An Integrated Education Programme for NDT Professionals

M E Gallagher
Chief Executive Officer
British Institute of NDT

The British Institute of Non-Destructive Testing (BINDT) has embarked on an ambitious programme to develop an improved approach to the professional development of NDT Technicians and Engineers.

The author is the Chief Executive Officer of BINDT and co-chairman of ICNDT Working Group 3 – Education & Research.

An integrated education programme for NDT professionals

This paper describes a new programme for NDT professional development which incorporates vocational training, work-based learning, personnel certification, academic awards, professional engineer registration and ongoing learning provision.

The programme was launched in the UK in 2007 and the paper reports on progress so far as well as plans for future development. The following elements are discussed:

1. Problems to address
2. Key elements of the programme
3. NDT professional development Qualification Matrix
4. The Foundation Degree in NDT
5. Foundation Degree in NDT – content
6. BSc(Hons)NDT – content
7. The student experience
8. Progression
9. Partnership with Industry
12. Further development of academic programme
13. Inspection & Test Technologies Professional Development Qualification Matrix
14. Conclusion
15. Next steps.

1. Problems to address

The purpose of the programme is to address a number of problems facing the NDT industry:

i. NDT is not always perceived as a proper engineering discipline
The perception of NDT as a proper engineering discipline varies. In some countries and industry sectors it is seen as a professional discipline. In some industry sectors NDT is not highly regarded.

ii. NDT certification is not fully recognised in the wider professional community
Personnel certification is well understood within the NDT fraternity. However it is a relatively alien concept in some industry sectors.

iii. Certification does not confer professional status and is in itself a temporary qualification
Certification is often seen as a qualification for 'operators' of inspection equipment rather than objective evidence of training, qualification and skill. Certification is inherently temporary as it requires renewal after prescribed periods.

iv. There is no structured career development for NDT technicians
Career development in NDT is haphazard. Technicians are encouraged to be free agents and are rarely accommodated within corporate staff development plans.

v. The demographic issue – not enough new entrants into NDT
A large percentage of current technicians are at the latter stages of their careers. Many were trained in the 1970s and 1980s. For some time after that there was a relatively abundant supply of qualified technicians and many companies ceased their training programmes. Consequently there is now a widespread shortage of younger NDT personnel.

vi. There is no structured entry route for school leavers
A structured and accessible approach to encourage new entrants into NDT is required. For the very few school leavers who know about NDT there is no clear route into a career.

2. Key elements of the programme

Key elements of the programme include:

i. Distance learning options
The new NDT degree programmes are delivered by distance learning. This provides substantial flexibility and enables students to study at any location with internet access. Currently there are students working towards a degree whilst offshore or overseas. For new entrants into the profession distance learning means that they can be employed whilst studying – which means that they are not building up student debts and are able to gain valuable work experience.

ii. Variety of routes into the programme
There are various entry routes into the programme. School leavers will need university level entry qualifications. Those with NDT certification can gain entry without meeting academic prerequisites. Certification also earns exemptions from some modules through accreditation of prior learning (APL).

iii. Primary purpose
The main purpose of the programme is to provide an integrated, flexible professional development path for NDT professionals – linking work-based learning, apprenticeships and CPD with vocational qualifications (certification), academic awards and professional engineer registration.

3. NDT Professional Development Qualification Matrix

The qualification matrix provides a graphical illustration of a flexible programme where equivalences, exemption routes and different entry points are provided. The aim is that no one with the necessary ambition is excluded. Entrants can come straight from school with A-level qualifications or through the vocational route with PCN certification at levels 1, 2 or 3.

<table>
<tr><th>WORK BASED</th><th>VOCATIONAL</th><th>ACADEMIC</th><th>PROF. REG</th><th>NQF EQUIVALENT</th></tr>
<tr><td rowspan="6">APPRENTICESHIPS
WORK BASED LEARNING
CPD</td><td></td><td>Engineering Doctorate</td><td></td><td>8</td></tr>
<tr><td></td><td>Masters Degree</td><td>Chartered Engineer</td><td>7</td></tr>
<tr><td></td><td>BSc (Hons) NDT</td><td rowspan="3">Incorporated Engineer</td><td>6</td></tr>
<tr><td>PCN Level 3</td><td rowspan="2">Foundation Degree Stage 1</td><td>5</td></tr>
<tr><td></td><td>4</td></tr>
<tr><td>PCN Level 2
PCN Level 1</td><td>Foundation Degree Stage 2</td><td>Engineering Technician</td><td>3</td></tr>
<tr><td colspan="5">SCHOOL LEAVER OR OTHER ENTRY LEVEL</td></tr>
</table>

4. Non-Destructive Testing Degree programmes

The Foundation Degree in NDT (FdScNDT) was validated in July 2007. There are currently around one hundred and twenty students studying towards the degree. The programme is delivered through a combination of work-based and distance learning.

Currently all students are existing NDT personnel who see the degree as an opportunity for professional development. In the longer term most students will be school leavers.

Entrants who have held certification in NDT are granted appropriate accreditation of prior learning (APL) which means that they can be exempted from some of the Stage 1 and Stage 2 modules.

During 2009 the BSc(Hons) NDT degree was validated. This provides a route to a Bachelor level engineering qualification.

FdSc(NDT) graduates are eligible to enter the BSc(Hons)NDT top-up programme. Candidates with PCN or ASNT Level 3 certification in four appropriate methods may be granted direct entry into the BSc(Hons)NDT programme.

5. NDT degree programme content.

The Foundation Degree in NDT (FdScNDT) is equivalent to two thirds of a full bachelor degree programme. By distance learning students without any accreditation of prior learning (APL) would typically take four years to complete the degree. The programme is split into two stages comprising:

Stage 1:

- Introduction to NDT 20
- Material Properties 20
- Electronic Principles 20
- Mathematics for Technology Part 1 20
- Technical Project 20
- Personal Development 20

Total Credit Points = 120

Stage 2:

- Visual and Surface Testing 20
- Radiographic Testing 20
- Ultrasonic Testing 20
- Eddy Current Testing 20
- Quality Management of NDT 20
- Quality Tools and Techniques in NDT 20

Total Credit Points = 120

The top-up BSc(Hons) NDT would typically take two years and consists of the following modules:

- Corrosion Analysis 20
- Thermographic Imaging 20
- Vibration Monitoring and Analysis 20
- Advanced Inspection Methods and Techniques 20
- Technology Project 40

Total Credit Points = 120

6. The Student experience

Student life is quite different from the conventional campus experience. Students are generally employed and student debt is less of an issue.

The integrated nature of the programme means that students will gain academic qualifications, alongside vocational certification and engineer registration.

School leavers will be attracted to a learning experience which combines academic and work based learning. A successful student embarking on the programme at age 18 could have achieved after four years a Foundation Degree in Non-Destructive Testing, PCN Level 3 in UT, RT, PT, MT and ET as well as Engineering Technician Registration and four years' work experience.

Progression to the BSc(Hons)NDT, Masters Degree and an Engineering Doctorate in NDT is available to those with the necessary ability and aspiration.

7. Partnership with Industry

A key element for attracting school leavers into an NDT training and education programme is the availability of work placements. The British Institute of NDT is encouraging UK industry to offer suitable placements. We have created a new staff position – Associate Director of Industry, Education & Professional Affairs to help facilitate this.

The Institute is also considering establishing a Bursary for selected trainees.

8. Continuing Professional Development

Another key element of the programme is high quality material for continuing professional development (CPD).

Flexible delivery provides a variety of access points, online or through lectures in different locations. Material will be produced from accredited texts including published papers on the most recent developments.

Those registered for the CPD programme will be provided with their own web space within the Institute's web-site. This can be used for logging CPD and work experience.

The CPD programme will be designed to satisfy ongoing professional registration requirements as well as certification renewal.

9. Planned new features of programme

Currently the academic programme provided by the University of Northampton allows exemptions to students holding PCN/EN473 certification.

A possibility for the future is the recognition of appropriate academic awards within an EN473 structure.

The equivalence already established, and illustrated in the tables in this paper, for vocational qualifications, academic awards and professional registration could logically be extended to include a new Level 4 certification pathway to engineer level competency.

The technical scope of the Foundation and BSc degrees is likely to broaden which will lead to awards in related inspection and test disciplines such as Condition Monitoring.

These developments would lead to the next evolution of the professional development qualification matrix.

10. Inspection & Test Technologies Professional Development - Qualification Matrix

<table>
<tr><th>WORK/ CLASSROOM BASED</th><th>VOCATIONAL</th><th>ACADEMIC</th><th>PROF. REG</th><th>NQF EQUIVALENT</th></tr>
<tr><td rowspan="6">APPRENTICESHIPS
WORK BASED LEARNING
CPD
ACCREDITED TRAINING MODULES</td><td></td><td>Engineering Doctorate</td><td></td><td>8</td></tr>
<tr><td></td><td>Masters Degree</td><td>Chartered Engineer</td><td>7</td></tr>
<tr><td>Level 4 NDT Engineer</td><td>BSc (Hons)
NDT, CM, ITT</td><td rowspan="3">Incorporated Engineer</td><td>6</td></tr>
<tr><td rowspan="2">PCN Level 3</td><td rowspan="2">Foundation Degree S2</td><td>5</td></tr>
<tr><td>4</td></tr>
<tr><td>PCN Level 2
PCN Level 1</td><td>Foundation Degree S1</td><td>Engineering Technician</td><td>3</td></tr>
<tr><td colspan="5">SCHOOL LEAVER OR OTHER ENTRY LEVEL</td></tr>
</table>

11. Conclusion

The British Institute of NDT is making good progress with its education programme for NDT professionals.

There are currently around 120 students on the distance learning degree programmes – this is before any full promotional launch.

Plans for the future recognise industry's need for integrated inspection and test provision.

Developing high quality material for continuing professional development will help ensure NDT professionals remain at the forefront.

Recognising the overlaps in academic and vocational training leads to possibilities of mutual recognition and exemption pathways.

Flexible delivery whilst maintaining quality makes a programme attractive and accessible.

12. Next steps

At the British Institute of NDT we are happy to share our experiences with sister societies and international groups such as EFNDT and ICNDT.

Please contact matt.gallagher@bindt.org for more information.