Employer's 'Let's Get Started' Guidance – Non-Destructive Testing (NDT) Apprenticeships

GET IN GO FAR
APPRENTICESHIPS

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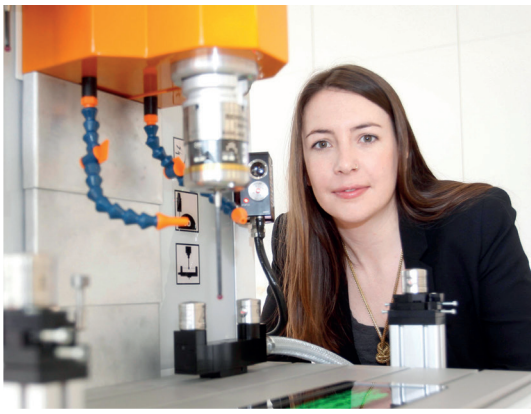

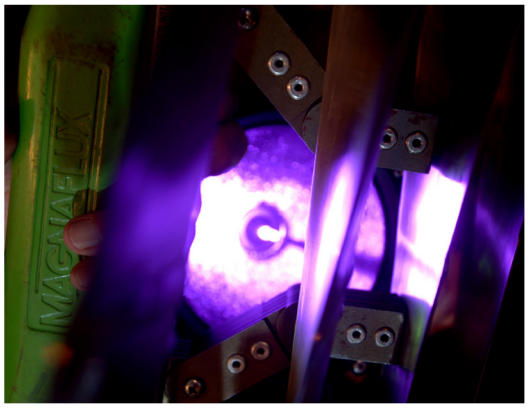


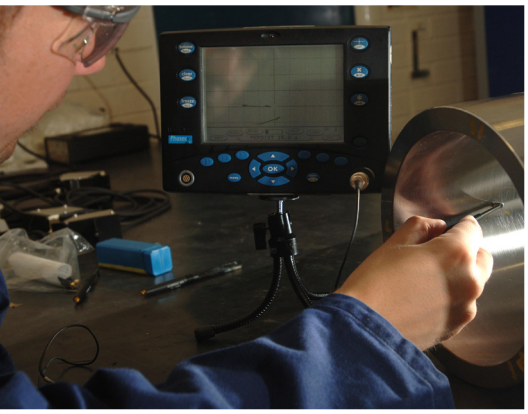

Supported by lead employer
Rolls-Royce

BINDT
THE BRITISH INSTITUTE OF NON-DESTRUCTIVE TESTING

1. Foreword

The NDT apprenticeships have been developed by an employer group led by Rolls-Royce and supported by the British Institute of Non-Destructive Testing (BINDT). The apprenticeships are considered to be a major benefit to employers of NDT personnel and provide a significant career opportunity to aspiring NDT apprentices, whether they come from the existing NDT community, a related engineering discipline or straight from school.

Apprenticeships are work-based training programmes, designed by employers, that combine on- and off-the-job learning and development activities. They are used to develop employees who are in new job roles, including higher-level roles.

2. Pre-Reading

In order for employers to fully understand the requirements of the particular apprenticeship scheme they are interested in, it is essential that they read the appropriate apprenticeship standard, the apprenticeship assessment plan and the apprenticeship on-programme competency document, all of which, together with other essential documents, can be found on the BINDT website at: http://www.bindt.org/education-and-training/Apprenticeships/apprenticeship-document-download/.

3. Definitions

ATO – an organisation approved by BINDT to act as an approved training organisation.

BINDT – the British Institute of NDT (the professional body for the NDT sector).

Gantt chart – a bespoke chart used for planning a project or a period of activity (an Excel spreadsheet or similar software will do just as well).

NDT training provider – a training organisation selected by the employer to provide the training requirements for the apprenticeship.

Prime lead provider – a lead provider that is on the SFA register of training providers and which has an allocation of funds for the delivery of apprenticeships.

SFA – Skills Funding Agency (a sector within the government department: Business, Innovation and Skills).

4. Requirements

Your business can work with an NDT training provider that is approved as an 'approved training organisation' (ATO) by BINDT, or you could work with another suitable training provider, to create an apprenticeship programme (note: it is mandated in international standards that NDT training must be provided by an ATO). The intention is for employers to work with a single NDT training provider for all of their apprenticeship needs. The NDT training provider will then partner with a lead provider that has a government allocation of funds for apprenticeships. However, the employer could work directly with a lead provider which could act as the NDT training provider, but if the lead provider is not approved to provide NDT training, *ie* an ATO, then the NDT training would have to be sub-contracted to an organisation that is approved as an ATO. If the lead provider or NDT training provider cannot provide all of the specific training needs, for example health and safety requirements, then the lead provider will sub-contract out the shortfall in training requirements. The NDT training provider will manage all of the employer's training requirements so that the employer will have a single point of contact for the duration of the apprenticeship. The employer has the final say on which NDT training provider to use and which sub-contractors the lead provider will use.

As an employer offering an apprenticeship you need to:

- Employ an apprentice for a minimum of 30 hours per week
- Pay at least the national minimum wage for apprentices
- Induct the apprentice and support their on-the-job learning using skills and knowledge in the workforce
- Be involved in reviewing the progress of an apprentice.

An NDT training provider can offer support to an employer to:

- Identify the apprenticeship that fits your business requirements
- Recruit an apprentice
- Develop a training plan that reflects the apprentice and employer requirements
- Review and test the progress of the apprentice and provide feedback
- Provide training to support the knowledge elements of the programme.

You should think about including some or all of this content in your apprenticeship:

- On-the-job coaching and learning
- Off-the-job learning
- Employer induction and training
- Online learning and support
- Workbooks
- Projects
- Mentoring and line management support
- Specific training for individuals
- Supervised NDT experience.

NDT training can only be delivered by BINDT approved training organisations (ATOs) and examinations leading to the issue of a certificate or letter of approval can only be delivered by authorised qualifying bodies (AQBs).

Taking on an apprentice is a commitment for the duration of the apprenticeship; you cannot make an apprentice redundant. If, during an apprenticeship, there are changes in circumstances or financial difficulties, you should contact the Skills Funding Agency for advice.

5. Interim Funding Arrangements

The funding available is on a two-for-one basis, which means that every £1 the employer contributes is matched by £2 from the government, up to the maximum cap determined for the apprenticeship. In addition to the matching process, there are allowances for recruiting a 16-18 year old, for small businesses of less than 50 employees and for successful completion of the apprenticeship. For a complete breakdown of the funding, see the table on page 3.

To find out which cap has been allocated to a particular NDT apprenticeship, see the table on page 3 or contact John Moody at BINDT (email: john.moody@bindt.org).

An interim funding arrangement exists until the end of May 2017. Anyone starting an apprenticeship during the interim funding arrangement will stay with that interim funding arrangement until the end of the apprenticeship.

During this financial year and up to the commencement of the funding scheme (April 2016 to May 2017) funding has already been allocated to lead providers, therefore NDT training providers and employers will have to establish a partnering arrangement with a lead provider in order to facilitate funding. John Moody at BINDT (email: john.moody@bindt.org) can offer advice on how to achieve this.

Funding Allocation for Apprenticeships starting in 2016/2017

					NDT Operator		NDT Engineering Technician
Maximum core government contribution (£2 for every £1 from employer)		**Cap 1**	**Cap 2**	**Cap 3**	**Cap 4**	**Cap 5**	**Cap 6**
		£2000	£3000	£6000	£8000	£13,000	£18,000
Employer contribution if the cap maximum is required		£1000	£1500	£3000	£4000	£6500	£9000
Co-payment for training and assessment if the cap maximum is required		**£3000**	**£4500**	**£9000**	**£12,000**	**£19,500**	**£27,000**
Additional incenctive payments	Recruiting a 16 to 18 year old	£600	£900	£1800	£2400	£3900	£5400
	For a small business (<50)	£500	£500	£900	£1200	£1950	£2700
	For successful completion	£500	£500	£900	£1200	£1950	£2700
Maximum total government contribution		**£3600**	**£4900**	**£9600**	**£12,800**	**£20,800**	**£28,800**

6. Future Funding Arrangements – from May 2017 onwards

The interim funding model is coming to an end and will be replaced by a new funding model linked to the apprenticeship levy. UK productivity lags behind other developed economies and employers are investing less in training. During the year 2000, 180,000 people were away from their workplace because they were involved in training, whereas, after a steady decline, the figure for 2014 was 18,288. The purpose of the Trailblazer project and the introduction of the levy is to reverse this trend.

The levy starts on 1 May 2017 and it will be paid through PAYE. The trigger for paying the levy will be set at 0.5% of an employer's pay bill, and it will only be paid if the employer's pay bill exceeds £3 million. The government is also giving an allowance of £15,000. Only 1.3% of UK employers will pay the levy.

Employer contribution calculator
£3,000,000 x 0.5% = £15,000
Government allowance = £15,000
Employer's net contribution = £0

Levy payers – The levy will be paid into an employer's digital account, which can then be used to fund training up to the designated cap. If, at any stage, an employer has insufficient funds in their digital account, then the government will provide 90% of the funding and the employer will provide 10% of the funding.

Non-levy payers – 10% will be paid towards training, which will be supported by a further 90% provided by the government. Employers with fewer than 50 employees will have 100% of the training and assessment costs covered when training a 16 to 18 year old.

For levy and non-levy payers – The government will pay £1000 to employers and a further £1000 to training providers if they train a 16 to 18 year old apprentice. The expiration of digital funds has now been extended to 24 months, helping employers to prepare for the new system and to adapt training programmes; this means that levies paid in year one will be available throughout year one and up to the end of year two. Every apprenticeship will be placed in a funding band; the upper limit of each funding band will cap the maximum amount of digital funds an employer who pays the levy can use towards an individual apprenticeship. There are now 15 new funding bands, ranging between a cap maxima of £1500 to £27,000; existing apprenticeships will be re-allocated to one of the new bands.

The new funding system comes into effect on 1 May 2017. Levied employers buying training from May 2017 can commit to apprenticeship starts from the beginning of May. Funds will automatically leave the digital account on a monthly basis and the cost will be spread over the lifetime of the apprenticeship; the government will hold back 20% of the total cost, to be paid on completion of the apprenticeship. Non-levied employers buying training from May 2017 continue to make payments direct to providers and will move onto the digital system at a later date.

Digital funds and government funding can be used for apprenticeship training and assessment against an approved framework or standard, with an approved training provider and assessment organisation, up to the funding band maximum for that apprenticeship.

Digital funds and government funding cannot be used for wages, travel and subsistence costs, managerial costs, traineeships, work placement programmes or the costs of setting up an apprenticeship programme.

Apprenticeships started before 1 May 2017 will be funded through to completion according to the existing rules.

7. Costs

There are a number of costs that are associated with an apprenticeship and these will have to be paid for by the 'two-for-one' matched funding allocation. These costs include:

- External training, certification and qualification costs
- Lead provider management fee
- NDT training provider management fee (if applied)
- Independent assessment organisation fee
- Professional body (British Institute of NDT) fee (free).

8. Summary of Activities

- Decide whether to be involved in an apprenticeship scheme
- Choose which apprenticeship scheme is applicable
- Inform the professional body (BINDT)
- Choose an NDT training provider, preferably a BINDT ATO
- The employer, in conjunction with the NDT training provider, will choose a lead provider to partner with in order to access government funding
- Recruit/identify an apprentice
- Make an apprenticeship agreement
- Develop a training programme (Gantt chart) to meet the requirements of the apprenticeship standard
- When applicable, select training subcontractors
- Select an independent assessment organisation (BINDT is an independent assessment organisation and you are encouraged to select BINDT as your end-point assessor).

It is important during the apprenticeship that you develop the culture in such a way that the apprentice wants to continue working for you on completion of the apprenticeship. You can do this by valuing the apprentice as a person, developing mutual trust and respect, maintaining confidentiality, listening both to what is being said and how it is being said, helping the apprentice to solve his or her own problems, rather than giving direction, and focusing on the apprentice's development and resisting the urge to produce a clone.

9. Glossary of Terms used in the NDT Apprenticeship Standards

Relevant mathematics, including numerical and data analysis, that is necessary to support the application of technical and practical skills – NDT relies on understanding aspects of mathematics so that equipment can be set up properly. All results from NDT equipment need to be interpreted and this can be in the form of numerical readouts, graphs, images and spreadsheets. Some areas of mathematics, such as trigonometry, are critical for locating defects, while statistics can be used as an aid to compile and analyse results.

Formula-based engineering and the scientific principles underpinning relevant current technologies – NDT relies upon the ability to use mathematical formulae to work out the correct settings for equipment. The most common formulae used are trigonometric and equations will need to be solved to obtain the correct inputs and outputs from the instruments. These aspects are taught on the NDT training courses, which explain the background physics, electronics and material properties knowledge needed to understand the inputs and outputs for the equipment.

How to use materials, equipment, tools, processes and products relating to NDT – NDT usually involves bringing together a collection of various components, including equipment, probes, media and the item or product under inspection, in a particular configuration that optimises the potential for the detection of unwanted flaws, features or characteristics in the latter. The detailed steps in configuring such a test system and applying the test to products of a specific size and shape is usually provided in the form of a written work instruction.

Preparation of NDT procedures, technique sheets and work instructions for use by NDT operators – In order to detect relevant discontinuities within a material or component with a high degree of confidence, NDT methods need to be applied in a standard, repeatable and controlled manner. Often, the test method will also have been validated to demonstrate capability in detecting relevant discontinuities. Based upon international standards, codes and working practices, NDT procedures, technique sheets (TS) and work instructions (WI) capture these requirements, describing how an organisation controls and undertakes its specific NDT inspection activities, both from a quality management system perspective (procedures) and in giving clear and concise instructions for NDT operators to perform inspections (TSs and WIs).

How to use and apply information from technical literature, codes of practice and industry standards – There is a great amount of information available relating to inspection by NDT methods. The standards will call for the inspection of the item by the NDT method(s) and there are relevant British, European and international standards relating to the use of the NDT method from which the appointed Level 3 will have written a company procedure. There can also be task-specific instructions that either the Level 3 or a Level 2 will have written. The appointed Level 3 should be accessible to guide the Level 1 and Level 2 inspectors on the use of technical literature, codes of practice and industry standards and facilitate any necessary specific training if required.

The limitations of standard tests and measurements relevant to their field of activity – NDT usually involves bringing together a collection of various components, including equipment, probes, media and the item or product under inspection, in a particular configuration that optimises the potential for the detection of unwanted flaws, features or characteristics in the latter. The detailed steps in configuring such a test system and applying the test to products of a specific size and shape is usually provided in the form of a written work instruction.

Industry-specific product technology, including material types, defect types, defect mechanisms, growth rates, industry-specific NDT applications and R&D opportunities – How products are manufactured plays a fundamental role in how defects or anomalies can arise in them. Sometimes these will be perfectly acceptable features of the product and at other times you will need to reject the product. When you NDT a part, you should be able to understand how it is made so that you can anticipate where to look for relevant defects. Many potential defect types exist (surface and sub-surface) and these vary with how products are made. Research and development (R&D) plays a vital role in NDT as it can lead to increased efficiency through a reduction in cost, a reduced processing time or an increase in capability.

How to use the results of engineering NDT analysis for the purpose of developing solutions to well-defined engineering problems – Being able to set up NDT equipment accurately and interpret the results is important. Many factors can affect the results for both the input and output of any equipment. NDT is highly dependent on the properties of the materials being tested (density, conductivity, surface roughness, etc) and the environment in which NDT is being conducted (for example under water, inside a pipe, near a weld, on a painted product and so on).

The need to gather contextual information prior to the inspection required for the assessment of defects against acceptance/rejection criteria – It is important to know what the aim of the inspection is and to have a set of rules that inform the interested parties on what flaws will be assessed against, in terms of dimensions, characterisation and position. These requirements can be found in the relevant national, European and international standards, along with company-specific codes and standards. The organisation that has a requirement to have an item inspected must agree with other interested parties, such as design authorities, insurers, etc, on which of the standards are to be used. Before the inspection commences, the inspector will know which acceptance/rejection criteria is to be used and, as an example, it could state that no cracks are allowed or that porosity less than 10 x 10 mm is acceptable but any larger areas are rejected. This allows the inspector to accept/reject all flaws found.

Project management processes and key points – A project is a discrete piece of work that is designed to achieve a planned outcome. It has to be completed within an agreed budget, within a defined time and to a specified quality. This can only be achieved if the project is managed from start to finish. The various activities have to be planned and coordinated. The resources needed have to be made available at the required times and the project team needs to know what is expected of them and when. A project can only be managed if progress against the plan is measured and if any risks, such as a key input being delayed, are anticipated and corrective actions taken early. A project manager needs to have good communication with everyone involved in the project.

The consequences of failure and the risk to life and the environment – Many industries use components, materials and plant items, which, when operational, are subject to immense stresses and risk and therefore the likelihood of failure is high. To mitigate the risk when justifying continued operation, extensive NDT is carried out that helps to make the necessary operational safety case. The consequences of failure could result in loss of life, an adverse environmental impact and commercial penalties. Very often the results of NDT inspections are not rechecked and are taken at face value and therefore it is essential that the NDT results are correct and that the NDT operators, NDT engineering technicians and NDT engineers are fully aware of the importance and the impact of their role.

Ability to conduct re-inspection audits of NDT operators' work, comparing and evaluating the results and taking appropriate action when necessary – Surveillance is performed in order to provide confidence that the inspection activities performed by NDT inspection personnel are true and accurate. It is often a requirement of the organisation's specific Quality Management System (QMS) that re-inspection activities are carried out. Surveillance can take the form of operator/equipment/documentation reviews, re-inspection of the operator's work, witnessing of inspections and dataset/radiograph/NDT report reviews. Where discrepancies or failures are identified, then corrective and preventative measures defined within the organisation's QMS are formulated and actioned with a high degree of professional conduct to mitigate a further repeat of the issue.

The knowledge required for the assessment of defects against acceptance/rejection criteria – Have an understanding of the flaws likely to occur in the product form tested, together with the way they are indicated with the test method used. Have the ability to interpret the acceptance and/or rejection criteria and have the skills needed to measure any flaw indicated and to accurately assess it against that standard. Understand the uncertainties inherent in the tests and measurements carried out and how they impact on the decisions made.

Exhibit environmental awareness and undertake safe working practices for self and others – Be aware of the potential impact of your actions or inactions on the natural environment and demonstrate awareness by avoiding possible damage. Be able to consistently recognise risks to your own and other people's and health and safety and take active steps to reduce them. Recognise improvements that can be made and communicate them to the appropriate department.

Demonstrate a disciplined approach relating to industry standard operations and processes – Strict adherence to the procedures and work instructions that have been provided for use and that have been developed by the employer as compliant with the relevant appropriate national and international standards.

Validation of NDT processes – Validation produces evidence to show that an inspection will achieve the detection of the defects that need to be found. It can also check that the defects found are able to be sized to the required accuracy. It can be achieved by the systematic introduction of known defective products having features or flaws of a predetermined size or severity commensurate with the end-user's specified limits, prior to, during and on completion of the NDT inspection of batches of identical products, or designated areas or volumes on very large products, such that consistent detection of flaws to the required standard is verified at intervals throughout the inspection and not simply assumed from an initial check or set-up.

Material properties, electronic principles, mathematics and technical project management – The characteristics of the material from which an item under inspection has been manufactured or constructed dictate how the item will perform in an intended application or environment. Strength, hardness, toughness, ductility, abrasion resistance and corrosion resistance are some key properties in this context. In the context of the performance of NDT, more basic physical properties, such as electrical conductivity, permeability and density, are considered in the selection of an appropriate test method.

Commercial awareness and the economics of their industry sector, business improvement and project and business management techniques relevant to the engineering industry – The understanding that the planning, preparation, execution and reporting of NDT tests invariably incur costs that must be reasonably limited and controlled such that those costs do not outweigh the sale value of the product itself or the perceived benefits, such as medium- or longer-term financial savings that result from effective ongoing asset protection and subsequent working life extension of parts and plant in service.

Regulatory and international standards requirements, technology, safety and the environment – Where the execution of NDT presents potential environmental impact or safety hazards, there are likely to be associated regulatory standards that mandate NDT procedures to address the specific issues or concerns contained therein, in a manner that mitigates the risk to the NDT inspector, local workforce, general public and the environment, to a recognised acceptable level.

Applying design processes, including materials selection, that meet NDT standards – A process that aims to produce a solution to a given inspection problem or requirement, by proper consideration of the product or materials to be inspected and specific inspection requirements. In the case of the former, their dimensions, shape, surface condition, properties, common flaw types and their likely composition, morphology, position and orientation are significant. For the latter, sensitivity, resolution, coverage, precision and inspection rate are prime considerations.

Root cause analysis and learning from experience (LFE) processes – A disciplined, exhaustive process, utilising established investigative tools, that strives to identify the true origin of, or reason for, a particular unwanted event or condition, such that a permanent and effective solution can be implemented in order to prevent recurrence.

The advantages of collaboration with other industry sectors in order to apply best practice – The sharing of ideas, information and experience in the application of particular NDT methods and techniques as applied across a range of industry sectors, their associated products, environments and specific inspection requirements, aiming to identify commonalities or best practice and potentially more universal adoption of those particular aspects, where possible and appropriate.

Have advanced skills in NDT methods substantiating their lead competency role within their organisation and industry sector. Work in all industry sectors, such as nuclear or aerospace – A level of skill above that normally found or expected of NDT practitioners such as operators or technicians, developed as a result of wider experience in the application of a particular NDT method, across a broader range of sectors, or to a greater depth as a result of further training or more prolonged engagement with equipment manufacturers, as necessary for an NDT engineer who will potentially provide longer-term *in-situ* support of a particular test system and its operators.

10. Further Information

NDT apprenticeships – **apprenticeships@bindt.org**

Website, CPD and publications – **info@bindt.org**

BINDT membership – **membership@bindt.org**

Training and certification – **pcn@bindt.org**

General advice – **info@bindt.org**

BINDT website – **www.bindt.org**

Apprenticeships website – **www.gov.uk/government/collections/apprenticeship-standards**

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