The viability of an ‘Engineering Centre of Excellence’ within the Northampton Waterside Enterprise Zone

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8th May 2013
Introduction

This document provides analysis of the current practice of engineering employers within the High Performance Technology sector within Northamptonshire with regard to the recruitment and training of engineering apprentices and graduates, the continued professional development of those engineering professionals and the inspiration of the next generation of engineers.

This specific project is additional to the existing 'Northampton Waterside Enterprise Zone (NWEZ) 'Skills Research' and includes specific feedback on whether the idea of an 'Engineering Centre of Excellence' has traction in the view of local employers.

Survey background information

The region includes a wide variety of engineering employers often operating in very specialist applied fields e.g. engine design and development, composite materials, computerised simulation (Computational Fluid Dynamics etc.), specialist materials coatings, passenger lift testing and whilst generally included under the ‘Engineering’ title the actual skills required can be quite diverse. Therefore face to face discussions with a selection of engineering employers was seen as essential to identify any common technologies and training requirements which could be supported by an 'Engineering Centre of Excellence'.

Employer support is seen as essential for the success of such a venture as there are numerous examples of initiatives which are under-utilised and not supported by employers. One example of this was the growth in ‘Motorsport’ degree courses a few years ago, many of which have since been removed as employers in this sector continue to recruit graduates with general Mechanical, Automotive and Aeronautical degrees from Universities with established reputations.

Key to growing the skills base in the future is inspiring the next generation and again many organisations in the region are already engaged in activities with schools through STEMNET and Imagineering initiatives and also through the provision of work experience and sponsorship of engineering students. It was seen as important to get a feel for how much of this is already taking place and whether there are opportunities for a more collaborative approach by employers to these activities.

Several engineering resources already exist, which could be used to inspire the next generation of engineers within the area e.g. the National Lift Tower, NVision, and the Silverstone Circuit and associated motorsport activities (including Formula Student). It is envisaged that many of these could be included in an alternative to a dedicated centre of excellence.
# Companies Surveyed

The following organisations kindly contributed to this survey.

<table>
<thead>
<tr>
<th>Organisation</th>
<th>Nature of Business</th>
<th>No. Employees</th>
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<tbody>
<tr>
<td>Flybrid</td>
<td>Design &amp; manufacture of mechanical hybrid systems.</td>
<td>17</td>
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<tr>
<td>G.E. Precision</td>
<td>Motorsport &amp; automotive precision manufacture &amp; design.</td>
<td>21</td>
</tr>
<tr>
<td>Hartings</td>
<td>Sales &amp; manufacture of integrated electronic systems.</td>
<td>100</td>
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<tr>
<td>Delta Motorsport</td>
<td>Motorsport &amp; automotive design and low volume build.</td>
<td>12</td>
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<tr>
<td>Viper Motorsport Harnesess</td>
<td>Motorsport &amp; prototype wiring harness manufacture.</td>
<td>4</td>
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<tr>
<td>Mahle Powertrain</td>
<td>Powertrain design, development and test.</td>
<td>180</td>
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<tr>
<td>EDM Precision</td>
<td>Precision electro-discharge machining.</td>
<td>7</td>
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<tr>
<td>Festo</td>
<td>Design &amp; manufacture of pneumatic and automation systems.</td>
<td>74</td>
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<tr>
<td>Ilmor</td>
<td>Design, development &amp; manufacture of racing engines.</td>
<td>70</td>
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<tr>
<td>Mercedes AMG HPP</td>
<td>Design, development &amp; manufacture of F1 engines.</td>
<td>600</td>
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<tr>
<td>Turnell and Odell</td>
<td>Precision manufacturing engineers.</td>
<td>40</td>
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<tr>
<td>Schumacher Racing</td>
<td>Design and manufacture of radio controlled cars.</td>
<td>25</td>
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<tr>
<td>Scott Bader</td>
<td>Development &amp; manufacture of composites, adhesives and emulsions.</td>
<td>250</td>
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<tr>
<td>Three Sixty Aerospace</td>
<td>Design and manufacture of premium class aircraft seating.</td>
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<tr>
<td>Sandwell</td>
<td>Shot peening &amp; surface engineering.</td>
<td>18</td>
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<tr>
<td>N and B Engineering Ltd</td>
<td>Precision manufacturing engineers.</td>
<td>8</td>
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<td>Total Sim</td>
<td>Engineering consultancy &amp; contract support.</td>
<td>16</td>
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<tr>
<td>Variohm</td>
<td>Sensor manufacture and sales.</td>
<td>40</td>
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<tr>
<td>Torquemeters Limited</td>
<td>Design &amp; manufacture of torque measurement systems.</td>
<td>55</td>
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<tr>
<td>Cummins Distribution (Wellingborough)</td>
<td>Sales and service of Cummins products.</td>
<td>200</td>
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</table>
Historical Information

One of the major industries in the region is Motorsport and, in particular, racing engine design and development with Cosworth and later Ilmor being major employers over recent decades. Cosworth in particular was, in the past, a major recruiter and trainer of engineering graduates and technicians, many of whom have gone on to form their own companies. Whilst this is still an important sector with Mercedes AMG HPP now being the largest employer in this sector and Ilmor being a major supplier of engines to the Indycar Championship, it is a changing market and future growth potential may be limited causing companies to diversify into new markets.

To support the prototype and high manufacturing quality requirements of the Motorsport industry the county has developed a network of small manufacturing companies specifically skilled in precision, small batch manufacture. By necessity many of these smaller companies have actively pursued alternative markets for their services in recent years, including aeronautical, medical, defence and the oil and gas industry.

Another significant change in the engineering industry in Northamptonshire, in the last two decades, has been the closure of two major engineering companies namely Timken Bearings (Duston) and Express Lifts (St James). This is very relevant as many engineers gained training through these two companies, some of whom have also progressed to form their own companies. Indeed the Head of Engineering at the University of Northampton started his career as an apprentice with Express Lifts. The loss of these two companies has had a significant impact on the apprentice training provision in the county.

Summary of Engineering Roles

With the diverse nature of the High Performance Technology sector, in the region there is a large variation in the roles of engineers within Northamptonshire. As a means of dividing the roles and matching the qualifications and experience requirements, the following definitions are those published by The Engineering Council and used by all Engineering Institutions which are licenced to award professional registration.

This is considered an appropriate definition as many companies within the area e.g. Cummins, Mahle Powertrain, ThreeSixty Aerospace and Mercedes AMG High Performance Powertrains operate employee development plans to achieve professional registration.

Engineering Council Definitions for Professional Engineers

**Engineering Technicians** are concerned with applying proven techniques and procedures to the solution of engineering problems. They carry supervisory and/or technical responsibility and are competent to exercise creative aptitudes and skills within defined fields of technology. Professional Engineering Technicians contribute to the design, development, manufacture commissioning, decommissioning, operation or maintenance of products, equipment, processes or services. Professional Engineering Technicians are required to apply safe systems of working. *(Benchmark academic qualifications = Tech Certificate from an Approved Apprentice Programme, NVQ3/SVQ3).*

**Incorporated Engineers** maintain and manage applications of current and developing technology and may undertake engineering design, development, manufacture, construction and operation. Incorporated Engineers are variously engaged in technical and commercial management and possess effective interpersonal skills. *(Benchmark academic qualification = accredited BEng degree).*

**Chartered Engineers** are characterised by their ability to develop appropriate solutions to engineering problems, using new or existing technologies, through innovation, creativity and change. They might develop and apply new technologies, promote advanced designs and design methods, introduce new and more efficient production techniques, marketing and construction methods. Chartered Engineers are variously engaged in technical and
commercial leadership and possess effective interpersonal skills. *(Benchmark academic qualification = accredited MEng degree).*

**What is an Engineering Centre of Excellence?**

There are many different facilities, nationally, which are called ‘Engineering Centres of Excellence’ and these range from dedicated apprentice training centres to centres supporting industry with the development and application of new and emerging technologies examples of these are:-

**Toyota Apprentice Development Centre (Burnaston)**

This is a training facility for maintenance technicians where all training is provided on site by Toyota staff supported, for some modules, by staff from a local FE college. The current intake is 24 per annum with a plan to increase this number to 36 in 2014 and 48 in 2015. A significant recent development is that Toyota is now offering this facility to their suppliers for apprentice training.

The programme is delivered over a 40 month period consisting of 18 months ‘off the job programme’ including NVQ L2 (Performing Engineering Operations) and VRQ Technical Certificate, a 4 month transition period and 18 months ‘on the job training’ leading to NVQ L3 (Engineering Maintenance Systems). The trainees are trained on equipment, including robotic manufacturing cells, which is up to date with modern manufacturing technology.

There is quite a rigorous selection process with a high failure rate at the selection stage due to numeracy and literacy issues. Also there is a rigorous appraisal process throughout the process with the opportunity to remove trainees from the programme or repeat years where appropriate.

Key factors from this initiative are that the training is driven by industry, the training is on equipment appropriate to the employer’s production facility and it is selective. Quite a few of the intake have A Level qualifications before entering the apprentice programme.

**Manufacturing Technology Centre (Coventry)**

This facility was opened in 2010, with £40.5M of public funding, to develop advanced manufacturing technologies into practical manufacturing solutions.

Specific technologies include Advanced Tooling and Fixturing, Metrology and Non Destructive Testing, Intelligent Automation, Net Shape and Additive Manufacturing (3D printing, laser sintering etc.), Electronics Manufacturing and High Integrity Fabrication (including rotary friction welding, laser welding, adhesives and coatings).

Some major industrial partners include Aero Engine Controls, Airbus and Rolls Royce but companies from Northamptonshire, including some who contributed to the survey, are also working with the MTC on new manufacturing processes.

It is believed that the MTC are to develop an apprentice training facility which will have residential facilities.

Key factors from this initiative are that the technology is driven by what industry requires moving forward, particularly in the automotive and aerospace sectors. There is also significant investment in the developing of internal technical skills.

**Local Initiatives**

Some local initiatives which could be described as ‘Engineering Centres of Excellence’ are:-

**Siemens-National Training Academy for Traction and Rolling Stock**

A state of art training academy for apprentices focused on rolling stock technology under construction at Kingsheath in Northampton.
**NVISION**
An immersive 3D visualisation centre based at Northampton University with different 3D projection technologies available for industrial applications including ‘Active Walls’ and an ‘Active Cube’. The take-up with the Northamptonshire High Performance Technology Centre is limited.

**Scott-Bader Innovation Centre**
One of the companies surveyed (Scott Bader) has an innovation centre which supports start-up businesses with workshops and office facilities. Utilisation of this facility is 80% and there is space to expand the facility by conversion of an existing building.
## Existing Connections with Centres of Excellence and Innovation Centres

Some of the Centres of Excellence and Innovation Centres which the companies surveyed have experience of are shown below.

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<thead>
<tr>
<th>Manufacturing Technology Centre (Coventry)</th>
<th>Advanced Manufacturing Research Centre</th>
<th>Silverstone Innovation Centre</th>
<th>Nottingham Uni. Advanced Manufacturing Centre</th>
<th>The Welding Institute</th>
<th>National Composites Centre (Bristol)</th>
<th>Scott Bader Innovation Centre</th>
<th>Production Engineering Research Association (PERA)</th>
<th>Warwick University Manufacturing Group</th>
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**Note:** This list is not extensive and largely dependent on the personal experience of the company contact for the survey e.g. HR personnel may not have access to this information.
Recruitment Policy

Within the Northamptonshire High Performance Technology Sector there is a high proportion of MEng and PhD level engineers and some of the smaller companies surveyed employ almost exclusively this level of engineers (with suitable post-graduation industrial experience). Also some of the larger companies surveyed have a high dependence on highly qualified engineering graduates. The general feedback regarding high level graduate recruitment is that companies recruit nationally and internationally and employers don’t believe that this level of education is provided within the county. Some employers have recruited from Cranfield University in Bedfordshire and others have used Cranfield University to provide additional short courses and 'Masters level' qualifications.

The intermediate level of engineers, who traditionally would be employed as production engineers, managers and applications engineers is an area where there is a shortfall and this is an area which can partially be addressed by local education providers e.g. Northampton University. Historically this level of engineer has been recruited locally often progressing through the apprentice and HNC/HND route. There is significant employer interest and involvement in this level of engineering training and employment through the NETP (Northants Engineering Training Partnership). Of the companies surveyed Festo has strong links with the NETP project but other companies in the area e.g. KAB Seating and G.E. Intelligent Platforms are known to use this as a source of engineering employees.

There is considerable interest, from the companies surveyed, in apprenticeships with 70% either having apprentices at present or in the recent past. Generally there was concern about the quality of candidates on offer and little interest in the use of apprentice training agencies as a selection tool. Where possible, employers prefer to get involved with selection of apprentices at an early stage of the training process. Three companies in the survey said that they sponsor more students than they require through the initial college period so that they can select the most able candidates for employment. The majority of employers were keen that apprenticeships should include study to HNC and beyond. Whilst some employers recruit apprentices only when required, others have policies to take on apprentices every year, one company targets 6 per year, a second usually take on 2 per year (although 5 this year) and a third company aims to take on 1 per year.

Note: At all levels of intake (apprentice to MEng) employers expressed concerns about the mathematics standards of candidates.

Some employers expressed concern about the quality of more mature candidates who are applying for vacancies and this seems to be across all sectors. Two companies, covering mechanical and electrical engineering, said that generally the candidates in their 30s and 40s with industrial experience were not used to working to the quality standards and level of autonomy that they required. Alternative sources for experienced engineers include ex-services personnel and engineers from Poland and other European countries who tend to have a high level of engineering experience and qualification.

Training and Further Learning

Throughout the companies surveyed there was very positive approach to employee development with the larger companies generally offering a structured approach to graduate and apprentice training. Mercedes AMG HPP, ThreeSixty Aerospace and Mahle operate a Monitored Professional Development Scheme (MPDS) for graduates with a view of developing the competences required for Chartered or Incorporated Engineer status after 4 years with the company. This is seen both as an effect mechanism for employee development and a benefit to attract the best quality candidates.

Due to the diversity of the industries in the HPT sector in the county, much of the skills requirement is company specific e.g. electro-discharge machining and shot peening and a large proportion of training needs to be provided in-house.

Where not operating structured development programme training is often dictated by annual appraisals and internal 'skills matrices' but overall there was a good approach to continued professional development across the companies surveyed.
Also most companies were supportive of employees wishing to take further learning courses e.g. Open University Degrees, if it meets the business needs as well as the individual.

Where skills cannot be provided internally companies use a variety of external training providers including:

- **Smallpeice Enterprises** (Lean, Six Sigma etc.)
- **Tutorcare** (H&S)
- **Solomon** (continuous improvement techniques)
- **INTACS Training** (fault finding on high voltage circuits)
- **Dark Matter** (composites)
- **Oaktree** (management)
- **Nottingham University Advanced Manufacturing Centre** (manufacturing and quality)
- **Production Engineering Research Association** (growth & change management)

**Engagement with local education providers**

Of the companies surveyed the use of local education providers is:

- Northampton University = 4
- Northampton College = 8
- Tresham College = 3

**Feedback on local education providers**

1) Colleges are not training apprentices on machine tools appropriate to the ones which they will use in industry.
2) Mixed opinions on the feedback of apprentice assessors, some thought that this was good whilst others thought that some assessors didn’t focus enough on the technical skills and questions focused too much on soft skills.
3) Visibility of what training is available could be improved ‘A central directory would be useful’! Several companies stated that communication on training opportunities is poor.
4) The standard of some candidates offered to employers by colleges fell short of their expectations particularly in numeracy and literacy.
5) Whilst happy with the quality of education provided, one company felt that the education providers lacked a clear understanding of the career options available within the industry.
6) One employer was frustrated with the lack of flexibility in courses particularly relating to a very competent apprentice who they want to fast-track to HNC. They were told that this would take 7 years!
7) One employer was unable to get the IT training they required for an apprentice locally and had to use a college in Hinckley. Another uses Stephenson College in Coalville as when they last reviewed they did not feel that local colleges were able to match their requirements. They are looking to review their training provider again in the near future.
8) Several employers thought that the Northants Engineering Training Partnership was a good opportunity for both students and employers but its existence has not been marketed well in the past.
9) Several companies expressed an interest in what the Silverstone UTC could offer and are actively pursuing links with this venture.
Collaborative Approach to Training and Development

There was interest in a collaborative approach to training and development from over 50% of the companies surveyed particularly where technical knowledge exists in companies which could be shared without jeopardising an organisation’s technical advantage.

Some links already exist with suppliers and customers on collaborative training but these could be expanded on a geographical basis. Examples could include industry based training (and assessment) on multi-axis machining centre and dissemination of process information to potential customers e.g. shot peening, electro-discharge machining, metallurgy, surface treatment and heat treatment.

Several employers expressed an interest in exploring a collaborative approach to apprentice training.

Support for Promotion of Engineering as a Profession

Work placement students (school age)

There is a high level of support for work placement opportunities but some companies restrict this to relatives of existing employees and personal recommendations.

Some companies noted a decline in support from local schools for this in recent years.

A common concern was about the selection of suitable candidates by schools and that employers were looking for placement students with a genuine interest in engineering and science as a career and an aptitude for mathematics and science.

There was concern about the careers advice that young people are being given and the awareness of teachers about the opportunities for careers in engineering.

Two companies who were surveyed have a particularly well established and pro-active approach to work placements from school age children. The first typically takes 2 placements in product development and 4 placements in the factory each year. The second take 2 or 3 placements a year but have noticed a decrease in support from schools and teachers. Additionally Festo take groups of 50 to 60 school children every month for a 4 hour ‘hands-on’ session in their training facility.

Work placement students (college and university age)

Many of the larger companies are involved with providing sandwich year and/or holiday placement opportunities for university and college students these include one company with 20 sandwich placements per year, a second who currently have 6 sandwich placements and a third who take 2 per year. A further company regularly take students on 5 month placements through the Northants Engineering Training Partnership (NETP).

Generally employers consider this type of placement as a useful assessment process/extended interview for future employees.

Support for STEM (science, technology, engineering and mathematics) type projects

There is significant support from this type of initiative from both employers and employees with graduates and experienced engineers acting as STEM Ambassadors. This is also seen as a useful tool for personal development of young engineering and science employees.

Festo is working with NETP and Northampton University on ‘STEM Summer Clubs’ and one day events with primary schools as part of Northampton ‘Science and Engineering Week’.

Scott Bader invites local schools into the company during ‘National Chemistry Week’.
Some young engineers are willing to get involved as STEM Ambassadors but have found difficulty finding information on local activities.

There is also evidence of support from employers and employees for the Formula Student and Green Power competitions.

**Note:** STEM initiatives are seen to be gaining momentum as a result of the increasing visibility of the ‘Science and Engineering Week’ and the establishment of local University Technical Colleges.

**Sponsorship of University Projects**
Many companies surveyed are actively involved with sponsorship of undergraduate and PhD projects with universities nationally.

**Interest in University Technical Colleges**
There was considerable interest in the development of the Silverstone UTC with several companies already establishing links with input on the curriculum and interest in supporting industry based projects.

**Support and Expectations of an Engineering Centre of Excellence**

There was genuine interest in the idea of an Engineering Centre of Excellence but obviously this would depend on the actual function and deliverables of such an initiative. The key areas which have support are:-

1) **Promotion of engineering as a profession with young people and education providers.**
   Particularly providing hands-on experience to young people.

2) **An opportunity for engineering employee development.**
   This could be delivered on virtual basis, from a physical building or a hybrid of the two. One observation is that any learning delivered virtually needs to be of a high standard of delivery utilising the best simulation technology.

   There is also interest in the provision of a ‘Training Hub’ which could include courses provided by existing colleges and universities, other training providers and from individuals and companies with specific knowledge and skills. There was a clear indication that such a ‘Training Hub’ should be independent of any single training provider.

3) **A centre of excellence for apprentice training.**
   There is an opportunity to create an apprentice training facility which focuses on training on modern manufacturing equipment (e.g. 5 axis machining centres) and Computer Aided Manufacture. Some local employers are currently reviewing the way that they provide apprentice training but support for a dedicated apprentice training centre would be dependent on the demonstration of ‘engineering excellence’.

4) **Networking opportunities.**
   There are some opportunities to improve the networking opportunities for employers and engineers in the region including factory visits and industry specific lectures. Some initiative already exist, the Northampton Engineering Symposium (organised by Northamptonshire Enterprise Partnership) was very well received by those who attended also the Northampton Young Members Panel (IMechE) organise some industry related lectures.

Whilst employers expressed an interest in supporting an Engineering Centre of Excellence with the provision of resources, projects, factory tours and input from experienced staff any financial support is likely to be restricted to payment for training provided.
Feedback from survey on an Engineering Centre of Excellence

Some comments on the expectations of an Engineering Centre of Excellence are:-

'Would be interested if it offered training in basic mechanical and electrical skills particularly in diesel engines and power generation. Also interested in a ‘Training Hub’ for other training such as 6 Sigma but only if the hub is independent of individual training providers. Prepared to pay for the service but only if the achievement of skills could be demonstrated in the workplace and matches employer’s requirements'.

‘Computational Fluid Dynamics, Finite Element Analysis and materials training. Also some project management training would be useful as whilst currently the engineers in the company are trained in the use of tools (e.g. MS Project), the practical application and planning style is currently left largely to the individual'.

‘Exposure to some other existing industries and technologies would be useful e.g. there is a lot of engineering on space satellite projects in the country but this is not promoted. Would like to see hands-on projects for trainees e.g. restoration of old vehicle or plane (ref. Spitfire project at BAE apprentice training school)’.

‘For graduates would like to see Masters level teaching in practical application of Applied CFD, Aerodynamics and Fluid Mechanics. To achieve this, could pay companies with the skills to provide modules and deliver training. Industry should drive the learning requirements and provide live projects’.

‘Modern (e.g. 5-axis) machine tool training and exposure to high speed tooling and advanced manufacturing processes. Possibly with support from machine tool manufacturers’.

‘General engineering training and other skills such as project planning (MS Project etc.). The provision of basic workshop and manufacturing training for graduates could be another possibility’.

‘An Engineering Champion would be good! Higher level training for mechanical apprentices than is currently available.’

‘Would like to see CNC and multi-axis training and also machine maintenance training’.

‘Could have common engineering modules with suppliers e.g. for grinding, turning and milling and also subjects like Geometric Dimensioning and Tolerancing but training needs to be at the high end (quality and technology) of manufacturing. Can see advantage of a ‘Harvard for Technicians’ with an on-line provision to reach an audience over a wider geographical area. This could also act as a focus for recruitment from local and national schools’.

‘Would welcome the opportunity to be able to mix and match training modules to meet the company’s needs and employee’s ability and potential.’

‘Could include some business training e.g. sales and marketing for engineers. An opportunity to extend the Science and Engineering Week activities and for more engagement with schools, to break down the barriers between schools and industry’.

‘The quality of training needs to be at a very high standard. It would be useful for the company if additional training was available in inspection standards, reading engineering drawings, surface finishes, materials, heat treatment, tolerances and limits and fits. This would help operators to understand customer (design) requirements and inspection needs. This would be useful as an on-line resource with the ability to pick and choose from a training menu. Also some basic maths training would be useful’.

‘Because we are in a specialist industry the technical training may be too specialist for an Engineering Centre of Excellence. However there may be opportunities for training in standard I.T. packages and some soft skills e.g. interview techniques, running meetings, project planning etc.’
‘Electronic engineering understanding and circuit design. Understanding of systems and components e.g. how pressure sensors and other sensors work and why these inputs are required in the systems. Also a good understanding of data logging systems and the mechanical side of race car design/ integration of electrical systems (why parameters need to be logged)’.

‘Would like to see a centre of excellence which is design focused including the basics of projection and the laying out of engineering drawings. Also would like to include material science (metals and composites)’.

‘Hands on practical assembly experience and basic electronics. The understanding of engineering drawings and the ability to read and these. Materials technology, particularly copper based alloys. Also some business/ continuous improvement techniques training’.

‘General appreciation of manufacturing skills with more emphasis on spending time in industry to appreciate the applied skills. Industry talks and visits. Better appreciation of design, manufacturing and quality. Perhaps machine tool manufacturers could provide practical demonstrations to students’.

‘Should start with schools and get pupils thinking about how things work with simple calculations applied to real life situations. For apprentices the learning should be more specific including materials and manufacturing technology. Teaching needs to keep pace with industry technology e.g. CAD/CAM software’.

The companies surveyed were asked to rate the importance of various features which could be included as part of an Engineering Centre of Excellence and four which gained the strongest support were:–

- Support for higher and further education training
- Learning centre for primary and secondary education.
- Advanced/prototype manufacturing technology.
- Computer aided engineering/simulation technology.

**Summary**

The companies surveyed reflect the breadth of technology and size of organisation within the Northamptonshire High Technology Sector. Northamptonshire itself could be considered as an ‘Engineering Centre of Excellence’.

There is a high level of engineering qualifications and skills within the HPT sector in the county and a requirement to maintain this especially with an increasing age profile within some organisations.

The requirement for highly qualified engineering graduates e.g. MEng and PhD for Chartered Engineer type roles cannot currently be provided from within the county and employers will continue to recruit from Universities nationally and internationally.

For the intermediate type of engineering qualifications (Incorporated Engineer roles) there is a useful resource in the Northants Engineering and Training Partnership (NETP) which provides both work experience for students and visibility to employers of potential engineers. Whilst, to date there have been a limited number of companies involved in this scheme and limited marketing of the scheme it does have opportunity to expand in the future.

For apprentice training there is support from local colleges (Northampton, Tresham and Moulton) for basic training with much of the applied skills being provided in the workplace. There is potential for some additional apprentice training capability incorporating modern machine tools and manufacturing processes which could be incorporated into an ‘Engineering Centre of Excellence’ but this would require a significant financial commitment.
At all levels there is a recruitment issue with employers stating that mathematics skills, in particular, fell short of their expectations.

For apprentice recruitment employers have a preference for direct selection rather than the use of apprentice training agencies. There is also evidence that employers are prepared to sponsor more students through college and select the most able for employment.

Generally employers are supportive of higher apprenticeships with targets of HNC and HND qualifications and if suitable they will support individuals through to a degree qualification.

With the bespoke training requirements of most employers in the survey, they tend to use a mixture of training providers and there is an opportunity for an Engineering Centre of Excellence to provide a ‘Training Hub’ which is independent of any single training provider and offers visibility of all training available. This should incorporate both formal and informal training and, where necessary, include training providers from outside the region and the sharing of process knowledge by companies.

The level of technology and engineering knowledge within companies in the HPT sector is generally in advance of that available with the colleges and university within the county.

Employers recognised opportunities for a collaborative approach to training and the sharing of knowledge and skills. This could be aided by more networking opportunities such as the Engineering Symposium organised by Northamptonshire Enterprise Partnership as part of the Science and Engineering Week.

There is strong support within the HPT sector for activities to promote engineering as a profession both to pupils and to school teachers and significant activity already in this area by individuals and employees. An Engineering Centre of Excellence could be a useful tool to provide some of this in combination with other initiatives in the region such as the Science and Engineering Week STEM activities and the STEM Summer Schools which are being developed by Northampton University. No barriers were seen to more collaboration between companies to support these initiatives e.g. a programme of factory tours as part of the Science and Engineering Week.

Employers expressed significant interest in the University Technical Colleges which are being developed in the area and see these as a potential source of future employees with the emphasis on science and mathematics qualifications and industry related projects.
Conclusion

Northamptonshire can, as a county, be described as a ‘Centre of Engineering Excellence’ with a network of engineering companies, with highly skilled and qualified staffing requirements. There is a focus on High Performance Technologies and a high proportion of small and medium sized enterprises offering quite a diverse range of precision and specialist services. This diversity including precision small batch manufacture and advanced predictive analysis techniques means that employers’ expectations of what the function of an additional facility (Centre of Excellence) should offer is quite wide. Caution should therefore be exercised before committing to a new facility and further research would be required to ensure that the nature of a new facility and importantly the technical content and quality of delivery of services meets employers’ expectations to ensure their support and participation.

There are some areas which would be supported by most of the employers surveyed and these include an expansion of the activities which already exist to promote engineering as a profession to young people, teachers and parents building on the STEM projects and the Science and Engineering Week. The University Technical Colleges at Silverstone and Daventry are seen as another important opportunity for industry to engage with young people to promote engineering as a career and identify potential future employees. Several employers would be willing to provide additional projects, lectures (including presentations by recent graduates and apprentices) and factory tours to promote the profession. The Northants Engineering Training Partnership was also seen as a very useful opportunity to develop engineers and give employers exposure to future employees but many companies were not previously aware of its existence.

The second area of common support is for a flexible approach to training of the engineering workforce with more visibility of formal and informal training opportunities through a ‘Training Hub’ which should be run independently of any single existing training provider. Much of this training could be provided in a virtual environment or by using existing facilities (lecture theatres at colleges, the university and within companies). It was also identified that manufacturing students need to be trained on equipment which matches that which they will be required to use in industry, perhaps involving a collaborative approach to providing and the assessment of this within industry. Flexibility is also required by existing further and higher education providers to match the training provided to employers’ requirements including increasing mathematics levels and allowing fast-tracking of talented students.

The third area, which has support, is to build on the opportunities for networking between employers and individual engineers to increase knowledge of the skills and technology which already exist in the county and encourage collaboration between local companies on training and developing new business opportunities. The Northamptonshire Enterprise Partnership is seen as an important vehicle for this type of activity including the Engineering Symposium and the company directory on the High Performance Technologies website.

Therefore expanding the existing activities in networking and promotion of the profession to the next generation whilst also investigating a flexible approach to training and a ‘Training Hub’ would be a sensible approach to further promotion of Northamptonshire as a ‘Centre of Engineering Excellence’. This is also likely to provide direction for any future dedicated facility and ensure employers’ support for any such facility. To ensure quality control of the training offered in a ‘Training Hub’ the content would need to be controlled independently of training providers by an individual or organisation who has expert knowledge of industry requirements and training on offer. Linking the on-line element of a Training Hub and the NEP High Performance Technologies website could also offer the opportunity to incorporate some elements of the activities to promote engineering as a profession and attract young people into the local engineering industry. This could include virtual factory tours and lectures by industry experts and again build on the Science and Engineering Week, the UTCs and other local activities and be offered to a wide audience.

Any new dedicated facility and/or on-line resource would need to match the high level of engineering knowledge and expertise that exists within the engineering industry in the county to succeed.