown structures, critical path analysis, progress measuring methods, estimating methods, cost and progress control, profit and revenue, trending and trend forecasting, cost and change control, types of contract, budgets, risks, change orders and document control. It also includes professional and interpersonal skills and team building activities.
Estimating methodology and practice (3 days)	This short course includes learning sessions and associated exercises that focus on what an estimate is, ethics, duty of care and confidentiality, personal development, estimate documentation, effective working relationships, the class two approach, cashflow, IT requirements, whole life costing, technical work practices and adjusting for various factors.
Managing risk as part of a project team (1 day)	Delegates are introduced to risk terminology, the risk management process, associated human factors and tools and techniques commonly used in best practice. Delegates participate in a series of group exercises based around an interesting engineering construction scenario.
Project document managers' course (2 Days)	The management of documents is at the centre of every project. Document management processes are different on every project due to the need to integrate the document management requirements of client, contractor and major vendors/subcontractors. This training focuses on the principles underlying the function in order for it to be transferable across companies. The course covers four main areas; setting the scene, understanding the requirements, setting up project processes and leading the document management function.
Project management competition (the ACTIVE Cup) (3 days)	The ECITB Project Management Competition – the ACTIVE Cup – is a highly rewarding and successful competition –based learning event held over two consecutive days at Cranfield University. Managing a project from conception to completion, each team manages a fixed price construction project, financed by negotiated loan capital, on behalf of an external client. There are significant opportunities for teams to engage in the negotiation of claims for client driven scope changes, and in the resolution of disputes. The exercise is highly time pressured and allows learners to exercise best practice techniques in the continuous planning execution and control cycle of a dynamic project, in a safe environment.

APM Accredited training

APM Project fundamentals qualification (APM PFQ) (2 days)	The APM project fundamentals qualification offers a fundamental awareness of project management terminology. The syllabus is aligned with the key elements of the project management lifecycle and covers knowledge areas from the APM Body of Knowledge, including planning and scheduling, communication, teamwork, resource management, project risk management and project reviews.
APM Project management qualification (APM PMQ) (5 days)	APM PMQ is a knowledge-based qualification that allows candidates to demonstrate knowledge of all elements of project management. Candidates will be able to demonstrate an understanding of how these elements interact and how their project fits into their strategic and commercial environment. APM PMQ is a qualification recognised both nationally and internationally giving candidates a qualification that can be carried from one job to another or from one industry to another.

ECITB Training Standards for Project Controls, Estimating, Planning and Cost Engineering

An Employer-led Project Controls Working Group has developed a set of agreed industry training standards to ensure consistent, high quality training which meets their needs. Companies and approved training providers can use these standards to develop their own bespoke training and be confident that this training will meet industry requirements. Courses developed from the standards are submitted to ECITB for review and to gain the seal of quality approval for the course. Each training standard details the training necessary to develop the skills needed from trainee project controller up to competent senior project controller or technical lead (i.e. lead estimator, lead planner, lead scheduler, lead cost engineer).

Level 2 Training Standards		Level 3 Training Standards		Level 5 Training Standards
TS PC02-01	Introduction to Project Controls	TS PC03-01	Project control overview	There are 23 Level 5 Training Standards – here are the first 15:
TS PC02-02	Introduction to Commercial Awareness and Risk	TS PC03-02	Breakdown and coding structures	
TS PC02-03	Gather and Process Data for Project Control Activities	TS PC03-03	Project control reporting and related governance systems	TS PC05- 01 Manage effective application of quality processes and IT
TS PC02-04	Introduction to Monitoring, Forecasting and Reporting	TS PC03-04	Monitoring risk, opportunity and uncertainty	TS PC05- 02 Scoping and requirements definition
TS PC02-05	Introduction to Quality Management Systems and Change Management	TS PC03-05	Monitoring, tracking, forecasting and reporting project progress	TS PC05- 03 Acquiring and acting on information
TS PC02-06	Introduction to Estimating	TS PC03-06	Commercial awareness and planning procurement activities	TS PC05- 04 Risk analysis and management (including opportunity and uncertainty)
TS PC02-07	Introduction to Planning and Scheduling	TS PC03-07	Financial controls and techniques	TS PC05- 05 Maintaining, controlling and reporting on project progress
TS PC02-08	Introduction to Cost Engineering	TS PC03-08	Estimating practice	TS PC05- 06 Task & project close-out
TS PC02-09	Communicating with Stakeholders	TS PC03-09	Planning and scheduling practice	TS PC05- 07 Advanced estimating practice
TS PC02-10	Introduction to Health & Safety, Environmental, Ethical and Behavioural Procedures	TS PC03-10	Budgeting and cost control practice	TS PC05- 08 Advanced planning and scheduling practice
TS PC02-11	Introduction to Self-development	TS PC03-11	Supporting construction or manufacturing planning	TS PC05- 09 Advanced budgeting and cost control practice
		TS PC03-12	Optimisation and efficiency	TS PC05- 10 Interpreting and applying financial controls
		TS PC03-13	Generating and using statistical data	TS PC05- 11 Leading the establishment of construction or manufacturing plans
		TS PC03-14	Using learning curve models	TS PC05- 12 Earned value management
		TS PC03-15	Communicating with stakeholders	TS PC05- 13 Advanced optimisation and efficiency practice
		TS PC03-16	Professional ethics	TS PC05- 14 Analysing and interpreting statistical data
		TS PC03-17	Professional development	TS PC05- 15 Developing and calibrating learning curve models

Professional Recognition

Project Controls professionals in the UK can gain professional recognition with one of two bodies:

ACostE – The Association of Cost Engineers	APM – The Association for Project Management
ACostE represents the professional interests of those with responsibility, at all levels, for the prediction, planning and control of resources and cost for activities that involve engineering, manufacturing, and construction. It offers individual and corporate memberships.	The Association for Project Management is committed to developing and promoting project and programme management through its five dimensions of professionalism. It offers membership for both individuals and organisations.