CIVITAS

in conjunction with the

ERA Foundation

BAE SYSTEMS BROUGH PROJECT

FINAL REPORT

Third Party Edition

SIMPSON ASSOCIATES

Forward

This project has been undertaken within very real time constraints and under intense scrutiny reflecting the highly charged political situation that currently obtains. It could not have been achieved without the cooperation of BAE Systems and in particular the considerable support and encouragement from the management and employees on the Brough site under the direction of Mr. Jim Welsh.

Much of the information and data has been derived from BAE sources for which we are greatly obliged. The responsibility for any interpretation or analysis of such information remains however our own, reflecting our commitment to be at all stages of the Project fully independent.

We also wish to express our thanks and appreciation to the Trades Union representatives and their colleagues at Brough for such wholehearted cooperation in what for them are the most difficult of circumstances; their ability to recognise and support the overriding objectives with such dignity, skill and commitment, despite the pressures and anxiety to which they are currently subjected, will remain a lasting experience.

David Davis MP has been engaged with us throughout the project and his commitment and sound advice is gratefully acknowledged. We are obliged for the encouragement and support of Lord Haskins as Chairman of the Humber LEP.

Not least we need to thank Civitas under the direction of Dr. David Green and the ERA Foundation under Sir Alan Rudge and Dr. David Clark for their foresight in initiating this Project in an endeavour to protect the interests of the employees at Brough and indeed the future of high technology manufacturing in the UK.

Christopher Simpson Dr. John Garside

2nd January 2012

Comments on the "Third Party Edition" of the Report

Following submission of the Full Report, the proposal to seek to establish an industrial/technology park on the Brough site, taking advantage of the Enterprise Zone status has been accepted by the main parties concerned. Lord Haskins, as Chairman of the Humber LEP, has given his support, subject to a significant engagement from a private sector partner with the requisite property development skills and experience. Agreement has now been reached for this role to be undertaken by the Property Services Division of BAE Systems plc.

The objective is now to approach third party companies with a potential interest in taking advantage of the facilities offered at the Brough site and most particularly to utilise the high skill levels of the existing workforce as the BAE Systems manufacturing activities are progressively scaled down. It has been indicated that the Humber LEP will support suitable and well drafted applications from third parties seeking further financial funding from the Department of Business, Innovation and Skills (BIS) to assist in establishing operations at the Brough site.

The full Report has now been revised and abbreviated to include only information required specifically to achieve the objectives defined above and to take out some commercially sensitive information concerning salary levels and projected operating costs. The sections covering the Hawk Assembly Initiative, the events leading up to the current situation, the justification for a new single aisle aircraft and the maintenance of a UK interest in civil aircraft are all deleted as are the meeting reports with senior management of other leading aerospace companies.

Some elements of the description of the Brough facilities have been slightly expanded to provide additional information.

Christopher Simpson Dr John Garside

31st January 2012

CONTENTS

1. Executive Summary

This Executive Summary highlights the key points in each of the subsequent sections and can be cross-referenced through the Contents page. The first parts address specifically the situation at Brough and the latter parts cover aspects of policy at the national level.

The Brief and Background to the Report

After the announcement by BAE Systems to end manufacturing at their Brough Plant (apart from the Structural Test Centre and the Hawk Engineering and Project Office) with potential job losses of nearly 900 employees, there was widespread concern expressed at both political and industrial levels. The Brough site has a long and successful history with the design and manufacture of both civil and military aircraft and represents with Warton and Samlesbury probably the last residual capacity in the UK to build a complete aircraft for which there is a large worldwide demand.

The independent think tank Civitas determined at the end of October 2011 to commission this Report, working in conjunction with the ERA Foundation and with David Davis MP, in an endeavour to keep the factory open as a going concern and retain as far as possible the skills. The Prime Minister has been consulted and has promised as yet unspecified backing. Also Dr Vince Cable MP, Secretary of State for Business, Innovation and Skills and President of the Board of Trade indicated there may also be assistance, subject to a viable proposal.

The basic objectives of this study, to be carried out within a period of two months, were to determine:

- If the site can be made economically viable and a location for other businesses
- What lessons can be learned for high technology manufacturing in the UK in the future.

The plan has been to study, as a short term interim solution, the feasibility of manufacturing alternative products by third party companies utilising the current workforce and the facilities on site. As BAE Systems had already entered into the statutory 90 day consultation period before redundancies were to be declared the timescale was very tight. In order to undertake the work, the approval and co-operation from BAE Systems, their employees and the Trades Union was required. Careful definition has been required of what is commercially sensitive information to ensure that this is held confidential and thus ensure the position of BAE Systems is not prejudiced. Confidence building and recognition of the potentially highly politically charged nature of the project was an integral part of the responsibility.

Discussions have been held with members of the Main Board of BAE Systems, the BAE management team on site, the trade union representatives, others working onsite, the

Humber LEP under Lord Haskins, aerospace industry leaders, politicians, industrialists, university academics, and the local BIS director in an endeavour to secure as wide a spectrum of opinion as possible. The work undertaken has been highly pragmatic and includes a quantitative evaluation of the skill levels and management abilities measured against world class standards, together with an appraisal of the facilities that will be available on site to third party companies. We have also made estimates of future operating costs.

The Current Status

It is evident that the decisions made by BAE Systems to reduce overall capacity to make it more in line with forecast demand are inescapable. The decision regarding Brough comes about in substantial part because it is regarded as necessary to concentrate production where the majority of recent investment has been made and where the highest levels of productivity may as a consequence be anticipated.

In the interim, since we started the project, an announcement was made in the Chancellor's Autumn Statement that the Brough site is designated an Enterprise Zone with special conditions including 100% capital allowances. After further consultation with the Trades Union, BAE Systems has agreed to a deferment of the implementation of the redundancy programme so that now redundancies will first come into effect mid 2012; and if viable proposals are available, then the start could be put further back to the end of 2012. This means that there is now a small window of opportunity for the proposals contained in this Report to be implemented.

Impact of the redundancy programme and appraisal of the current workforce

A detailed analysis has been carried out by skills and trades and shows the impact falls most heavily on the skilled manual direct employees and on the support staff. The majority of engineering staff are to be retained. The age profile of the skilled manual employees is relatively young averaging just over 40. This has significant implications in terms of the ability of these people easily to move out of the vicinity due to school and other family commitments. A review of wage and salary levels indicates that generally these are in line with that expected for highly skilled and experienced people (comparisons have been made with current pay levels in both aerospace and other sectors) and thus should not prove to be a barrier to third party companies taking advantage of these skills and the site facilities.

An essential task was to undertake an independent assessment of the processes employed and the knowledge and skills of the people who are to be made redundant. An established benchmarking process has been used, based on the Manufacturing Excellence Awards

that is also used to identify acknowledged best practice achieved by leading UK and Europe manufacturers. Two assessment models were adopted:

- Capability Maps
- Capability Footprint

The assessment processes requires people to identify the importance of specific business characteristics and to select answers matching their attainment level. Both these assessment models use the same categories for making the evaluation, which were derived from reviewing the performance of leading manufacturing companies in the UK and Germany, including:

- Customer Focus
- Innovation in Products and Processes
- Logistics and Operational Efficiency
- People Effectiveness

Overall it is concluded the workforce is well trained and with the correct motivation is capable of undertaking a range of multi-skilled tasks. They work to high standards of logistical and operational efficiency and many examples of good manufacturing practice are embedded. Considering this level of manufacturing competence and maturity of people in embracing change, with the appropriate training, they would be an asset to any company setting-up production facilities on the site.

The Brough Site and Facilities

The site is very large and the major buildings cover in total an area of nearly 120,000 square metres. The condition of the buildings, although relatively old, is sound and some have had improvements to the cladding. Sizes vary considerably from a single building over 30,000 square metres to quite small structures. Most of the floors are load bearing and there is wide provision of cranes, some of considerable lifting height and span, but with maximum lifting capacities of 10 tons. There is extensive well located office accommodation that will become available. The overall impression is of a modern and efficient site compatible with the aerospace industry.

An appraisal of the plant and machinery has been undertaken. With few exceptions the level of investment has been low and in the machine shop, although the machines are functional, few represent the latest technology or provide levels of productivity now available. There has, however, been investment in the heat and surface treatment areas and to a limited extent in the pipe and ducting, and electrical sections.

The sections that have been appraised include:

- Heat and surface treatments

- Duct and Pipe Manufacture
- Electrical
- Hydraulics Department
- Forming and Fabrication
- Machining

It is concluded that the parts of the site not to be retained by BAE are capable of conversion into a modern industrial park that potentially could attract interest from third party companies manufacturing a wide range of products and taking advantage of the benefits offered by the Enterprise Zone. With the high level of skills available, together with the other facilities, a training school could be established compatible with the Government's current initiatives in this area.

Third party companies will need to invest in new plant and equipment and in this context, the advantages offered by the Enterprise Zone will be vital.

The Mission to attract Third Party Companies

Discussions have been held with the Chief Executives of the leading aerospace component manufactures to ascertain their potential interest in utilising parts of the Brough site and also eliciting their views on the potential for building smaller single aisle aircraft in the UK. The response at this stage from companies engaged in airframe manufacture was generally positive.

BAE held a Skills Fair at Brough which attracted some 83 companies and which demonstrated there are a substantial number of UK businesses that are actively recruiting. Although their interest was in recruiting for their current operations, a significant sample stated their potential interest in the concept of an industrial park located in the Enterprise Zone. These opportunities are to be followed up.

Siemens has recently announced plans for a new wind turbine production facility located at the Alexandria Dock in Hull. Previous interest had been indicated in the Brough site and there may still be an opportunity to consider some major component manufacture such as blades where the Brough facilities would be well suited. There are other possible local interests including Gardner Aerospace which already has manufacturing operations adjacent to the Brough site.

There is clearly a requirement for the closest coordination and common purpose between the various interested parties if success is to be achieved in protecting the jobs of the 900 highly skilled people at Brough facing redundancy. The declaration of the Enterprise Zone, the associated provision of the 100% capital allowances and not least the appointment of Lord Haskins as Chairman of the Humber LEP may be regarded as valuable contributions towards achieving these objectives.

The agreement between BAE and Civitas for joint initiative to enter into further discussions at a senior level with other third party companies with a potential interest in both the skilled employees and the site is a further important step towards the concept of an industrial park. If at least one "large corporate" can be secured, this would act as a magnet in encouraging other companies to follow.

Events leading up to the present situation

A brief review has been made of trends in military expenditure and of the inevitable impact on the BAE operations. The overall dominance of the US military is fundamentally apparent, where their expenditure is bigger than that of the next 17 leading countries combined including China the UK, France, Russia and Japan.

The circumstances surrounding the sale by BAE of its 20% shareholding in Airbus (now owned by European Aeronautic and Space EADS) in 2006 are reviewed and the subsequent development of the respective businesses analysed in terms of share price and position in the aerospace market. In the interim, Airbus has achieved record levels of orders and currently has an outstanding order book for around 3,500 aircraft representing some 7 years of production for the company and its suppliers.

The strategy of a total reliance on military aircraft and other defence expenditure is questioned, as is the process by which such a strategy was determined. The role of the City in this particular circumstance and indeed in a wider context is examined. The overriding focus on short term results is a clear determinant and compares starkly with a German model that recognises the vital importance of developing long term strategies including a wide product portfolio and the strongest possible market presence.

The justification for a new Single Aisle Aircraft

The UK aerospace industry is the second largest in the world with only that of the USA larger. Rolls Royce, BAE Systems and GKN have international reputations with industry leading technologies. And yet the UK's capacity to maintain a position in the manufacture of civil aircraft is in jeopardy and the decline in military expenditure leaves it potentially even further exposed. The world market for civil aircraft is growing, particularly for single aisle aircraft carrying around 200 passengers. These account for around 50% of all aircraft sold. Demand for single aisle aircraft over the next 20 years is forecast to be 20,000 units, worth $1.6 trillion. Apart from the UK, only two other nations, USA and France, have the capability to design, manufacture and flight certify a passenger aircraft with more than 150 seats. Several countries are attempting to introduce new single aisle aircraft (China, Japan, Brazil, and Canada) to compete in this market which will increase competition. The market is dominated by aging aircraft; the Boeing

737 was designed 43 years ago and the Airbus A320 is 23 years old, with replacements not expected until 2025.

The opportunities and risks are identified. Brough has the skills, experience and capacity and, given the runway is retained, the overall facilities to permit a contribution to such an enterprise. Other countries have already shown the initiative without any comparable set of skills and resources, other than recognition of the opportunity and a determination to succeed.

The Strategic Role of UK Aerospace Manufacturing

This section is a review written by Dr. John Garside, based on his experience over many years. It defines the current position of the UK as the world's second largest aerospace industry and looks in detail at the activities of the emergent nations in developing their own aerospace industries. The technological drivers for manufacturing are defined and pointers given for future initiatives and success.

Conclusions

There are three main elements:

- We believe there are realistic opportunities to maintain the skills base and jobs at Brough
- Important decisions on policy at national level are required to ensure the UK maintains and indeed advances its position as a leader in high technology manufacturing
- The consequences of short term decisions regarding the disposal of strategic assets is highlighted

At the very least the impact of the declared redundancies at Brough can be mitigated. Given commitment and the closest coordination and common purpose between the various interested parties, substantially greater objectives can be achieved in terms of protecting the Brough site and skills and ensuring the UK maintains a leading position in the manufacture of civil aircraft. It will demand recognition from the other major UK aerospace companies that they also need to contribute if the UK's overall future strategic position in aerospace is to be protected. Not least the Government must be seen to act quickly and decisively in encouraging all parties to respond.

There is only a small window of time in which the necessary actions can be implemented. The declared redundancy programme is due to commence at the latest an the end of 2012; further, and even more critically, unless there is clear evidence of action, inevitably a significant proportion of the workforce will either accept skilled jobs geographically remote from Brough or will take lower grade jobs in the vicinity.

Looking beyond the immediate situation at Brough, the Government must find new ways of forming long term partnerships involving government agencies, manufacturers, trade associations, and the workforce, following the German model that has proved so successful. Companies need strategic protection from the vagaries of the stock market, which causes so much damage with its obsession with short term results. The whole question of corporate governance needs urgently to be addressed.

A strategy of supporting defined industrial sectors and encouraging the growth of companies independent of the stock market for funding is fundamental. The German Mittelstand, which largely comprises private and often family owned companies, demonstrates the value of such a strategy. With British banks currently securing funds at ½ % and lending on to SMEs at over 10% there surely have to be better alternatives.

Levels of investment in the UK in plant and machinery and in R& D are way below that of competing nations as illustrated by Germany where in 2010 the level of investment was over eight times that of the UK. Many good investment proposals in the UK never gain approval because of unrealistically short time horizons.

Much is to be done, but the potential rewards are great.

2. General introduction and background to the project

2.1 Brief for the Project

With the announcement made on the 27th September 2011 by BAE Systems that there are potential job losses at the Brough Works of 899 employees and that the Company had commenced a 90 day consultation period on ending manufacturing capacity at the site, the independent think tank Civitas determined, working in conjunction with the ERA Foundation and with David Davis MP, to commission this Report in an endeavour to keep the factory open as a going concern. The Prime Minister has been consulted and has promised as yet unspecified backing. Also Dr Vince Cable MP, Secretary of State for Business, Innovation and Skills and President of the Board of Trade indicated there may also be assistance, subject to a viable proposal. In the interim an announcement was made in the Chancellor's Autumn Statement that the Brough site is designated an Enterprise Zone with special conditions including 100% capital allowances.

The plan has been to study the feasibility of manufacturing alternative products by third party companies utilising the current workforce and the facilities on site not to be retained by BAE Systems. Fundamentally, the objectives of the study have been to determine:

- If the site can be made into a viable business
- What lessons can be learned for high technology manufacturing in the UK in the future.

In addition, the potential for manufacturing and/or refurbishment of short-haul or light civil aircraft has been considered. This would require a major study in itself, so within the timescale and with the resources available, any proposals are of necessity in outline only. A brief analysis is included of the current world market for short-haul and light civil aircraft and what requirements there are for further investment and resources.

In order to undertake the work, the approval and co-operation from BAE Systems, their employees and the Trades Union was required. Careful definition has been required of what is commercially sensitive information to ensure that this is held confidential and thus ensure the position of BAE Systems is not prejudiced. Confidence building and recognition of the potentially highly politically charged nature of the Project was an integral part of the responsibility.

The work undertaken has been highly pragmatic and includes a quantitative evaluation of the skill levels and management abilities measured against world class standards, together with an appraisal of the facilities that will be available on site to third party companies.

We have also made estimates of future operating costs.

2.2 History of the Site

The Brough site was established in 1916 and in the intervening period of nearly 100 years thousands of aircraft, both military and civil, have been built. In addition a very large volume of components and part assemblies have been produced. The original selection of the site was largely influenced by its proximity to the River Humber for launching seaplanes. In the intervening years a special relationship developed with the Royal Navy to whom many aircraft of varying types were supplied. Some of the most notable aircraft manufactured at Brough included the Beverley heavy transport and more latterly the Harrier and Buccaneer that saw distinguished service in the Falklands and in Iraq. The site is particularly recognised for its association with the Hawk trainer, the most successful jet trainer ever produced, of which over 900 are flying in 30 variants with air forces worldwide.

One of the most important facilities developed at Brough and which will remain in operation under BAE is the Structural Test Centre. This is used to perform static and fatigue strength tests and has a worldwide reputation. Testing for the Eurofighter and the Joint Strike Fighter programme is conducted here and the US military also makes extensive use of the facility.

Diversity has resulted in comprehensive support structure essential to modern aircraft design and manufacture with particular skills in stress analysis (used to assist Airbus in resolving major problems with wing design) and computing. This inherent skill and flexibility was well demonstrated by the support to the very fast and successful design and development at Brough of the Mantis medium-altitude long-endurance unmanned air vehicle (UAV) system principally for UK Defence Forces to perform intelligence, surveillance, target acquisition and reconnaissance operations. The current workload is predominantly Typhoon and F-35 related.

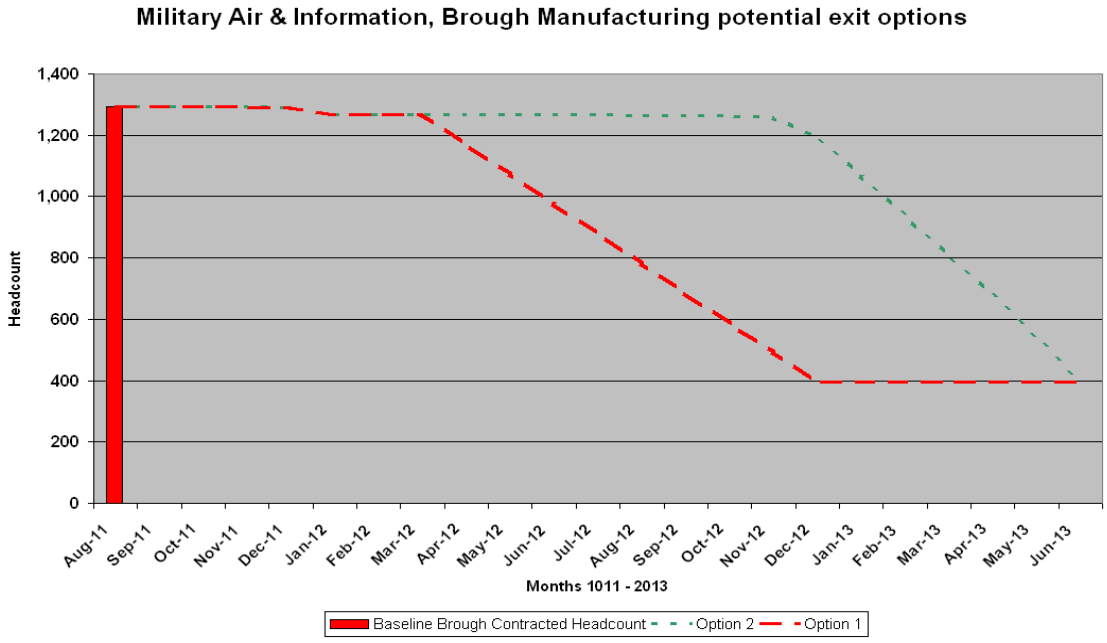
From the earliest days under the ownership and direction of Robert Blackburn it is evident that there were frequent changes in demand for aircraft reflecting military requirements and economic cycles and these changes in demand were compensated by a remarkable ability to adapt and introduce an extraordinary range of new products and take subcontract work from other manufacturers. The list of products previously manufactured includes piston engines, pumps and compressors, gas turbines, automotive components and even in the post Second World War years, kitchen utensils, agricultural equipment and lawn mowers.

This history of adroitness and agility, which can only have been achieved with the support of a very adaptable and cooperative workforce, may well be illustrative of the way forward in the current circumstances.

2.3 The current Status.

BAE Systems propose to cease all manufacturing and assembly on the site, but retain the Structural Test Centre and the Hawk Engineering and Project Office (c. 400 people) with associated offices and facilities, which will result in a reduction in building footprint from 112,000 m^2 to 15,600 m^2. Manufacturing and assembly operations are to be transferred to BAE sites in Lancashire, including the existing Typhoon and F-35 manufacturing workload back to Samlesbury, utilising surplus capacity and mitigating c. 100 jobs. The Hawk production facility will be relocated to the Warton and Samlesbury sites, utilising available floor-space, in anticipation of potential future orders.

The consequence will be the release ca. 900 people from the Brough site, with the potential to retain ca. 100 people with product knowledge should a potential Hawk order materialise. The timing of the redundancy programme with two options is illustrated in the graph below. We understand that at the time of writing the probability is that the programme will be initiated at the end of 2012 and scheduled for completion mid 2013 if reasonable prospects for alternative employment within the timescale can be identified. Part of this time may be used for the purposes of further training.



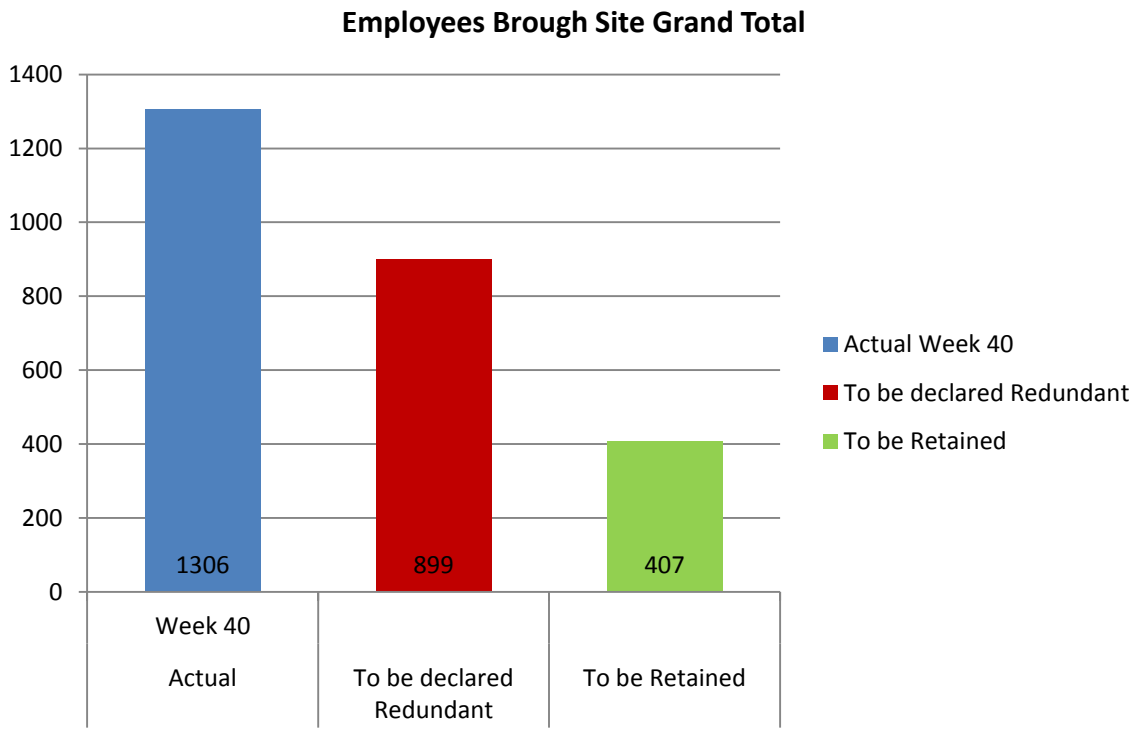
In the Chancellor's Autumn Statement, it was announced that proposals from the Humber Local Enterprise Partnership to form an Enterprise Zone on and around the BAE Systems' site at Brough was approved and further 100 per cent capital allowances are to be made available.

This combination of an extended redundancy programme with incentives to attract third party companies as a result of the Enterprise Zone provides a window of opportunity to implement viable proposals.

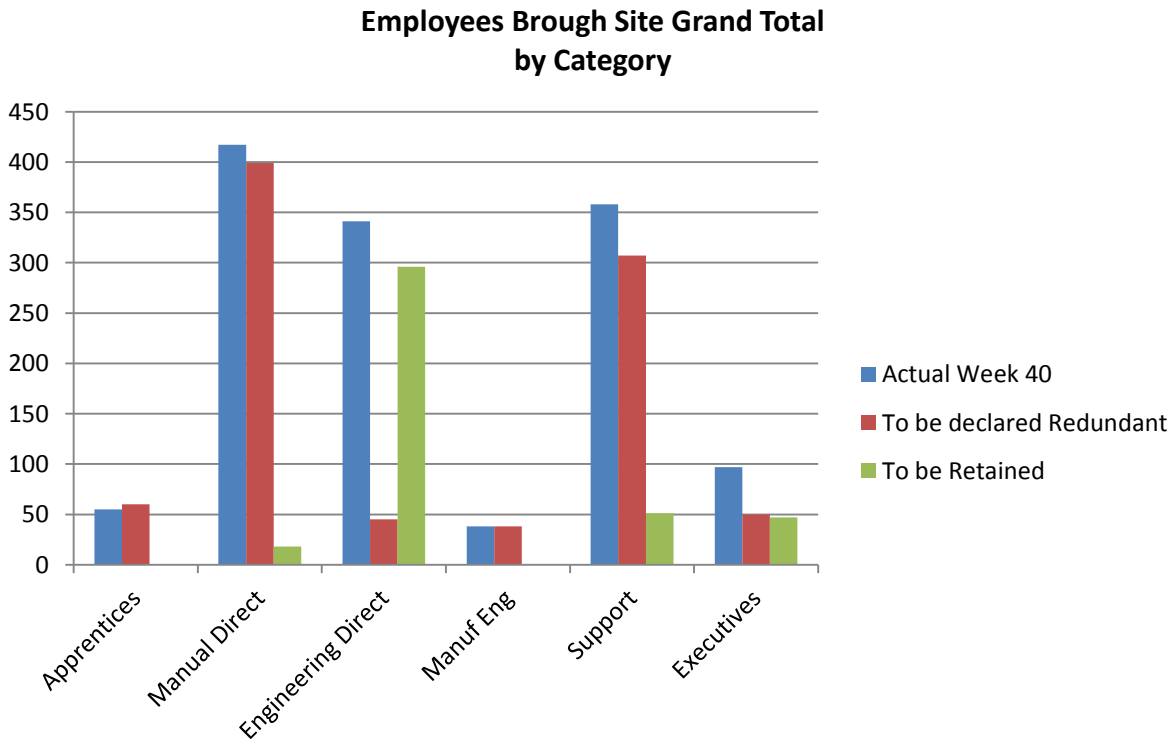
3. Impact of the redundancy programme and appraisal of the current workforce

3.1 Employment numbers and categories

The chart below illustrates the scale of the redundancies proposed:

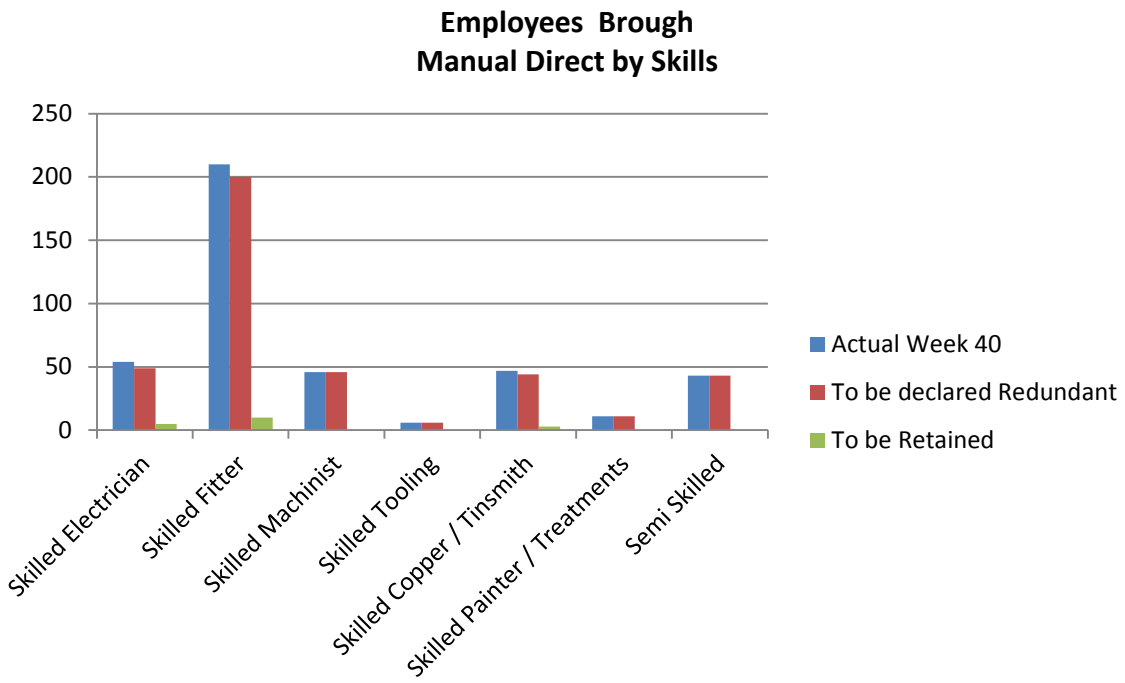


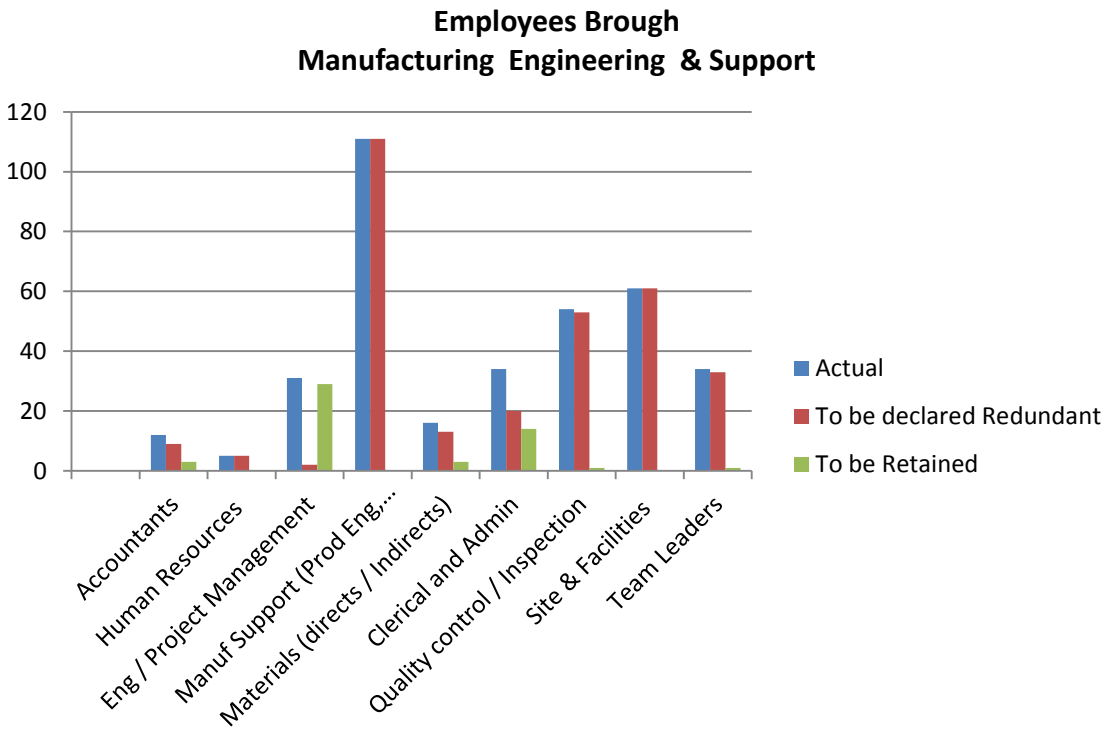
This total is then analysed by category:

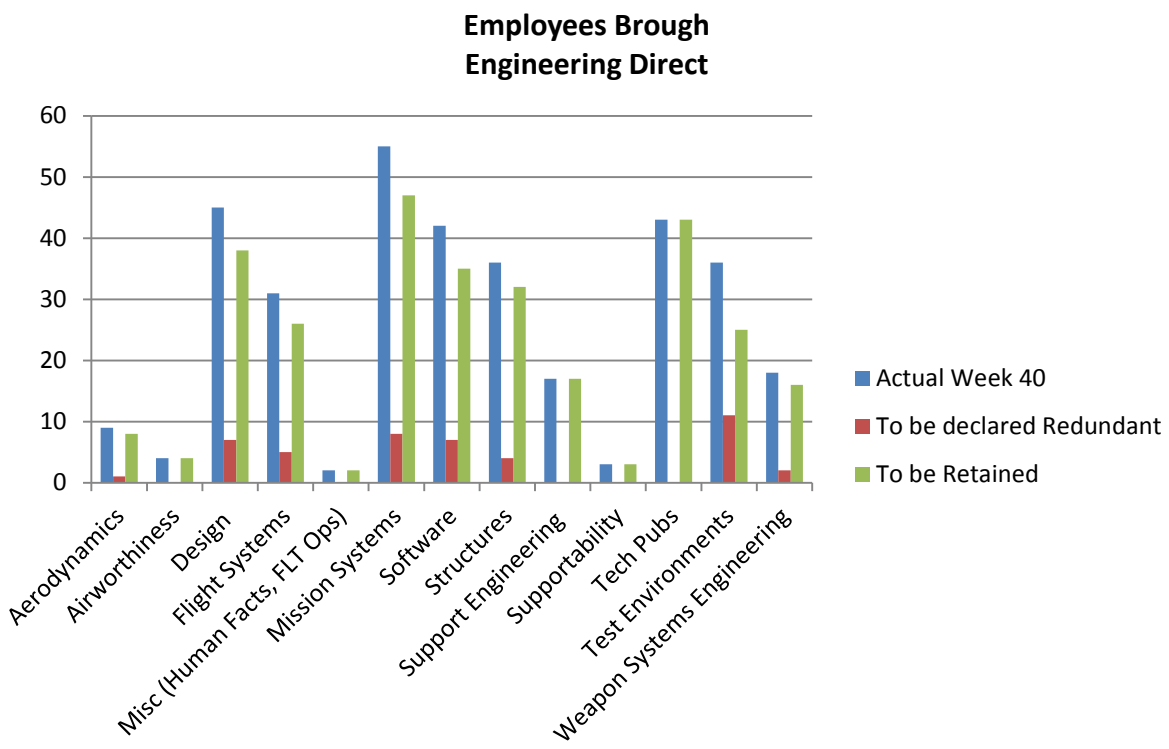


It can be seen that the impact falls most heavily on the skilled manual direct employees and on the support staff. The majority of engineering staff are to be retained.

Looking specifically at the two categories most affected, the charts below identify the particular skill areas:

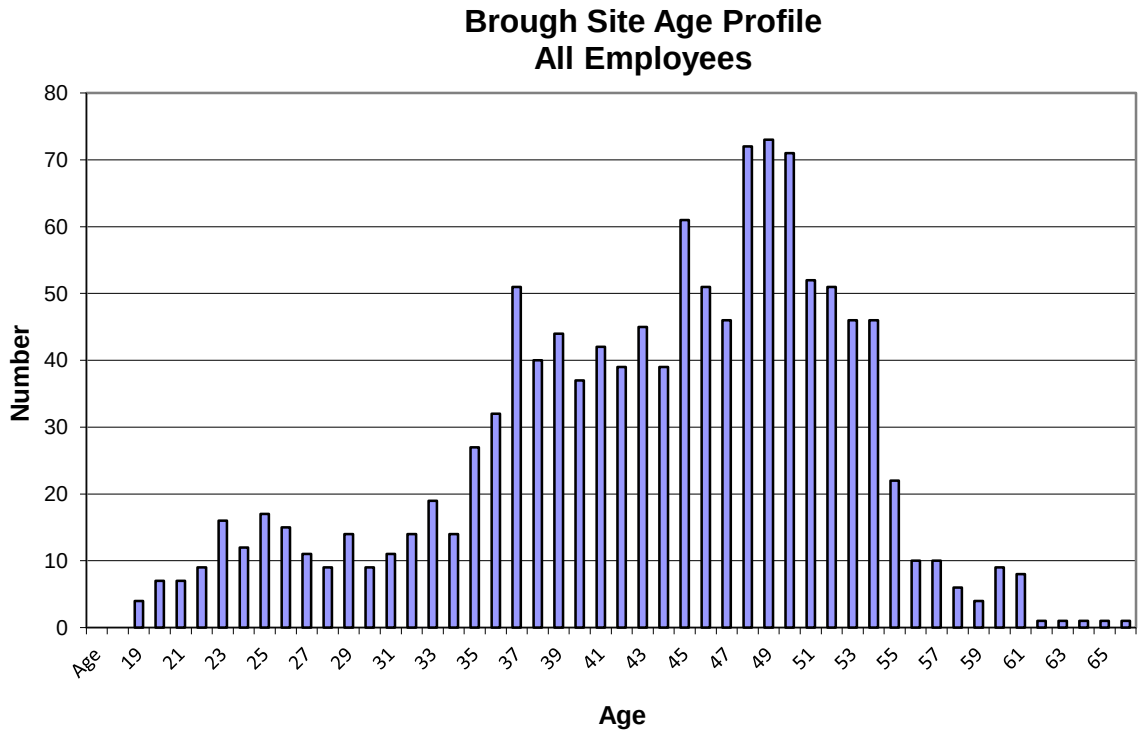


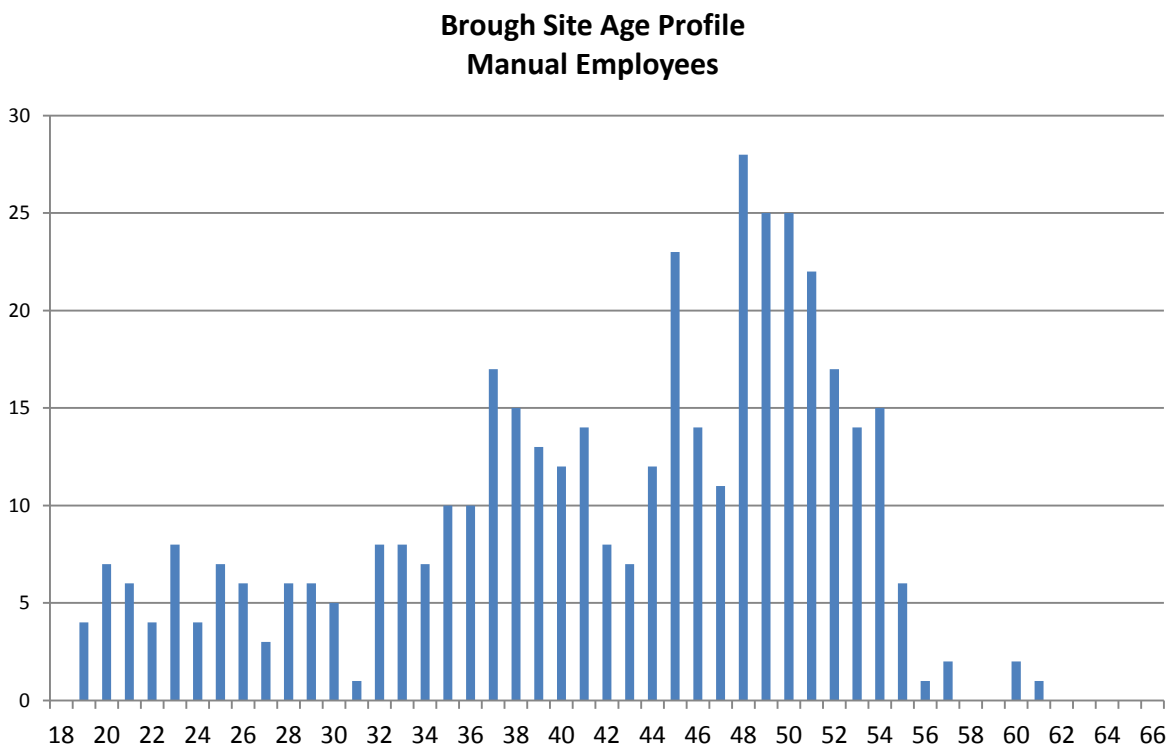




3.2 Age Profile

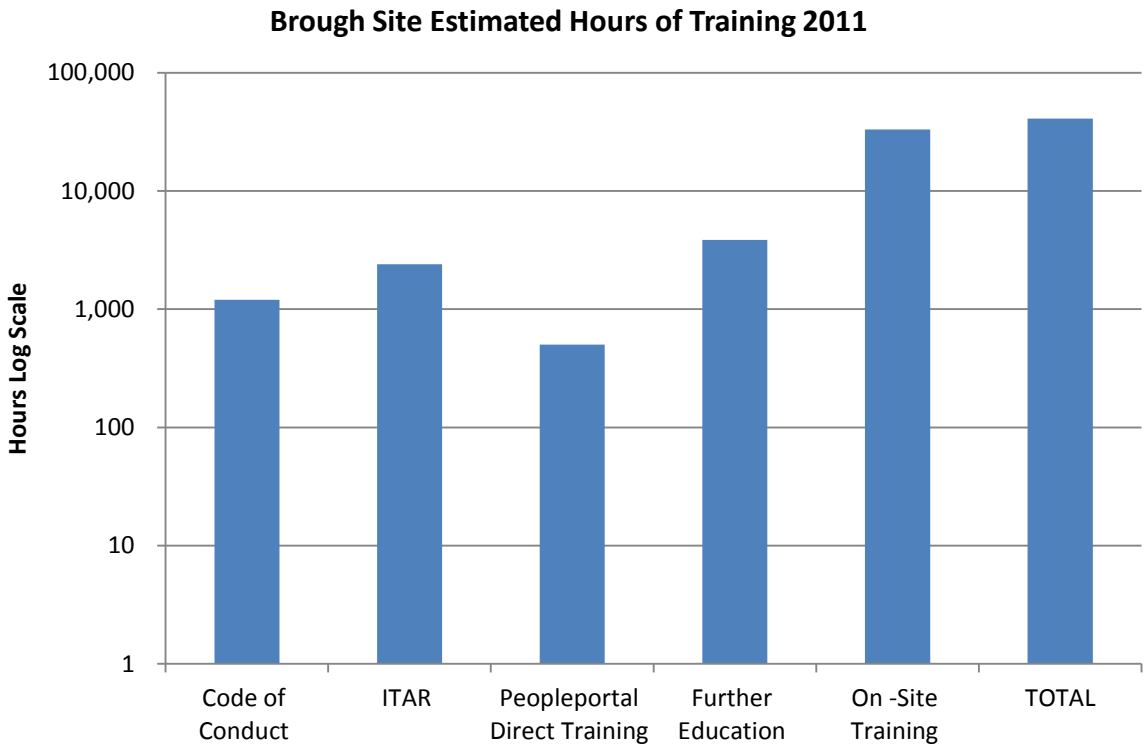
Due to the previous series of redundancy programmes, where the older employees have taken the option of early retirement, the remaining employees have a relatively young age profile.





The average age of all employees is 43.4 years and for manual employees mainly suffering the impact of the redundancy programme 41.8 years

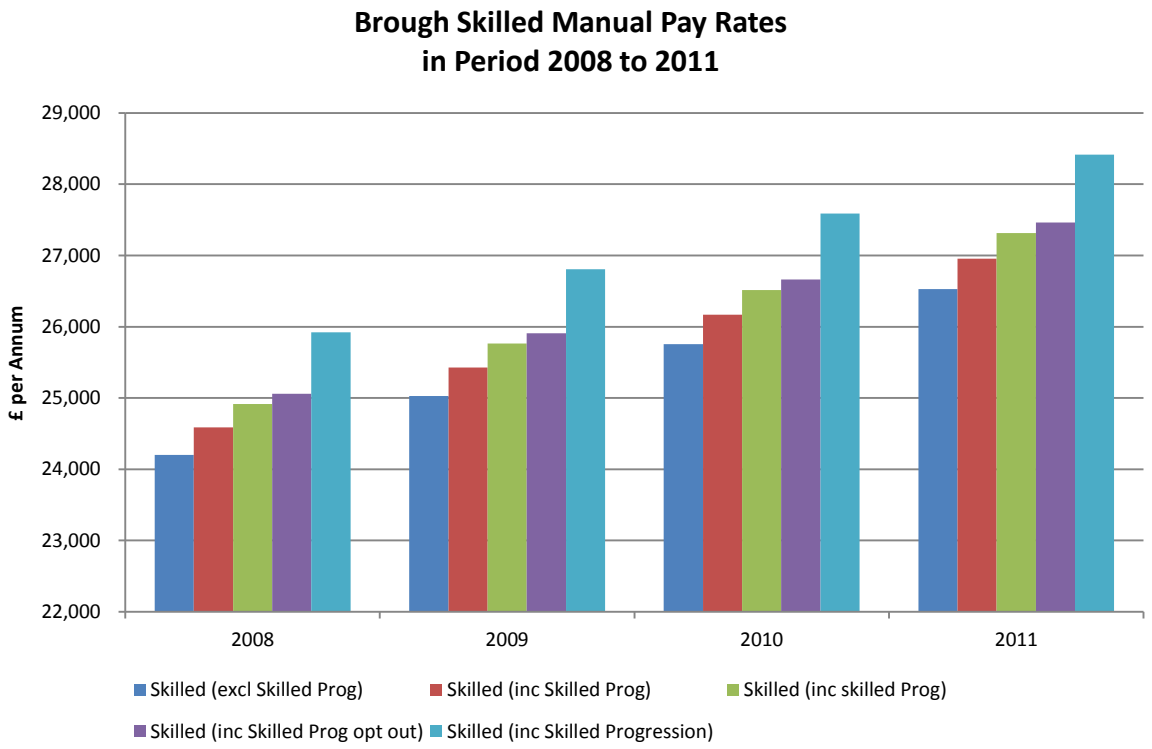
3.3 Training



There have been nearly 2,000 employee training sessions carried out in 2011with an average total duration of 21 hours equating to 3 days each of 7 hours. A skilled worker is defined as someone who has taken an Advanced Apprenticeship to NVQ Level III, including Key Skills and experience that make up the Technical Certificate. BAE Systems is recognised as an Ofsted Grade 1 apprenticeship provider, and is the National Apprenticeship Services Large Employer of the Year for Apprentice Programmes.

3.4 The Wage and Salary Structure

The focus of the analysis has been on the skilled workers. Wage rates per annum in the period 2008 to 2011 are illustrated in the chart below:

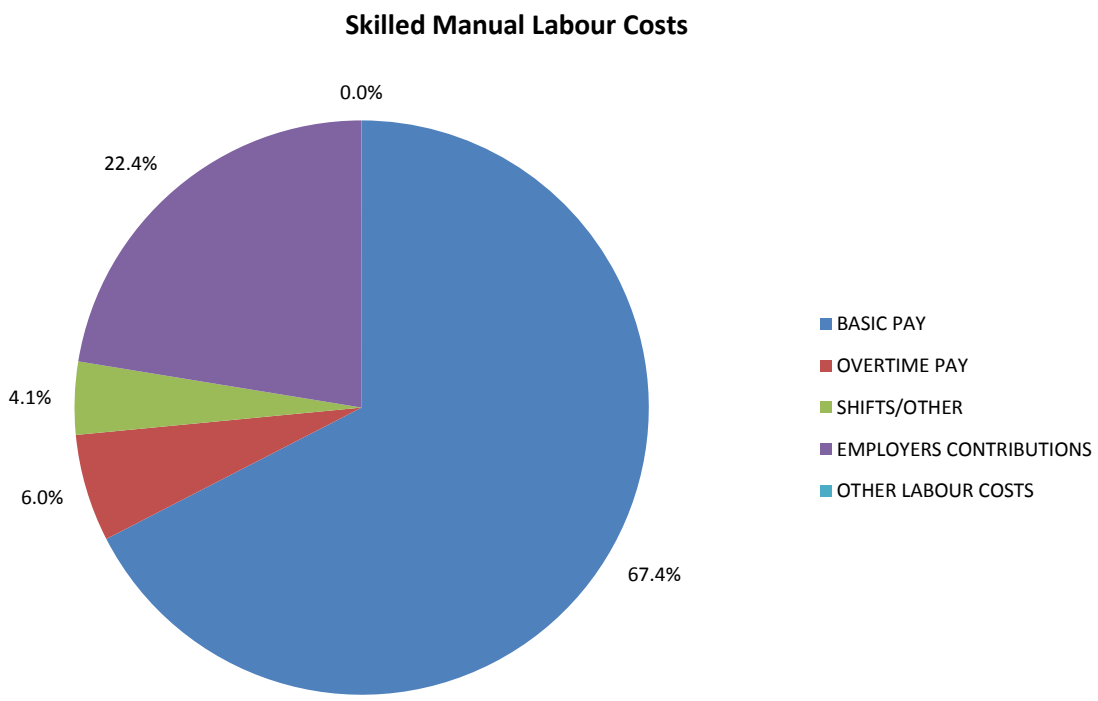


The average rate per annum in 2011 is £27,336 and the increase over the last three years has averaged ca. 9.6%, which equates to approximately 3.1% per annum compound. The spread between highest and lowest in 2011 is respectively £26,530 and £28,415.

We then looked at the effect of the additional costs for shift patterns, overtime and employers contributions using the three main operational areas A, B and C where most of the workforce is concentrated:

Skilled Manual Labour Rates

		Basic Pay	Overtime	Shifts/ Other	Employer Contributions	Other Labour Costs	Total Labour
Shed	A	6,043,893	966,213	501,775	2,190,132	-	9,702,013
Shed	B	3,390,385	130,059	68,400	1,022,977	-	4,611,822
Shed	C	7,267,914	400,274	443,523	2,340,117	1,615	10,453,443
Total		16,702,193	1,496,546	1,013,698	5,553,226	1,615	24,767,278



A review of remuneration levels in Yorkshire and the North East, based on previous work, enabled us to select four companies engaged in high technological manufacturing in the oil and gas sector and the results are set out in the table below.

	A	B	C	D	Average
Average Remuneration per Employee	£ 32,101	£ 32,725	£ 31,862	£ 28,567	£ 31,314

It can be seen that the current wage and salary levels at Brough are not out of line with other employers.

4. Assessment of the processes, knowledge and skills of the people

4.1 Background

An essential task was to undertake an independent assessment of the processes employed and the knowledge and skills of the people who are to be made redundant following the closure by BAE of manufacturing operations at the Brough site. An established benchmarking process has been used that is also used to identify acknowledged best practice achieved by leading UK and European manufacturers. Two assessment models were adopted:

- Capability Map

Appropriate members of the management team were required to provide written answers to selected set questions that could be scored against a database of established best practice.

- Capability Footprint

This assessment process requires a group of people to identify the importance of specific business characteristics and to select answers matching their attainment level. This Capability Footprint was completed by groups from the Management Team and also appropriate union representatives. (This process has been developed and verified in conjunction with the Manufacturing Advisory Service in the West Midlands, MAS-WM)

Both these assessment models use the same categories for making the evaluation, which were derived from reviewing the performance of leading manufacturing companies in the UK and Germany. It had become evident that companies with clear, well-defined business processes involving people working together in empowered teams were the most successful.

All businesses are different, but at a high level there are a number of common core processes that must be managed effectively:

- Identifying customer needs
- Designing products
- Designing the processes needed to manufacture new products
- Managing manufacturing operations
- Managing supply chains (Logistics)
- Winning orders

These common activities/processes are embedded in the following sections of the Capability audits used in this evaluation:

a) Customer Focus
b) Logistics and Operational Efficiency
c) People Effectiveness
d) Product and Process Innovation
e) Business Development

f) Financial Management

These aspects of a business can be regarded as the essential 'building blocks' for a successful company. The following appraisals have been undertaken:

Capability Map - completed by the management team

Capability Footprint - completed by the management team

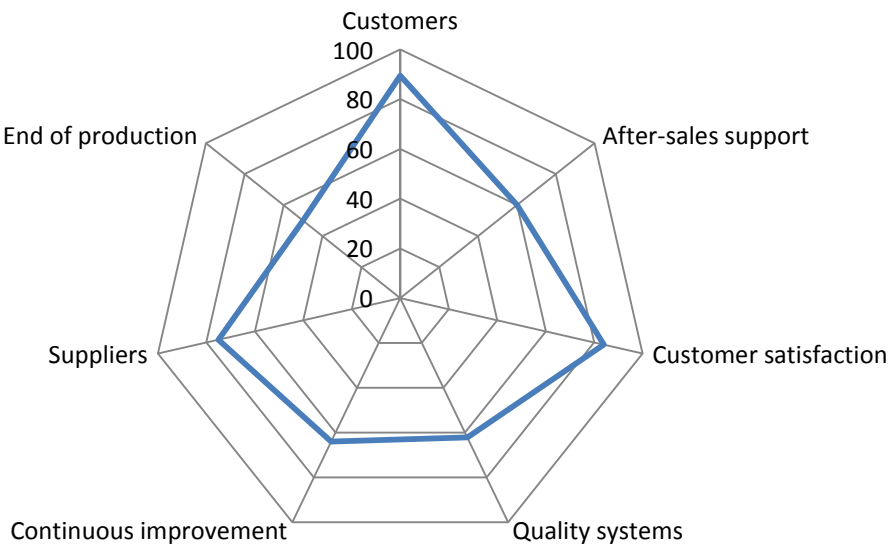
Capability Footprint - completed by the union representatives

4.2 Summary Results

The detailed results of this extensive appraisal exercise are contained in a large document which is available as an Annex to this Report. This includes all of the Capability Footprint results, which due to space and the desire to achieve a reasonable balance to the main body of the Report could not be included. Set out below is a summary of the main findings for sections a) to d) resulting from the Capability Map analysis:

a) Customer Focus

Customer Focus			
Section	*Maximum Score*	*Actual Score*	*%*
Customers	95	85	89%
After-sales support	45	27	60%
Customer satisfaction	75	63	84%
Quality systems	45	28	62%
Continuous improvement	50	32	64%
Suppliers	40	30	75%
End of production	20	10	50%
Summary	30	20	67%
Total Score	400	295	74%

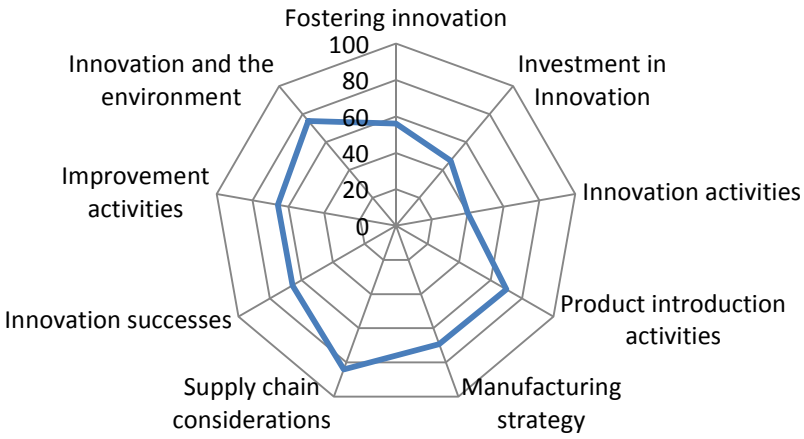


The BAE Systems Brough site has established good interfaces with its customer base and developed a number of specific approaches for identifying and meeting the need of customers and potential customers for military aircraft. The Capability Footprints demonstrate that employees across the business understand the importance of their customers to the business. The management team recognise that all aspects relating to customers are critical to the business, whilst the union team consider they are performing to a level beyond their customer expectation in respect to improving customer satisfaction and continuous improvement. Overall both teams generated similar high scores regarding their performance for each of the sections. This is supported by the scores for the Capability Map but this shows probably a more realistic overall result as to its approach to customer focus. Overall the results are acceptable compared with companies entering the MX Awards, but there are considerable opportunities for improvement.

b) Innovation in Products and Process

Innovation in Products and Process			
Section	***Maximum Score***	***Actual Score***	***%***
Fostering innovation	105	59	56%
Investment in Innovation	15	7	47%
Innovation activities	70	28	40%
Product introduction activities	30	21	70%
Manufacturing strategy	130	90	69%

Supply chain considerations	50	42	84%
Innovation successes	35	23	66%
Improvement activities	50	33	66%
Innovation and the environment	40	30	75%
Summary	30	18	60%
Total Score	555	351	63%



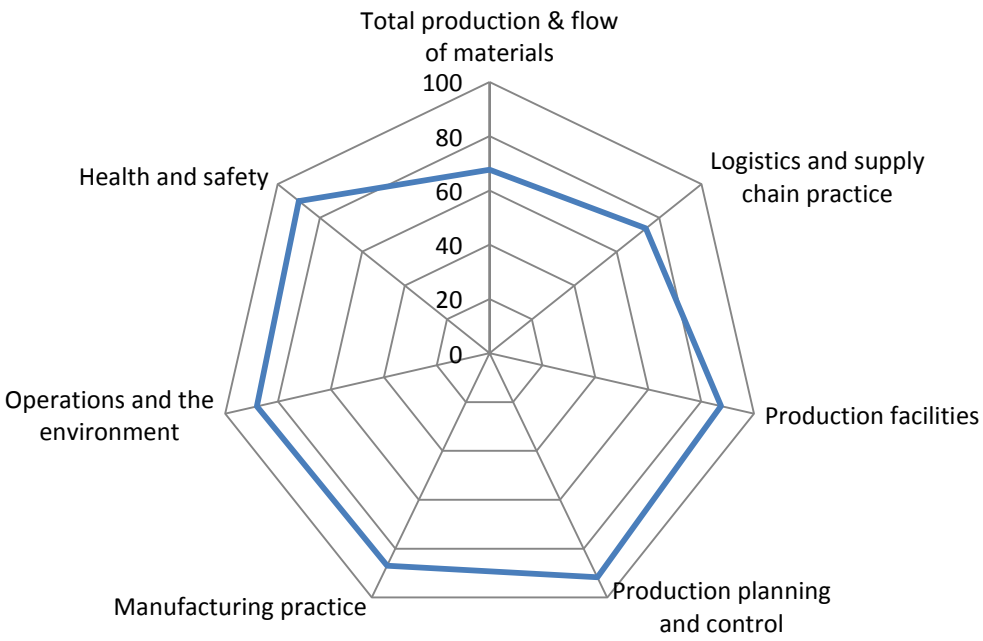
The site has not been involved in the launch of any new aircraft programmes for several years and hence it was not possible to provide quantified information on significant new products for the Capability Map. The design and manufacturing systems for Eurofighter and the American JSF, which BAE Systems are responsible for, have been undertaken at their other sites. The Footprint scores are very high compared to the Capability Map scores. This demonstrates that people on site are aware of the good practices associated with the introduction of new products, but suspect these are associated with specific projects. However, people working on developing new components for onsite manufacture and designing the Mantis prototype UAV will have acquired these skills. The depth of people's capabilities to design, develop and manufacture complex new products without training would require further evaluation.

Manufacturing operations have been responsible for introducing several new components. These have usually been existing products transferred from other BAE Systems facilities. This transfer of work, often on short lead-times, has allowed the manufacturing team to develop a flexible workforce that is capable of adapting to a changing product mix. Those who will remain on site have the skills needed to develop new products and associated manufacturing processes, as was demonstrated by the team responsible for developing the Mantis UAV.
People on site have demonstrated a willingness to change and innovate by the number of Chairman's Awards for Innovation they have received. These are proudly

displayed around the site, which again shows people's commitment to continuous improvement.

c) Logistics and Operational Efficiency

Logistics and Operational Efficiency			
Section	***Maximum Score***	***Actual Score***	***%***
Total production & flow of materials	105	71	68%
Logistics and supply chain practice	80	59	74%
Production facilities	40	35	88%
Production planning and control	85	78	92%
Manufacturing practice	115	100	87%
Operations and the environment	25	22	88%
Health and safety	20	18	90%
Summary	30	26	87%
Total Score	500	409	82%

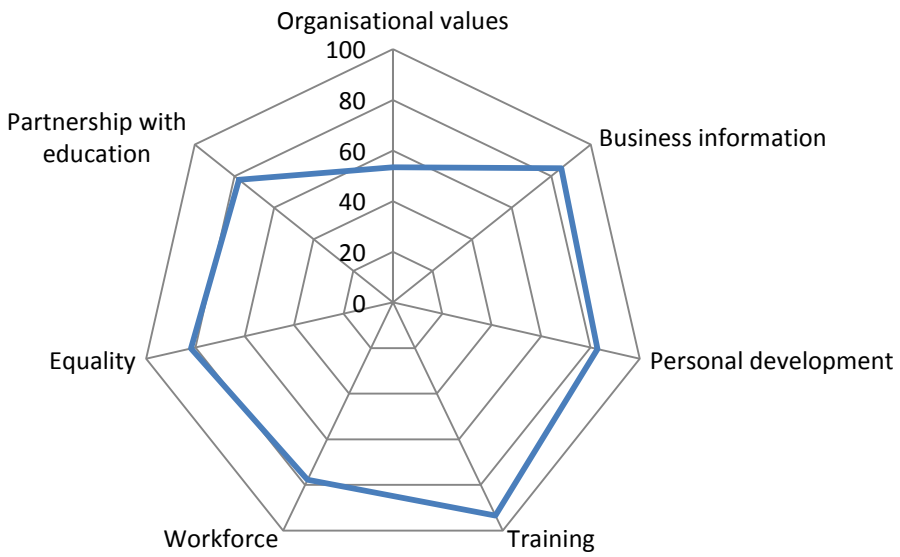


The high scores for the Capability Map and Capability Footprint for both the management team and the union representatives confirm that manufacturing is the site's greatest strength. The scores for Capability Map are consistently high but show managing the supply chain activities and increasing the flow of materials to reduce inventory level is an area for improvement. This aspect might be improved by appointing a single person to own the master production schedule and take full responsibility for delivering product on time and in full to customers. However, managing complex supply chains and logistics for a wide variety of components with low production volumes is notoriously difficult. The Capability Footprints show the business has achieved good performance levels on material flow and managing inventories, but it is suspected that these judgements are based on few areas of the factory and not consistently across the supply chain.

Overall, the factory operates to a high standard of logistics and operational efficiency. The production facilities were installed in the 1990's to manufacture Hawk, and these would have been exemplary at that time. Many of the principles of good manufacturing practice are embedded in employees at Brough and these are still relevant today. It is considered that people in manufacturing operations have the necessary experience and skills to incorporate these concepts into a variety of new production facilities. This has been demonstrated by the way new components have been introduced to supplement the declining Hawk workload. Considering this level of manufacturing competence and maturity of people in embracing change, with the appropriate training, they would be an asset to any company setting-up production facilities on the site.

d) People Effectiveness

People Effectiveness			
Section	***Maximum Score***	***Actual Score***	***%***
Organisational values	60	32	53%
Business information	40	34	85%
Personal development	70	58	83%
Training	120	112	93%
Workforce	85	66	78%
Equality	55	45	82%
Partnership with education	45	35	78%
Summary	30	25	83%
Total Score	505	407	81%

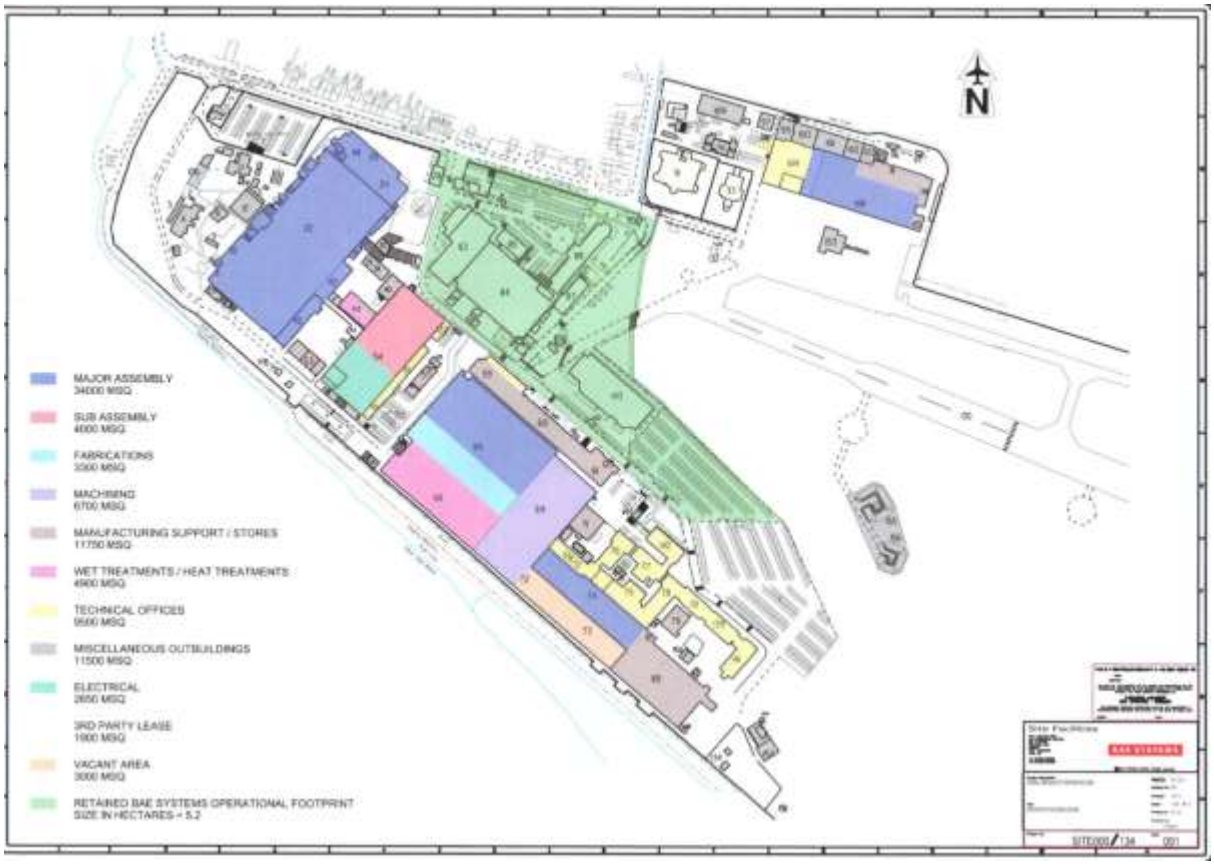


The scores for the Capability Map are consistent apart from organisational values which scored low, due to the lack of information provided. However, having spent time with people on site, it is clear that the company has demonstrated sound organisational values. The scores for the Capability Footprint are relatively similar, apart from the unions view on reward schemes.

The site is due to initiate its closure programme from July 2012; however the workforce, particularly the union representatives, were willing to play a full part in helping the Civitas team make an independent assessment of the capabilities of employees and their approach to work. Positive impressions were obtained, reflecting the many years of pride people felt resulting from working at Brough. The site has been subjected to a succession of redundancy programmes over the past several years. However, the company adopted a policy of redeploying existing employees and providing them with the necessary training. Therefore, people on site were well trained and had been given the opportunity acquire a wide range of new skills. The jobs vacated by older employees appear to have been filled by the younger people willing to take on new challenges and gain wider experience. This has resulted in a group of young, motivated, multi-skilled people capable of undertaking a range of tasks.

5 The Brough Site and Facilities

5.1 The built up area of the site is shown below. The area to be retained by BAE Systems, coloured in green is approximately 5.2 hectares



Areas Major Buildings

	Square metres
Major Assembly	30,000
Sub Assembly	4,000
Fabrications	33,000
Machining	6,700
Manufacturing Support / Stores	11,750
Surface and Heat Treatment	4,900
Technical Offices	9,500
Electrical	2,650
Miscellaneous Outbuildings	11,500
Vacant area	3,000
Third Party Lease	1,900
Total	118,900

Although it has not been practical to undertake a detailed survey, the general standard of the buildings appears good, despite the structural framework in some being relatively old. The new machine shop was built in 1981and building 54 (C shed) was re-roofed in 1987. The production sheds were re-clad in 1994. We are informed that there is no significant risk of asbestos hazard.

There is extensive provision of overhead gantry cranes in all buildings (A full schedule is provided in Annex II). Most of the flooring is in good condition and is all of load bearing quality with the machine shops capable of taking heavy machinery.

BAE SYSTEMS BROUGH CRANE LIST

			RANGE		
BUILDING	**LOCATION**	**NUMBER**	**SWL tons**	**LIFT HEIGHT (m)**	**SPAN (m)**
65	A-SHED	11	0.5 to 5.0	3.5 to 7.0	7.0 to 12.0
22	B-SHED	14	0.75 to 2.75	4.0 to 6.6	8.0
54	C-SHED	5	0.5 to 5.0	3.5 to 5.0	3.5 to 10.0
74		1	2.5	7.0	13.0
66	K-SHED TREATMENTS	14	0.15 to 2.0	3.0 to 6.0	4.0 to 11.0
65	K-SHED TREATMENTS	1	2.0	3.5	
80	MACHINE SHOP	5	All 2.0	All 4.0	All 11.0
73	N.C. MACHINES	3	All 2.0	4.5 to 7.0	All 11.1
72	N.C. MACHINES	4	0.5 to 2.0	3.5 to 4.5	3.7
69	PROD / MACHINE SHOP	13	0.2 to 0.5	2.5 to 3.5	2.5
66	PROD / MACHINE SHOP	2	0.5	4.0	?
118	REPAIR CENTRE	1	3.5	8.0	?
24	REPAIR CENTRE	1	1.5	4.0	?
60	RKD	1	2	3.5	5.0
109	S.T.F. MACHINING	1	1	3.0	?
84	S.T.F. PRODUCTION	5	1.5 to 5.0	4.0 to 10.0	15.0
42	TAILPLANE BUY OFF	1	5	4.0	8.0

The maximum lifting capacity is 10 tons and maximum lift heights and spans are 10 metres and 15 metres respectively. There is a very large amount of floor space available that could be used for a variety of manufacturing operations. The constraint is in terms of lifting capacity for any type of heavy engineering where the costs of providing larger cranes would be prohibitively expensive, due to the major modifications required to the structures of the buildings and foundations.

The focus of the comments below is on the buildings other than the main assembly and fabrication shops as these, once the transfer of jigs and other equipment is completed, will essentially be empty.

5.1.1 Heat and Surface treatments

We start with this section as this is where the largest recent investments have been made and where there would be a direct opportunity to attract a third party company engaged in a similar activity to acquire as a going concern. The facilities include processes for organic and inorganic treatments and the application of protection and paint systems:

Solution Heat Treatment
Chemical Etching
Anneal & Super Anneal
Precipitation
Stress Relieving

Paint Spray
Zinc Spray
Cadmium
Chromic Acid Anodising
Alocrom

For a variety of materials including:

Aluminium Alloys
Mild Steels
Stainless Steels
Titanium Alloys

In addition there are vacuum blast and non-destructive testing facilities available.

A full specification is set out in Annex IIa)

5.1.2 Duct and Pipe Manufacture

The facility is regarded as a centre of excellence and can produce a large number of products using seam/spot/tig and longitudinal welding including:

Small bore pipes from 5mm to 18mm diameter
Large bore pipe details, large and small welded assemblies

In a variety of materials, including:
Aluminium
Titanium
Stainless Steel
Nimonic

There is a high and low pressure testing facility to prove the integrity of the pipe assemblies. It would appear there is an opportunity to investigate establishing some form of cooperation with other aerospace companies that have similar requirements for complex ducts and pipes in very difficult to work materials, to meet stringent standards.

A full specification is set out in Annex IIb)

5.1.3 Electrical

The capability covers a wide range including:

Connector assemblies
Aircraft wiring looms,
Military cable assemblies
Military wiring harnesses
Missile pylon wiring harnesses

Specific products and activities include:

Large and small Harness Manufacture
Braided Harness Manufacture
Installation of Harnesses into structures
Mechanical Assembly of Electrical Boxes and Panels
Electrical Wiring of Boxes and Panels
Automated Electrical Testing of Cable Harnesses, Boxes, Panels and Racks
Workstations.
Wire and Connector Kit preparation
Automated Smart Wire Laser Marking
Automated Harness Laser Identification Marker
Printing System
Automated Harness Identification Marker Printing System
Automated Panel Identification Marker Printing System
Form-board Printing
Crimp Tool Calibration

There has been some investment in UV Laser machines for laser wire identity marking of wires and cables (now accepted as the new Aerospace Industry standard), being a safe, permanent, non- aggressive method of directly marking a large range of the latest high performance grades of insulating materials. New automated braiding machines have also been purchased. Further investment in automated cutting and crimping machines would be desirable to conform to latest best standards and achieve substantial improvements in productivity and reliability. Such machines, however, cost ca. £ 250,000 each. At present, force gauges are used for testing contact retention and millivolt drop tests are carried out for electrical quality of terminations.

A full specification of the equipment is set out in Annex IIc)

5.1.4 Hydraulics Department

This is small in comparison with the other operations; but we were impressed by the skills and enthusiasm we witnessed. They maintain and calibrate a whole range of hydraulic test and manufacturing equipment. It would make an ideal small MBO or potentially could be acquired as a small independent business.

5.1.5 Forming and Fabrication

Stretch forming and fluid forming machines with capacities up to 250 tons are available, which together with 3m and 5m press brakes provide a comprehensive facility used to produce structural components. There is also a 5 axis router and other conventional routers. Various degreasers, auto de-burring, croppers, plasma cutting and a range of benches and hand-tools complete the operation.

5.1.6 Machining

We were impressed by the skill levels, but the majority of the machines are old. The average age is 25 years, the oldest 42 years and the most recent investment was one machine in 2006. The book value is zero. Despite this situation some very

challenging work is undertaken. It includes machining of top and bottom wing skins, front, rear and auxiliary spars that form an integral part of the wing torsion box structure. All are complex. The wing skin process includes the "creep forming" of the airfoil shape of the completed wing surface. Manufacture of predominantly aluminium components, but with some titanium and other hard materials, is undertaken utilising various 3 and 4 axis high speed CNC milling and turning machines. The grinding machines are particularly old. The overall workload consists of numerous parts ranging in size and shape.

There is also a separate tool room; the machines in it are more reminiscent of a museum than a modern machine shop.

A full specification of the equipment is set out in Annex IId)

5.1.7 Training Centre

There is also the opportunity for the site to be used in some capacity as a training centre. The Business Secretary Vince Cable announced plans to create an extra 100,000 apprenticeships and in his speech launching this in February 2011 he highlighted issues around administration and employers liability as a hurdle for small businesses. As BAE SYSTEMS is recognised as an Ofsted Grade 1 apprenticeship provider, and indeed are the National Apprenticeship Services Large Employer of the Year for Apprentice Programmes, there are the necessary skills, capability and infrastructure to support this government objective. If the region is to grow its capability in supporting new business coming into the area, a training centre on the Brough site could support the region for both apprenticeships and conversion training.

5.2 Summary

In general, apart from the heat and surface treatment areas and the obvious requirements for jigs and fixtures associated with specific aircraft build, there has been little capital investment in Brough in recent years. The machining facilities, with few exceptions, do not reflect current technologies and processes. Any third party company would need to make the necessary investment in modern productive plant and machinery in order to secure essential levels of productivity and quality and not least flexibility to changing demands. In this context, the availability of 100% capital allowance takes on a real significance.

5.3 Potential

The available site represents a good potential for conversion into an Industrial Park occupied by a number of third party companies both in aerospace and from other industrial sectors. It would, however, require some investment in infrastructure to facilitate access and probably this would involve demolition of some of the smaller link

buildings. BAE Systems is currently undertaking an evaluation of the scope and cost of the work required, but this is not available at the time of completing this Report.

There is a large amount of free office space available, generally in close proximity to the buildings and this provides a further advantage. Utilities in terms of power, heating and water are available, but some work will be required if the existing areas are sub-divided.

The other major consideration is the future of the runway. If there is any prospect of developing the manufacture of small civil aircraft or components on the site, then retention of the runway will be critical. We have been informed that "Airbus" type skills would be the quickest to re-establish. As we understand, there are plans for the sale of part of the land, currently occupied by the runway, for new roads and housing development, which would result in the useable length being further reduced.

Initial estimates show this work would provide employment for around 100 direct and indirect workers peaking around 2015 and then declining until 2017 were no further orders to be secured. There would also be a requirement for supervisory staff. The manufacture of the components required for the assemblies is also to be sub-contracted and if this were to be retained in house, further jobs could be retained.

6 The Mission to attract Third Party Companies

6.1 The Major Aerospace Companies

As a priority, visits to meet the Chief Executives of the following companies have been undertaken:

Cobham plc
Gardner plc
Goodrich Actuation Systems
GKN plc
Meggitt plc

A meeting with Rolls-Royce is planned but a date is yet to be confirmed.

The main objective was to ascertain in principle potential interest in taking advantage of the skill levels and other benefits relating to the Enterprise Zone at Brough. Further, their views and possible support for a re-engagement in the build of civil aircraft in the UK was sought (see section 8). The overall response to both points was generally positive. With respect to the former, most companies with civil work have full order books and are recruiting actively; but their strategy regarding location of manufacturing sites is already firmly established and we were told the incentives we described were in themselves at this stage insufficient for them to be persuaded otherwise. There was reference in some cases to the incentives provided by Governments in other overseas countries and the

desire to follow the business i.e. to ensure manufacturing facilities are located proximate to market and customer.

The concept of re-engagement in the build of single aisle civil aircraft in the UK also brought some positive re-action. Views vary from belief there is already insufficient skills and experience available in the UK to make such a project feasible to one where the project is impossible because the UK would not provide the necessary funding in comparison with that available say in China, Japan or Brazil, or a combination of both.

Generally, the view was that overseas countries were already far advanced in this area and the funding made available was of an order that they felt the UK Government was unlikely to match. There was an interesting comment that some UK aerospace companies had overly concentrated on winning orders from Airbus and the potential from Boeing had not been fully recognised. Such an initiative would require UK Government support. Opportunities from the Chinese market were in the main regarded as of little interest due to a fear that it would result ultimately in the loss of intellectual property with no other serious long term benefit.

There was general criticism of absence of a long term strategic direction available from the Government, although some encouraging reference to work done by Mark Prisk. It was encouraging that frequent reference was made to the key differentiator being the skills in manufacturing technology when competing in international markets.

6.2 The BAE Systems Skills Fair

As part of their commitment to mitigate the impact of the intended redundancy programme, BAE organised an on-site skill fair that attracted substantial interest from a large number of companies not only engaged in aerospace, but also from other industries including the oil and gas sector (see Annex III for the full list of companies, excluding recruitment agencies and consultancies that were represented). The objective of the fairs was to encourage offers of employment to the workforce; but this inevitably would mean for the majority of people moving out of the area and the consequent dilution if not disintegration of the nucleus of skills and experience. It is a laudable objective, but one which can only be regarded as very much inferior to retaining the majority of the employees at Brough.

The skills fair also had a particular relevance as far as this Civitas Project is concerned in that by definition the companies attending were seeking to recruit and this was reinforced by the fact that the individual booths were manned by senior managers from the respective companies. It was evident that many of the companies were enjoying full order books and that recruitment of new employees with the requisite skills, qualifications and experience was proving difficult. Discreetly we were able to interview a representative sample of the companies and ascertain that in the majority of cases the option to expand into the Brough site with its Enterprise Zone benefits would be worthy

of serious consideration. Most, but not all of these companies come from the oil and gas sector and include:

Cobra plc
Gardner plc
Wood Group PSN
Sub Sea North East
Sparrows Engineering & Operations
Penspen

6.3 Siemens Wind Turbines

It is understood that the German engineering conglomerate Siemens has given previous consideration to the use of the Brough site for the manufacture of wind turbines, but this was rejected because of the requirement for deep water facilities that Brough cannot provide. Prior to this BAE Systems had undertaken an in-depth appraisal of their own direct engagement in this sector utilising the facilities at Brough. The main components in a wind turbine including the blades, towers, gear boxes, electrical components, etc represent potential opportunities for BAE utilising their current skills in composites and other areas of advanced engineering.

In January 2011 Siemens announced that together with the Associated British Port's (ABP), they intended to develop and build at the Alexandria Dock in Hull what will be Britain's first major offshore wind turbine manufacturing plant. It is understood that ABP will receive about £20m for the development from the government's ports upgrade fund. Siemens' proposed plant is to cost £80 million and will create about 700 jobs, it was further announced. Industry sources estimate that the proportion of UK-sourced components in on-shore wind farms is as low as 6% and thus this development is of considerable significant not only for Hull, but for the whole of the UK economy, given that the plans for the rapid installation of wind turbines off the British coast in fact were to be realised.

An announcement was made by Siemens on 13 December 2011 that planning applications for the new wind turbine factory to be opened in late 2014 have been submitted. The estimated cost had increased to £200 million.

We have been informed that Siemens has been reticent so far to enter into dialogue with either BAE or other interested parties, but now with the announcement of the planning application and the Enterprise Zone it may be possible to re-consider the use of part of the Brough site for manufacture of some of the major components. The main assembly sheds offer substantial floor space, high clearance and long span gantry cranes all suitable for such a use. The alternative would be to build new facilities at the Alexandria Dock but presumably at higher initial capital cost.

6.4 Other possible local interest

In this respect, Gardner Aerospace with a plant located on the periphery of the Brough site represents the best opportunity. Gardner is one of the UK's largest and successful aerospace metallic component suppliers with revenues of ca. £85 million and over 700 employees working on eight manufacturing sites.

The constraint, however, is that apparently they have long term contracts for the lease of their current premises in Brough and have sufficient space for their immediate requirements. Despite this, there are opportunities for further discussions, particularly because of the specific nature of the work they undertake, which includes machining, fabrication, heat treatment, assembly in soft and hard metals. Apparently, Gardner has an "alliance" of managed supply chains in India and there could be opportunities for the repatriation of some of this work were the advantages of the Enterprise Zone to be available.

6.5 The role of the LEP and the Enterprise Zone under the direction of Lord Haskins

There is clearly a requirement for the closest coordination and common purpose between the various interested parties if success is to be achieved in protecting the jobs of the 900 highly skilled people at Brough facing redundancy. The declaration of the Enterprise zone, the associated provision of the 100% capital allowances and not least the appointment of Lord Haskins as Chairman of the Humber LEP may be regarded as valuable contributions towards achieving these objectives.

The agreement between BAE and Civitas to a joint initiative to enter into further discussions at a senior level with other third party companies with a potential interest in both the skilled employees and the site is a further important step towards the concept of an industrial park. If at least one "large corporate" can be secured, this would act as a magnet in encouraging other companies to follow.

The other major element is ensuring that the relevant Ministers are apprised of these developments and encouraged to consider funding to allow the necessary modifications to the infrastructure that will be required. We are confident that Lord Haskins with his high level contacts is in the best position to achieve this and through his office should take the lead position on the Project.

7 Strengths, Weaknesses, Opportunities and Threats (SWOT) Analysis

Meetings have been held with members of the Main Board of BAE Systems, the BAE management team on site, the trade union representatives, others working onsite, the LEP under Lord Haskins, aerospace industry leaders, politicians, industrialists, university academics, and the local BIS director in an endeavour to secure as wide a spectrum of opinion as possible. This information, taken in conjunction with the analytical appraisals we have undertaken of both people and the facilities, provides the basis for this SWOT analysis

7.1 Strengths

Politicians from all three main parties have expressed a commitment to retaining the jobs and related skills at Brough and have been active in visiting the site and meeting the workforce

Senior politicians David Davis (Haltemprice and Howden, Conservative) and Alan Johnson (Kingston upon Hull West and Hessle, Labour) together with other local MPs Diana Johnson, Andrew Percy and Karl Turner are committed to supporting the retention of highly skilled jobs in Brough

Secretary of State for Business, Vince Cable, has been consulted and supports the need to retain skilled jobs in high value manufacturing industries and is willing to consider viable proposals for investment

House of Commons Debate on 24 Nov 2011 (see Hansard) focused on the situation at BAE Systems, Brough. The government was urged to act swiftly in order to preserve the UK's defence production skills base

Site designated as an Enterprise Zone with advantageous capital allowances, with other possible financial inducements for companies interested in manufacturing at Brough

LEP Board established, chaired by Lord Christopher Haskins and Vice-Chair David Ross. (The board comprises 14 members, nine from the private sector and five from the public sector)

Extensive professionally produced publicity materials are available to promote the advantages and services available around the Hull Area, such as

‘Welcome to Humber Global Gateway’ - Humber Economic Partnership

Employees have been well trained with skill sets that are in demand by companies working in civil aerospace, oil and gas, wind turbines manufacture, installation and service, pharmaceuticals, energy, chemical and such

Job fair on site (5 December 2011) attracted over 83 companies who sent senior people to recruit

Employees trained in a number disciplines – business management, product and process innovation, manufacturing and supply chain operations and personnel management

Employees on site are relatively young with a range of relevant experience, due to older people taking advantage of previous redundancy packages and their job roles being filled by people on site

Highly skilled manufacturing workforce who are fully aware of the latest initiatives aimed at improving effectiveness (lean, production planning, multi-skilled team work,

continuous improvement) as confirmed by the many Chairman's Innovation Awards they have received

Employees have the capability to develop new products and manufacturing processes, demonstrated by the Mantis project and the new work that has been brought on site

The site will retain the BAE Systems Advanced Engineering Structural and Dynamic Testing facilities employing around 400 people in a dedicated unit

The designated Enterprise Zone facilities consist of several discrete factories with good open spaces, moderate height ceiling, medium duty lifting equipment, load-bearing floors suitable for machining centres

Separate dedicated office buildings are available as stand-alone units.

New access road can be constructed to allow development of self-contained units

All buildings currently have heat, light and power and provision is to be made to meet the requirements of new companies taking up residence

Current centres of excellence include:

- Working surface and heat treatment facilities and expertise, with approvals and licences to process a wide range of both ferrous and non-ferrous components and materials
- Specialist pipe and duct forming (bellows etc) and bending facilities, means the capability to work with advanced aerospace materials e.g. nimonic, stainless steels
- Electrical harness manufacture to military aerospace standards – cable braiding, laser marking, electrical panel assembly
- Hydraulic test rig manufacturer, calibration, service and test
- Advanced Engineering Structural and Dynamic Testing to be retained by BAE Systems
- Long bed machining facilities for wing spars and such
- Metal forming of complex sheet metal parts

Good motorway and rail links

Site adjoins the estuary with access to the North Sea

Good affordable housing and local facilities available in Brough and surrounding villages

7.2 Weaknesses

BAE Systems management have announced the decision to end manufacturing at the Brough site with redundancy notices starting mid-year 2012 with closure by July 2013

Work on the site has been centred predominantly on traditional military aircraft technologies, manufacturing processes and service provision

No immediate new customers for the Hawk trainer, although new sales are being sought from the US military and other interested governments.

The broader skill sets to design, develop and flight certify aircraft have been relinquished as Brough has been integrated with other facilities such as Farnborough, Samlesbury and Warton which have taken responsibility for developing new aircraft systems and associated technologies

Products and services are purchased by government agencies, which have unique routes to market and trading arrangements, i.e. no exposure to wider commercial markets.

People have little recent experience of the more competitive civil aerospace market or being subject to full economic commercial pressures, therefore will require training to become accustomed to working with additional time and cost pressures

BAE Systems sold its financial holding in Airbus Industrie, relinquishing direct access to the growing civil aerospace market.

Plant and equipment, jigs and fixtures etc. needed for assembling the Hawk trainer aircraft are being transferred to other BAE System's sites

Modern machining centres and manufacturing equipment that can be readily moved are also being transferred to other sites. (This standard equipment is not difficult to replace, if capital were available)

BAE Systems are taking all existing work schedules to other sites, apart from work for Structural and Dynamic testing; this makes it more difficult for employees to establish their own businesses

Few key high technology centres and specialist technical resources (with critical mass) are available in the area, apart from those currently at Brough

Few aerospace manufacturing companies in the Hull area, apart from a Gardner Aerospace machining facility, which has several Brough trained employees

Low investment has been made on site to develop a new aircraft or other projects to enhance the employees advanced engineering skills

No attempt by the company to develop the site's core competencies into a broader range of products that could sustain the site in the event of a significant decline in military equipment

The existing runway is potentially being acquired by property developers for commercial property, housing and retail outlets, preventing any possibility of building and flying aircraft in the future

UK and European aerospace companies have expressed no demand for additional manufacturing facilities to supplement their existing aerospace businesses

Investment in the site will be needed to provide good access roads, separate power supplies, and security fencing for the military work being retained on site

7.3 Opportunities

Identify and acquire meaningful financial inducements for companies considering investing in additional facilities

Establish an advanced business and manufacturing training centre on the site to ensure people have access to the essential skills needed for a competitive company

Provide mentoring and support to transform the current centres of excellence that currently exist on site into standalone viable businesses

Identify key aerospace components based on new technologies that make them commercially attractive to the civil aircraft market. For example the manufacture of lightweight seats, seat mounts, food and service trolleys etc using metal coated thermoplastic materials. This new application of metal plating technology allows significant weight reduction over conventional materials. (Studies have estimated over the 25 year life of an Airbus A330 a saving of between € 1500-2000 is achieved per kg gross weight based on fuel costs at €0.4 per litre)

Use financial inducements to attract aerospace and other industrial companies seeking to install additional manufacturing facilities in the UK for their new products:

Meggitt is proposing to invest in a large heat exchanger manufacturing facility

Goodrich is building a factory to manufacture energy capture and release flywheel devices for passenger vehicles

Identify companies in the oil and gas industry who are considering increasing their presence in the North Sea. (Woods Group, Sparrows, PSN and others have expressed a possible interest)

Explore possibilities with Siemens wind turbines to create a centre of excellence in the Hull area and build the critical mass needed to attract suppliers, installation companies, service agents and maintenance facilities.

Explore the opportunities with the Humber LEP for developing an area of excellence for the nuclear power industry and supplement the greener renewable energy sources

7.4 Threats

BAE Systems exit the site before commitments for alternative work has been secured from other companies

A significant number of the best employees decide to accept new jobs and relocate, leaving the area deprived of its most attractive asset

The government fails to provide the necessary funding and incentives to make the site into an attractive commercial proposition

Further cuts to the defence budget and other capital projects restrict opportunities for entrepreneurs to develop viable new businesses

South Yorkshire offers alternative more attractive venues and resources to possible investors.

The Hull area does not prove to be sufficiently attractive to companies

8 Conclusions and Recommendations

8.1 Timescales

The opportunities identified in this Report have only a small window of time in which they can be implemented. The declared redundancy programme is due to commence at the latest at the end of 2012; further, and even more critically, unless there is clear evidence of action, inevitably a significant proportion of the workforce will either accept skilled jobs geographically remote from Brough or will take lower grade jobs in the vicinity.

8.2 Action

There is clearly a requirement for the closest coordination and common purpose between the various interested parties if success is to be achieved. It is sensible for Lord Haskins as Chairman of the Humber LEP to lead, supported by BAE and Civitas in a joint initiative to encourage other third party companies with a potential interest in both the skilled employees and the site, developing the concept of an industrial park. If at least one “large corporate” can be secured, this would act as a magnet in encouraging other companies to follow.

8.3 General comments

- The Government must find new ways of forming long term partnerships involving government agencies, manufacturers, trade associations, and the workforce, following the German model that has proved so successful. Companies need strategic protection from the vagaries of the stock market, which causes so much damage with its obsession with short term results. The whole question of corporate governance needs urgently to be addressed. With the Main Boards of most British public companies consisting of a Chief Executive and a Finance Director acting in “gate

keeper roles" and surrounded by a large number of non-executive directors representing the City interests, the knowledge and experience of other directors at divisional or functional levels are suppressed and rarely have an impact on key decision making.

- Trading companies for the benefit of city bankers, their advisors and senior directors seeking short term returns on their investment, without considering the long term implications for the company, the effect on its employees or the impact on the economic interests of the nation, must be intensely questioned. The sale of around £700 billion of UK industrial assets to overseas buyers over a period of 10 years and used to offset the huge balance of trade deficit in goods has had a devastating effect on the long term viability of much of UK industry. In most cases the businesses were undervalued as the stock market takes little account of the value of the in-built intellectual property, knowledge and experience of a company: not just relating to patents, but even more importantly to the huge investment involved in the design and manufacture of products the world wants to buy and the marketing structures required to ensure they can be effectively sold. Very often a position as product market leader takes a generation to achieve and establishing effective overseas marketing operations even longer.
- As Sir Alan Rudge frequently comments in public and in the ERA Reports, good government has a duty to create a "greenhouse" effect in which well managed companies with competitive products and processes can thrive.
- Inevitably such views will generate the response that interventionism "backing winners", has proved disastrous in the UK in the past, as indeed it did. A strategy, however, of supporting defined industrial sectors and encouraging the growth of companies independent of the stock market for funding is very different. The German Mittelstand, which largely comprises private and often family owned companies, demonstrates the value of such a strategy. With British banks currently securing funds at ½ % and lending on to SMEs at over 10%, there surely have to be better alternatives modelled on the German Sparkassen with their local knowledge and commitment to long term investment.
- Levels of investment in the UK in productive capital equipment and in R& D are way below that of competing nations. In Germany in 2010 the level of investment in automated and flexible plant and machinery was over eight times that of the UK. Machine tool investment the UK now ranks in absolute levels of investment below Turkey and Mexico. Many good investment proposals never gain approval to proceed in the UK because of unrealistically short time horizons. Successful companies entering the Manufacturing Excellence Awards in the UK and Germany spend over 6% of operating revenue on research and product innovation, compared with a general level including BAE of around 3%. Bosch in Germany invested 8.1 % of revenues, amounting to € 3.8 billion per year on research and new product development last year and Siemens also is reported to invest around € 4.0 billion per year on research and products.

- Government contracting agencies must endeavour to place contracts for design, development, manufacture and in-service support with British based companies following the clear precepts adopted particularly by other European countries. It must instigate and implement an industrial strategy, identifying key industries considered to be important for the economic benefit of the nation and in which it is prepared to invest. Without such a strategy, Airbus would never have achieved its success against Boeing and would not now enjoy the security of a full order book extending over the next seven years.

ANNEXES

Annex I covering the detailed Capability Studies is, due to its size, issued as a separate document

Annex IIa) **Treatments**

Tank Number	Treatment / Process	Qty	Chemicals	Water Supply	Temperature	Tank Size	Installed	Condition	Current Net Book Value (£k)
Tank 1	Cold Water rinse	1	N/A	Mains Town Water	Ambient	1785mm x 825mm x 1380mm	2008	Good	
Tank 2	Pickling (Titanium)	1	20 - 24g/l Hydrofluoric Acid 300 - 400g/l Nitric Acid	Mains Town Water	Ambient	1747mm 787mm x 1380mm	2008	Good	
Tank 3	Pickling (Stainless Steel Nickel Alloy)	1	8 - 23g/l Hydrofluoric Acid 100 - 670g/l Nitric Acid	Mains Town Water	Ambient	1747mm 787mm x 1380mm	2008	Good	
Tank 4	Cold Water rinse	1	N/A	Mains Town Water	Ambient	1785mm x 825mm x 1380mm	2008	Good	
Tank 6	Etching (Steel)	1	1250 - 1500g/l Sulphuric Acid 5.5 - 6.75g/l Chromic Acid	Mains Town Water	Ambient	1820mm x 900mm x 1080mm	2008	Good	
Tank 7	Cold Water Rinse	1	N/A	Mains Town Water	Ambient	1785mm x 825mm x 1380mm	2008	Good	
Tank 8	Nickel Strike	1	200 - 260g/l Nickel Chloride 30 - 40g/l Hydrochloric Acid	Mains Town Water	Ambient	1790mm x 830mm x 1561mm	2008	Good	
Tank 9	Cold Water Rinse	1	N/A	Mains Town Water	Ambient	1785mm x 825mm x 1380mm	2008	Good	
Tank 10	Holding Tank	1	5 - 50g/l Sodium Cyanide 3g/l Sodium Hydroxide	Demin Water	Ambient	930mm x 930mm x 1060mm	2008	Good	
Tank 11	Cadmium Plate	1	56 - 63g/l Sodium Cyanide 14 - 17g/l Cadmium 11 - 14g/l Sodium Hydroxide	Mains Town Water	Ambient	1820mm x 900mm x 1060mm	2008	Good	
Tank 12A	Cold Water Rinse Dragout	1	N/A	De-min from the Bewt Cell Number 1	Ambient	880mm x 800mm x 1330mm	2008	Good	
Tank 12B	Cold Water Rinse	1	N/A	De-min from the Bewt Cell	Ambient	880mm x 800mm x 1330mm	2008	Good	
Tank 13	Passivate (Cadmium)	1	136 - 182g/l Sodium Dichromate 9 - 18g/l Sulphuric Acid	Demin Water	Ambient	1820mm x 900mm x 930mm	2008	Good	
Tank 14	Cold Water Rinse	1	N/A	De-min from the Bewt Cell	Ambient	900mm x 855mm x 700mm	2008	Good	
Tank 17	Cadmium Strip	1	250 - 350g/l Ammonium Nitrate	Demin Water	Ambient	890mm x 860mm x 700mm	2008	Good	
Tank 18	Cold Water Rinse	1	N/A	De-min from the Bewt Cell	Ambient	890mm x 860mm x 700mm	2008	Good	

Tank 21	Passivate (Stainless Steel)	1	475 - 525g/l Nitric Acid	Mains Town Water	Ambient	1765mm x 805mm x 1389mm	2008	Good	
Tank 22	Cold Water Rinse	1	N/A	Mains Town Water	Ambient	1785mm x 825mm x 1380mm	2008	Good	
Tank 23	Passivate (Typhoon)	1	475 - 525g/l Nitric Acid	Mains Town Water	Ambient	1765mm x 805mm x 1389mm	2008	Good	
Tank 24	Cold Water Rinse	1	N/A	Mains Town Water	Ambient	1785mm x 825mm x 1380mm	2008	Good	
								Phase 1 Refurbishment	£125,
Tank 26	Alkaline Cleaner	1	40 - 60g/l Turco 4215 NCLT	Mains Town Water	50ºc	3857mm x 901mm x 1550mm	2008	Good	
Tank 27	Cold Water Rinse	1	N/A	Mains Town Water	Ambient	3870mm x 915mm x 1520mm	2008	Good	
Tank 28	Deoxidiser	1	4.5 - 10.5g/l Deoxidiser No.7 75 - 100g/l Nitric Acid	Mains Town Water	Ambient	3857mm x 901mm x 1550mm	2008	Good	
Tank 29	Cold Water Rinse	1	N/A	Mains Town Water	Ambient	3870mm x 915mm x 1520mm	2008	Good	
Tank 30	Alocrom 1200	1	8 - 22g/l Alocrom 1200	Demin Water	Ambient	3857mm x 905mm x 1550mm	2008	Good	
Tank 31	Cold Water Rinse	1	N/A	Mains Town Water	Ambient	3870mm x 915mm x 1520mm	2008	Good	
Tank 32	Cold Water Rinse	1	N/A	Demin Water	Ambient	4870mm x 915mm x 1520mm	2008	Good	
								Phase 2 Refurbishment	£100,
Tank 51	Caustic Etch	1	100 - 150g/l Sodium Hydroxide	Mains Town Water	80ºc	1220mm x 4270mm x 1220mm	2009	Good	
Tank 52	Cold Water Rinse	1	N/A	Mains Town Water	Ambient	1220mm x 4270mm x 1220mm	2009	Good	
Tank 53	Nitric Desmut	1	225 - 450g/l Nitric Acid	Mains Town Water	Ambient	1220mm x 4270mm x 1220mm	2009	Good	
Tank 54	Cold Water Rinse	1	N/A	Mains Town Water	Ambient	1220mm x 4270mm x 1220mm	2009	Good	
Tank 55	Aluminium Etch	1	Turco 17L - Turco 9HL	Mains Town Water	96ºc	1220mm x 4270mm x 1220mm	2009	Good	
Tank 56	Cold Water Rinse	1	N/A	Mains Town Water	Ambient	900mm x 600mm x 500mm	2008	Good	
Tank 57	Zinc Phosphate	1	8 - 10% Grandine	DI Water	95ºc	900mm x 600mm x 500mm	2008	Good	
Tank 58	Hot Water Rinse	1	N/A	Mains Town Water	80 - 90ºc	900mm x 600mm x 500mm	2008	Good	
Tank 60	Chromic Rinse	1	0.5g/l Chromic Acid	DI Water	60 - 80ºc	900mm x 600mm x 500mm	2008	Good	
								Phase 3 Refurbishment	£603,
Tank 62	Chromic Acid	1	30 - 50g/l Chromic Acid	Demin Water	40ºc	9750mm x 1530mm x 1980mm	2010	Good	
Tank 63	Cold Water Rinse	1	N/A	Mains Town Water	Ambient	9140mm x 900mm x 1980mm	2010	Good	
Tank 64	Cold Water Rinse / Spray	1	N/A	Demin Water	Ambient	9140mm x 900mm x 1980mm	2010	Good	

Tank 65	Cold Water Rinse	1	N/A	Mains Town Water	Ambient	9140mm x 900mm x 1980mm	2010	Good	
Tank 66	Chromic Acid	1	30 - 50g/l Chromic Acid	Demin Water	40ºc	9750mm x 1530mm x 1980mm	2010	Good	
Tank 67	Cold Water Rinse	1	N/A	Mains Town Water	Ambient	9140mm x 900mm x 1980mm	2010	Good	
Tank 68	Deoxidiser	1	4.5 - 10.5g/l Deoxidiser No.7 75 - 100g/l Nitric Acid	Mains Town Water	Ambient	9140mm x 900mm x 1980mm	2010	Good	
Tank 69	Cold Water Rinse	1	N/A	Mains Town Water	Ambient	9140mm x 900mm x 1980mm	2010	Good	
Tank 70	Alkaline Cleaner	1	40 - 60g/l Turco 4215 NCLT	Mains Town Water	50ºc	9140mm x 920mm x 1980mm	2010	Good	
Tank 71	Demin Water Hand Spray	1	N/A	Demin Water	Ambient	1785mm x 825mm x 1380mm	2009	Good	
Tank 72	Drying Oven	1	N/A	N/A	60ºc	1785mm x 825mm x 1380mm	2009	Good	
Tank 77	Hot Air Dryer F77	1	N/A	N/A	60ºc	7100mm x 900mm x 1900mm	2010	Good	
								Phase 4 Refurbishment	£34
Tank 79	Alkaline Cleaner	1	40 - 60g/l Turco 4215 NCLT	Mains Town Water	50ºc	6900mm x 900mm x 1900mm	1994	Fair	
Tank 81	Cold Warer rinse	1	N/A	Mains Town Water	Ambient	6900mm x 900mm x 1900mm	1994	Fair	
Tank 82	Hot Water Rinse	1	N/A	Mains Town Water	58ºc	6900mm x 900mm x 1900mm	1994	Fair	
Tank 90	Drying tank	1	N/A	N/A	60ºc	900mm x 4850mm x 1550mm	2009	Good	
Tank 98	Hot Clean Air F98	1	N/A	N/A	60ºc	1720mm x 800mm x 1400mm	2009	Good	
Oven F9	JLS Oven	1	N/A	N/A	120 - 190ºc	5000mm x 1900mm x 2100mm	1980	Fair	
Oven F17	JLS Oven	1	N/A	N/A	70 - 540ºc	2300mm x 1200mm x 2000mm	1983	Fair	
Oven F18	JLS Drop Bottom Oven	1	N/A	N/A	370 - 540ºc	4500mm x 1850mm x 2600mm	1984	Fair	
Oven F22	JLS Oven	1	N/A	N/A	430 - 1050ºc	2000mm x 1400mm x 2000mm	1984	Fair	
Oven F24	Abar Ipsen Furnace	1	N/A	N/A	750 - 1065ºc	1600mm Dia x 2000mm	1983	Fair	
Oven F52	JLS Drop Bottom Oven	1	N/A	N/A	370 - 540ºc	4500mm x 1850mm x 2600mm	1982	Fair	
Oven F53	JLS Oven	1	N/A	N/A	120 - 190ºc	7500mm x 2300mm x 2100mm	1983	Fair	
Oven F54	JLS Oven	1	N/A	N/A	370 - 540ºc	1800mm x 1500mm x 2000mm	1987	Fair	
Oven F55	JLS Oven	1	N/A	N/A	120 - 190ºc	7500mm x 2300mm x 2100mm	1977	Fair	

Annex IIb)

Duct and Pipe Manufacture

Machine Type	Qty	Capability	Approx Working Envelope	Number of Spindles	Number of Axes	Installed	Condition	Current Net Book Value (£k)
Ev Bends (semi-automatic)	3	Soft / Hard Metal	4mm Dia - 13mm Dia	1	2	2000	Fair	-
Eaton Leonard VB25 (Full Electric)	1	Soft / Hard Metal	6mm Dia - 25mm Dia	1	2	2007	Good	-
Eaton Leonard VB25	1	Soft / Hard Metal	6mm Dia - 25mm Dia	1	2	1998	Fair	-
Eaton Leonard VB40	1	Soft / Hard Metal	6mm Dia - 40mm Dia	1	2	Transferred from Samlesbury 2010	Fair	-
Eaton Leonard VB150	1	Soft / Hard Metal	6mm Dia - 40mm Dia	1	2	1996	Fair	-
Eaton Leonard VB76	1	Soft / Hard Metal	32mm Dia - 76mm Dia	1	2	1998	Fair	-
Orbital Welders	1	Hard Metal	2.6mm Dia - 54mm Dia	N/A	N/A	2010	Good	£29,
Orbital Welders	1	Hard Metal	2.6mm Dia - 54mm Dia	N/A	N/A	Transferred from Samlesbury 2010	Fair	-
Laser Vision Pipe Inspection System	2	N/A	N/A	N/A	N/A	1997 / 2010	Fair / Good	£81
Laser Vision Pipe Inspection System	2	N/A	N/A	N/A	N/A	Transferred from Samlesbury 2010	Fair	-
Enclosed Vapour De-greaser	1	Soft / Hard Metal Sheet	N/A	N/A	N/A	2008	Good	£135,

Annex IIc)

Electrical

Machine Type	Qty	Capability	Number of Spindles	Number of Axes	Installed	Condition	Current Net Book Value (£k)
Cable Laser Marker	1	N/A	N/A	N/A	2010	Good	£110
Label Laser Marker	1	N/A	N/A	N/A	2011	Good	£76
DITMCO 2508 Cable Test System	1	N/A	N/A	N/A	1998	Good	-
Braiding Machines	4	N/A	N/A	N/A	1996	Good	-

Annex IId)

Machining (The Book value is zero)

Machine Type	Qty	Capability	Approx Working Envelope	Number of Spindles	Number of Axes	Installed	Condition
Mazak 610 CNC Turning Centre	2	Soft / Hard Metal	42mm Dia x 400mm	2	6	1991	Fair
Mazak 430 CNC Turning Centre	1	Soft / Hard Metal	77mm Dia x 650mm	2	4	1991	Fair
Georg Fischer	1	Soft / Hard Metal	150mm Dia x 800mm	1	5	1989	Poor
Herbert Churchill HC 2/10 CNC Lathe	1	Soft / Hard Metal	42mm Dia x 140mm	1	2	1985	Poor
Bridgeport Ezpath Electronic Lathe	1	Soft / Hard Metal	50mm Dia x 1000mm	1	3	1996	Good
Ward 2DB Capstan Lathe (Conv)	2	Soft / Hard Metal	38mm Dia x 250mm	1	3	1995	Fair
Jones & Shipham Cylindrical Grinder (Conv)	1	Soft / Hard Metal	120mm Dia x 500mm	1	2	1970	Fair
Cincinnati Centreless Grinder (Conv)	1	Soft / Hard Metal	75mm Dia max	1	1	1970	Poor
EIB Surface Grinder (Conv)	1	Soft / Hard Metal	800mm x 300mm x 250mm	1	3	1960	Poor
Pollard Multi Spindle Drill (Conv)	1	Soft / Hard Metal	1200mm x 400mm x 1000mm	4	1	1978	Fair
Ajax Multi Spindle Drill (Conv)	1	Soft / Hard Metal	2000mm x 400mm x 1000mm	4	1	1997	Good
Ajax Multi Spindle Drill (Cov)	2	Soft / Hard Metal	3000mm x 500mm x 1000mm	6	1	1998	Good
OERLIKON Jig Bore	1	Soft / Hard Metal	1000mm x 1000mm x 1000mm	1	3	1960	Fair
Huron NU4/NU5 Universal Mill (Conv)	3	Soft / Hard Metal	1400mm x 350mm x 200mm	1	3	1973/1974 /1979	Fair
Huron NU66 Universel Mill (Conv)	3	Soft / Hard Metal	2000mm x 550mm x 400mm	1	3	1982/1991	Fair
Cincinnati Horizontal Mill (Conv)	2	Soft / Hard Metal	1400mm x 300mm x 300mm	1	3	1978	Fair
Matsuura MC 1000 CNC Machining Centre	1	Soft Metal	500mm x 490mm x 450mm	2	3	1989	Fair
Matsuura RA5 CNC Machining Centre	1	Soft Metal	500mm x 490mm x 450mm	2	3	1991	Fair
Matsuura FX5 CNC Machining Centre	3	Soft Metal	1020mm x 560mm x 490mm	1	3	1984/1994 /1999	Fair
Matsuura FX10 CNC Machining Centre	1	Soft Metal	2000mm x 1000mm x 500mm	1	3	1997	Fair
Mazak AJV25 CNC Machining Centre	2	Soft / Hard Metal	1000mm x 500mm x 460mm	1	3	1989/1991	Fair
Mazak FJV250 CNC Machining Centre	2	Soft Metal	1000mm x 500mm x 500mm	1	3	2006	Good
Mazak MTV515/40N CNC Machining Centre	3	Soft / Hard Metal	1000mm x 500mm x 500mm	1	3	2006	Good
Mitsui Seiki HU50A CNC Machining Centre (Horizontal)	2	Soft Metal	700mm x 720mm x 650mm	1	4	1999/2006	Good
Mitsui Seiki HU50A CNC Machining Centre (Horizontal)	1	Soft / Hard Metal	700mm x 720mm x 650mm	1	4	2006	Good
Bridgeport VMC 2000XP CNC Machining Centre	3	Soft Metal	2000mm x 800mm x 210mm	1	3	2002	Good
Max-e-trace CNC Machining Centre (Longbed)	4	Soft Metal	Max. 12100mm x 2000mm x 250mm	2	3	1970/1974 /1980/198 9	Fair

Annex III)

Selected List of Companies attending the Skills Fair

Aircelle Ltd

Alexander Dennis

Cobham plc

David Brown Gears

Dynamometer Service Group Ltd

Expro North Sea

Gardener Aerospace

Halliburton

GKN Aerospace

GE Aviation Systems

GE Energy

Jaguar Landrover

Lambert Engineering

Lufthansa Technik

Marshall Aerospace

Merc Engineering UK Ltd

Messier Dowty Ltd

Penspen

Raytheon

Rolls-Royce plc

Sub Sea North East

Sparrows Engineering & Operations

Wood Group PSN