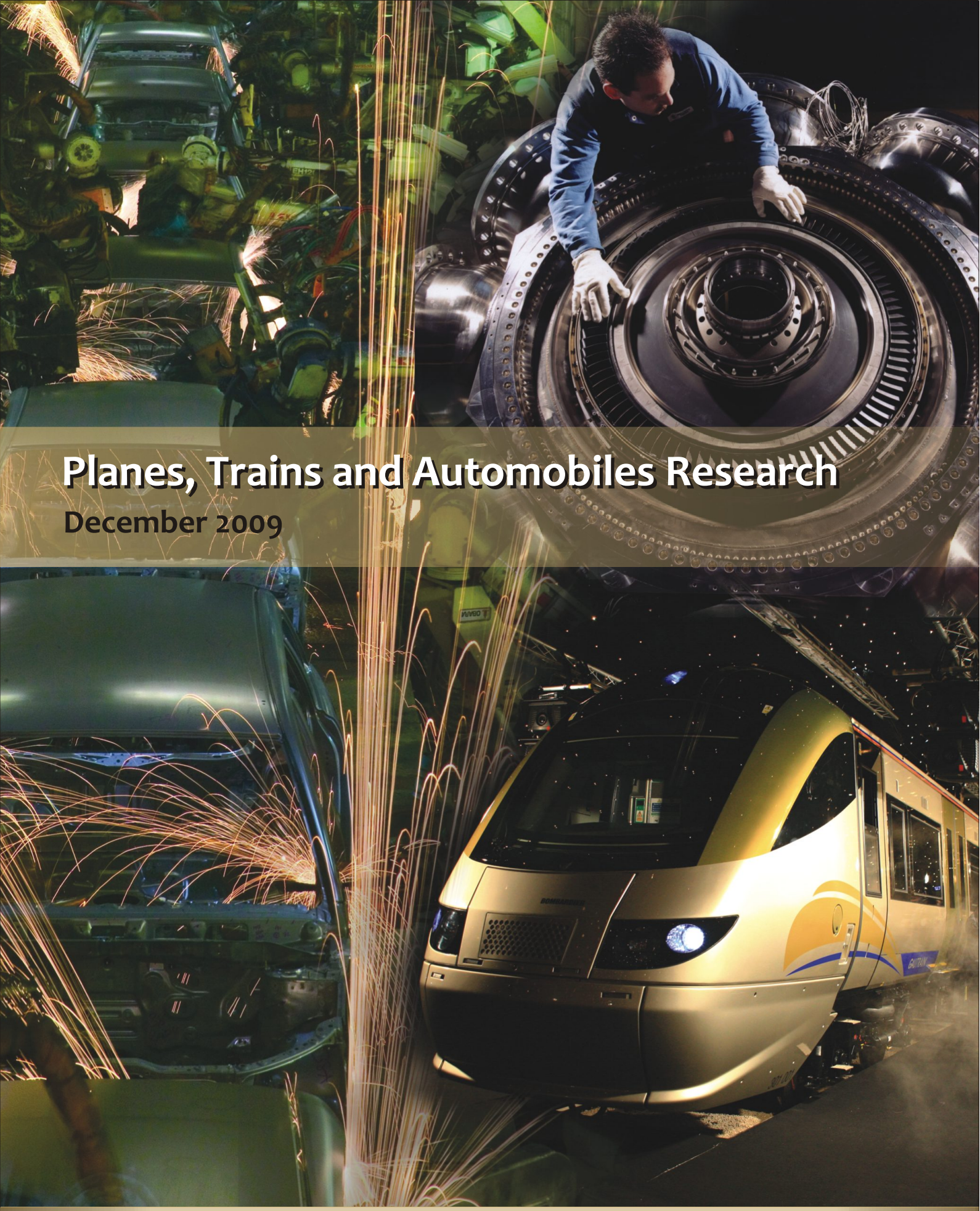

Planes, Trains and Automobiles Research

December 2009

PRODUCED BY URS

derbyshirechamber

nottinghamshire chamber

east midlands development agency

DERBY CITY COUNCIL

Project Title: Planes, Trains and Automobiles Research

Report Title:

Project No: 49352112

Report Ref:

Status: Final

Client Contact Name: Catherine Williams

Client Company Name: Derby City Council

Issued By:

Document Production / Approval Record

Issue No:	Name	Date	Position
Prepared by	Kevin Duxbury, Daniel Collins and Joanne Woolmer	November 2009	Project Manager / Regeneration Consultant
Checked by	Kevin Duxbury	November 2009	Project Manager
Approved by	Bob Perkins	November 2009	Project Director

Document Revision Record

Issue No	Date	Details of Revisions
1	September 2009	Original issue
2	October 2009	Re-drafted issue
3	November 2009	Re-drafted issue including tasks 5 and 6
4	November 2009	Re-drafted issue including additional analysis (Transport iNet rail database)

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1. EXECUTIVE SUMMARY

1.1. Introduction

Derby has a strong industrial base across three complementary transport sectors, namely; Aerospace, Automotive and Rail. Within these sectors are a small number of world-renowned employers. Current strategic planning at city and regional level was formulated before the recent economic downturn. The recession has affected different industrial sectors to a varying degree. In the short term there are major decisions that have to be made, which could potentially have an enormous impact on the local economy and these three sectors.

URS Corporation were commissioned to; quantify the scale and impact of the three sectors and their supply chains; assess the strengths, weaknesses, opportunities and threats; assess the linkages and interrelationships between sectors; and make recommendations on specific local interventions.

1.2. Context and importance of the sectors

The following is a summary of the scale and significance of the three sectors. It is important to note that the report explores the three sectors in slightly varying geographies based on the total share of employment. This is discussed in more detail in Section 3.5 (in the main report). In short the analysis of the aerospace and rail sectors relate to the local authority boundary of Derby with the automotive sector extended to Derbyshire.

1.2.1. Planes

The UK has the second largest aerospace market in the world, with the Midlands home to one of the largest clusters of aerospace companies in Europe. There are over 700 companies in the aerospace supply chain in the Midlands employing approximately 45,000 highly skilled workers. Over half of these firms are located in the East Midlands cluster.

Rolls Royce in Derby is the driving force behind the success of this sector in the region. The company supports many supply chain firms in Derby and 75% of the 700 supply chain firms in the Midlands are directly connected to Rolls Royce. The importance of this sector to the local, regional and national economy cannot be overstated. The following summary demonstrates this:

- The aerospace sector in Derby **contributes £4.6bn of economic output**[1] to the local economy – this is 27% of the total output generated in the City and is the largest contributor to output in Derby of all 123 sectors;[2]

[1] *Including direct, indirect and induced outputs.*
[2] *Source: ONS, Supply and Use Tables, 2007 and URS calculations, 2009*

- In 2007, the sector **directly employed approximately 10,338 people** within Derby, with a **total of 15,600 jobs supported** locally, including indirect and induced employment. The latter figure equates to 12.2% of all employment locally and 6% of all aerospace related jobs within the UK;[3]

- Employment in aerospace has **8.3 times the concentration** in Derby than the East Midlands and 8.2 times the concentration than nationally;[3]

- Derby is **home to Rolls Royce, a major global brand**. The company has been established in the city for 100 years and is the largest single employer in the City with 12,500 employees, the majority of which are employed in the aerospace sector. It is the world's number two engine manufacturer overall and market leader for commercial jet engines. It currently supplies over 600 airlines and 160 defence customers and has over 54,000 gas turbines in service worldwide;

- **Other major regional assets** in the sector include; Goodrich Corporation (leading global supplier of systems and services to aerospace and defence sectors), Alcoa Inc (worlds largest manufacturer of aluminium goods), Dunlop Aerospace (providing braking systems), HS Marston (heat transferee and fluid management), Roxel (design propulsion systems) and Timet (Titanium and metals corporation). Also the Midlands Aerospace Alliance (supports and represents the aerospace industry across the Midlands), East Midlands Airport, and the University of Nottingham, and Loughborough University.

1.2.2. Trains

The East Midlands is the rail capital of the UK and is Europe's densest cluster of rail engineering companies. Similarly to the aerospace sector, the rail sector has a large positive impact on the local economy. The following bullets illustrate this:

- The rail sector in Derby **contributes £2.6bn of economic output**[4] to the local economy – this is 16.6% of the total output generated in the City and is the 3rd largest industrial sector contributor;[5]

- In 2007, the sector **directly employed approximately 5,010 people** within Derby, with a **total of 8,500 jobs supported** locally, including indirect and induced employment - this equates 7% of all employment locally and 13% of all rail related jobs within the UK;[6]

- Employment in rail has 8 times the concentration in Derby than the East Midlands and 8.8 times the concentration than nationally;[6]

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[3] *Source: ONS, Annual Business Inquiry, 2007 and URS calculations, 2009*
[4] *Including direct, indirect and induced outputs.*
[5] *Source: ONS, Supply and Use Tables, 2007 and URS calculations, 2009*
[6] *Source: ONS, Annual Business Inquiry, 2007 and URS calculations, 2009*

- Derby is **home to a number of major global brands**. This includes; Bombardier - the UK's only major rolling stock manufacturer, East Midlands Trains – one of the UK's major passenger train companies and Network Rail who provide the UK's rail infrastructure;

- **Other major assets** in the region in relation to this sector include; DeltaRail (a specialist software and technology provider), Interfleet Technology (an international rail technology consultancy group), Atkins Rail (global experts in both the mass transit and heavy rail markets), Universities of Nottingham and Loughborough (partners of Rail Research UK) and Derby & Derbyshire Rail Forum (promotes the area as a world class centre of rail excellence).

1.2.3. Automobiles

There is a strong presence of automotive businesses in the East Midlands. Employment is concentrated in a few areas of the region, where Derbyshire accounts for an impressive percentage share of the market. The automotive sector makes significant contributions to the local and regional economy:

- In Derbyshire it **contributes £3.1bn of economic output**[7] to the sub regional economy.

- In 2007, the sector **directly employed approximately 17,000 people** within Derbyshire, with a **total of 22,100 jobs supported** locally, including indirect and induced employment - direct employment equates to 4.2% of total employment in the sub region.

- Derbyshire is home to **Toyota, a major global car manufacturer**. They are located just outside the City of Derby, currently supporting 3,540 jobs which account for approximately a fifth of the automotive workforce in Derbyshire. Also in the region, major players in the automotive sector include – JCB, Caterpillar and global German production company ZF.

- A high percentage of those businesses in the automotive sector in Derby belong to car **dealerships, repair and leasing companies**. They account for 92.6% of those automotive businesses in Derby compared to 75.8% regionally and 75.5% nationally.

- Recent public sector investments decisions from the UK government have assisted the automotive sector throughout the recession with varying effects across the industry, **significant investment has recently been announced by Toyota** to a produce a 'green' vehicle at its Derbyshire plant.

- Neighbouring region, the **West Midlands,** has a strong automotive cluster in the UK – accounting for more than 40% of car production and therefore a stronger

[7] *Including direct, indirect and induced outputs.*

manufacturing base than the East Midlands. There is an opportunity here to make stronger links with the automotive sector in the neighbouring region.

- The **Motorsport** industry is an important sub sector and the East Midlands is home to Donington Park, Rockingham Speedway and Silverstone race tracks.

1.3. Output and employment contributions of the sectors

The following highlights the economic output and employment contribution of the three sectors across Derby.

Industry Description	Economic output ('07)		Employment ('07)	
	£m	% of Derby	No.	% of Derby
Planes, Trains and Automobiles (core)*	6,986	44.3	32,388	25.3
Aerospace (core)	3,055	19.4	10,399	8.1
Automotive (core)*	2,389	15.2	16,979	13.2
Rail (core)	1,542	9.8	5,100	3.9
Aerospace inc. supply chain	4,583	29.1	15,599	12.2
Automotive inc. supply chain*	3,106	19.7	22,072	17.2
Rail inc. supply chain	2,622	16.6	8,517	6.6

Source: ONS Supply and Use Tables, 2004-2007, Annual Business Inquiry, 2007 and URS calculations

** The automotive output figure relates to Derbyshire, but is shown as a proportion of Derby output and is therefore not strictly comparable*

1.4. SWOT analysis summary tables

PLANES	TRAINS	AUTOMOBILES
Strengths		
Rolls Royce	Bombardier	Toyota
Barriers to entry	Established local supply chain	Engineering heritage
Established supply chain	International reputation/ history	Skilled workforce
Skilled workforce	Highly skilled workforce	Flexibility to market demand
Long lead-in time	Innovation and research centre	Links with rest of the world
Long term growth	Strong link with universities	Transferable skills sets
High demand	Expertise within DDRF	Proximity to West Midlands
Aftercare market	Proximity to related clusters	Vehicle Scrappage Scheme
	The sector is seen as green	Highly desired consumable
	Large, long term contracts	
Opportunities		
Environmental pressure	Future Government investment	Skilled workforce
Civil aviation	Highly skilled workforce	Environmentally friendly cars
Defence aviation	Willingness to work locally	Lessons learnt from recession
Healthy backlog	Sustainability agenda	Scrappage Scheme
Supply chain development	Work with local public sector	Sustainability agenda
Perceptions	Opportunity for R&D	Work with local public sector
Emerging markets	Exploit foreign markets	Motorsport industry
Investment	Hitachi moving to region	
Weaknesses		
Reliance on Rolls Royce	Over reliance on Bombardier	Badly hit in recession
Reliance on civil aerospace	Dependant on Govt investment	Low consumer confidence
Continued investment in R&D	Lack of graduates	High level of redundancies
Negative perceptions	Uneven international competition field	Lack of local cluster
Potential skills gap	Low confidence for short-term	High levels of imports
Susceptible to global shocks	Lack of some specialist professionals	Used car market
Global competition	Inward looking	Limited opportunities
Barriers to entry	Cyclical nature of sector	Limited opportunities
	Difficulties for new businesses	High fixed manufacturing costs
	Negative public perception	
	Engaging with SMEs is difficult	
Threats		
Environmental pressure	Not winning Thameslink contract	Lack of opportunities
Global shocks	Losing more work internationally	Current economic climate
Global fuel prices	Current economic climate	Cuts in public spending
Global competition	Cuts in Public spending	Banks not lending
Composite Materials	Banks not lending	Environmental restrictions
Reduction in supply chain	Ageing workforce	Poor media image
Ageing workforce	Poor image	Losing work internationally
Reduced investment in R&D		

1.5. Future prospects of the sectors

There are a number of major investment decisions that will influence future activity in each sector. These could have a significant impact upon employment and economic output in Derby. We have presented three alternative scenarios of the possible impact of these activities over the next ten years. Employment scenarios were based on our consultations with key stakeholders by assessing the potential employment impacts of the opportunities and threats coming to fruition along with a review of historic trends. The scenarios cover optimistic, reference and worst-case scenarios. Economic output has also been forecast based on current output per employee calculations. Therefore the same percentage change is demonstrated as with employment. It is unlikely that employment and output would change at the same rate but the latter is shown for illustrative purposes. These are explored (including the definitions) in more depth in the SWOT Analysis Section of the full report.

Table 1 below presents a summary of the employment and economic output projections. The Rail sector demonstrates the greatest volatility of all the sectors with capability for the greatest percentage growth but also if not supported the greatest potential loss of employment.

Table 1: Employment and Output Scenario Estimates for 2009 and 2019

	Employment			Economic output (£m)		
Scenarios	**2009***	**2019**	**% change**	**2009***	**2019**	**% change**
Planes						
Optimistic	15,567	20,921	34.4	4,574	6,147	34.4
Reference	15,567	15,035	-3.4	4,574	4,417	-3.4
Worst case	15,567	10,089	-35.2	4,574	2,964	-35.2
Trains						
Optimistic	8,517	14,136	66.0	2,622	4,352	66.0
Reference	8,517	9,309	9.3	2,622	2,866	9.3
Worst case	8,517	1,716	-79.9	2,622	528	-79.9
Automobiles						
Optimistic	21,970	26,785	21.9	2,785	3,395	21.9
Reference	21,970	23,271	5.9	2,785	2,950	5.9
Worst case	21,970	17,680	-19.5	2,785	2,241	-19.5
* 2009 figures have been estimated using known employment and output figures for 2007, from ABI, and most recent JSA Claimant figures with the exception of rail which is taken from the Transport iNet database						

Source: ONS, Annual Business Inquiry, 1998 to 2007 and URS Calculations, 2009

1.6. Summary of key qualitative findings

The main issues, opportunities and threats that have been highlighted by the research are illustrated below. The main section of the report suggests a series of recommendations for addressing these. The key issues fall into the following areas:

1.6.1. Skills

These sectors generally suffer a poor image and are seen as “oily rag” trades. This is having a negative impact on the recruitment of graduates to work in the aerospace, automotive and rail sectors. This is despite local businesses in all three sectors identifying that there is a variety of good long-term career prospects within these sectors that people are not aware of. This again stems from an outdated and negative perception of work within these specific sectors and manufacturing more generally.

A substantial number of firms in these sectors suggest an ageing workforce and a loss of skilled employment due to retirement. They also suffer from a large number of skills gaps and consequently hard to fill vacancies. Ensuring that the existing workforce receives the appropriate training to fill these gaps and preparing, educating and training the future manufacturing workforce to address skill shortages is a critical element in supporting these sectors and wider manufacturing in Derby and the region.

1.6.2. Business support

The larger employers involved in the research process felt that the existing work and investment from public sector bodies to support the sector was of good quality and targeted in the right areas. However there are a number of issues and concerns that were raised that relate specifically to SMEs in these sectors. A number of smaller businesses that were consulted felt that public sector support and intervention was geared more towards larger organisations. SMEs also report a level of confusion and a general lack of awareness of targeted and specialist business support.

Another difficulty SMEs face is the lack of credit offered by banks in the current economic climate. Deposits for goods and services are increasingly needed up front, an area where small businesses struggle generally but is accentuated in current economic conditions. This is still an issue even where companies have orders guaranteed in advance.

1.6.3. Market intelligence, influence and collaboration

The central purpose of this research has been to gain a better understanding of the economic contribution that the three sectors make to the Derby economy. This improved intelligence can be used in a number of ways to support the sector in the future. The critical point here is that emda, Derby City Council and Chamber of Commerce can demonstrate a better understanding of the key sectors in the local economy to investors and government to help deliver further growth and support. This is a particular concern in relation to the rail sector in Derby where a significant number of jobs are reliant on a single manufacturer securing government contracts. This makes future business planning

more difficult and increases the risks of job loss and wider impacts on the Derby economy.

The evidence suggests that there is only limited interaction between the supply chains of the three sectors. Whilst there are some examples of collaboration between the larger employers this could be improved and awareness of new networks and organisations that have been developed for this purpose increased.

2. INTRODUCTION

2.1. Background to the study

Derby has a strong industrial base across three complementary transport sectors, namely; Aerospace, Automotive and Rail. Within these sectors are a small number of world-renowned employers.

Transport is one of four priority sectors[8] in the region and as such is identified in the Regional Economic Strategy (RES) as most likely to make the greatest economic contribution to the East Midlands. Aerospace, automotive (including motor sport) and rail, alongside leisure marine make up this sector. The importance cannot be overstated with the highest levels of productivity in the region, output growth forecast (2004-2014) at almost 4 times higher than the national average and average earnings a third above the regional average[9].

An iNet has been established for each of the priority sectors in the region. This encourages sectors (including transport) to grow at the pace they are capable of by bringing together specialists, such as businesses, sector organisations and universities, to share their knowledge and work together. The overall aim is to increase the level of innovation in the East Midlands and in doing so, improve business competitiveness, margins, sustainability and growth[10].

Current strategic planning at city and regional level was formulated before the recent economic downturn. The recession has affected different industrial sectors to a varying degree. In the short term there are major decisions that have to be made, which could potentially have an enormous impact on the local economy and these three sectors.

This study has been commissioned by Derby City Council (DCC) and part funded by East Midlands Development Agency (*emda*) and Derbyshire & Nottinghamshire Chamber of Commerce.

2.2. Aims of the research

The findings of this research will be used to inform local, regional and national decision makers about the importance of the 'Planes, Trains and Automobiles' sectors and the influence that large-scale decisions have on the economy of Derby. The main aims of the research are to:

- Quantify the importance of the three sectors and their supply chains to the local and regional economy;

[8] *The three others are; food and drink, healthcare and bioscience and sustainable construction*
[9] *http://www.emda.org.uk/innovation/transport.asp?nav=06&snav=0602*
[10] *See: http://www.eminnovation.org.uk/Default.aspx*

- Assess the strengths, weaknesses, opportunities and threats of these sectors and enumerate the impact of each;
- Understand the linkages and interrelationships between each of the sectors;
- Make recommendations on specific local interventions that can be delivered by Derby City Partnership, *emda* and other partners to support retention and growth of these sectors; and
- Understand the inward investment and investor development opportunities.

2.3. Method overview

The research combines both quantitative and qualitative approaches. This includes;

- Analysis of a range of national data sources such as the Inter-Departmental Business Register (IDBR) and the Annual Business Inquiry (ABI);
- We also examined local databases such as that provided by the Chamber of Commerce of both members and non members across Derby;
- 50 semi-structured telephone consultations with a range of public and private sector stakeholders (see Appendix C); and
- We have also undertaken a thorough literature review.

2.4. Structure of the report

The remainder of the report is structured as follows:

- Section 3 discusses a number of **methodological issues** with the research such as the sector definitions and data sources used;
- Section 4 quantifies **the 'core' sectors** in terms of employment and market penetration, as well as assessing the impact of the economic downturn;
- Section 5 presents **analysis of the supply chains** and the inter-relationships between the three sectors;
- Section 6 illustrates **the linkages between the three sectors** on an employee and supplier level;
- Section 7 demonstrates the **overall economic impact** of the three sectors in Derby in terms of employment size and output;
- Section 8 outlines some **recent investment decisions** that have taken place in relation to 'planes, trains and automobiles';

- Section 9 is an assessment of the **strengths, weaknesses, opportunities and threats** (SWOT) of the sectors. We have also produced a number of scenarios demonstrating the potential impact of the opportunities and threats;
- Section 10 **evaluates the opportunities and threats** that the sectors could face in the future and predicts the likely impacts of these upon employment and economic output; and
- Section 11 presents our **recommendations** on possible interventions that can be taken forward by partners to maximise the opportunities and minimise the risk of the threats;

3. METHODOLOGICAL ISSUES

3.1. Defining the aerospace and automotive sectors

In order to profile the economic structure of the three sectors and their associated supply chain linkages it was necessary to accurately define them. However, this is not as straightforward as it may seem. Despite a wide range and number of research projects for each of the sectors there was not one consistent definition for the aerospace and automotive clusters. The rail sector did have an existing definition that was being used in the region and previous work; this is outlined in the following section.

A tried and trusted way of quantifying sectors is through the use of Standard Industrial Classification (SIC) coding. These are used by the Office for National Statistics (ONS) and provide a consistent framework for collecting, presenting and analysing data across key official sources such as the IDBR and ABI. This does have its limitations. For example, SIC coding categorises business establishments by the type of economic activity they are mostly engaged with and does not take into account their wider services. SIC codes are also decided by the company and thus prone to errors and inconsistency,. However, in order to fully utilise official sources it was necessary to define the sector by SIC 2003.

We wanted the definitions used to be consistent with other definitions used in the region, these included:

- An aerospace sector definition used in a recent study by Midlands Aerospace Alliance for Transport iNet.[11] The definition for this study did not utilise SIC 2003. The final aerospace definition used developed through consultation with key stakeholders, such as Transport iNet, a review of relevant literature and advice from ONS.

- An automotive sector definition in a recent study by KGP for Transport iNet[12] and another mapping exercise in the region conducted by Experian in 2007. This latter study presented a definition of the sector utilising SIC 2003. We tested this definition of the sector through consultation with key stakeholders, such as Transport iNet, a review of other literature and advice from ONS.

[11] *Aerospace in the East Midlands: industry structure, industry dynamics and innovation drivers, Midlands Aerospace Alliance, Prepared for East Midlands Transport iNet, June 2009*
[12] *Mapping of the East Midlands Automotive Industry & Identifying the Main Innovation Drivers, Knibb Gormezano & Partners, Prepared for East Midlands Transport iNet, February 2009*

3.2. Defining the rail sector

A rail sector definition was used in a recent study by Transport iNet for Derby & Derbyshire Rail Forum.[13] As part of this study a database of rail businesses within East Midlands was formulated using a range of sources including Derby and Derbyshire Rail Forum membership details, UKTI, Rail News 2009 directory, Railways Industry Association and the on-line Rail Directory at railwaypeople.com. This was also combined with data from emda's Investor Development Team. The information was verified against data on Companies House to confirm that they were still trading.

Although we used this database as a starting point for measuring the size of the core rail sector (see section below), we carried out a number of further procedures to refine the information and test the robustness and validity of the businesses within the database:

- All companies outside of the Derby local authority area were discounted;
- Businesses were taken out where less than 80% of their core activity was "rail related."[14] For example, organisations that provided engineering services to a range of industrial sectors, recruitment consultants and marketing companies were withdrawn. These type of businesses, are however, picked up in the wider supply chain definition (see below);
- In a number of instances, business size (in terms of employees) was unknown. We applied the average size of a business in Derby to each of these[15].

3.3. Two definitions of each sector

1. **"Core" definition** – this is based upon those SIC 2003 that are *directly* related to the aerospace, rail and automotive sectors. Businesses under these definitions report their main business activity as aerospace, rail or automobile related. We understand that this definition does not take into account all activity relating to each of these sectors and results from the wider supply chain definition need to be considered alongside these. However, this definition allows us to conduct detailed statistical analysis. It must be noted, that wherever possible we have used the second, wider definition (supply chain) of each of these sectors, for example in producing the total economic output and future scenarios for the sectors.

[13] *Mapping of the elements of the rail sector supply chain in the East Midlands and identifying the main innovation drivers, Derby and Derbyshire Rail Forum, Prepared for East Midlands Transport iNet, June 2009*
[14] *this was conducted primarily through a web search of each company*
[15] *this equates to 17 people per business, as taken from the Annual Business Inquiry (2007). We did not use the average size for rail businesses as there would be a skew towards the largest employers which are already known*

Table 2: Core definitions based on directly related SIC 2003 for each sector

Aerospace
3530: Manufacture of aircraft and spacecraft
5114: Agents involved in the sale of machinery, industrial equipment, ships and aircraft
6311: Cargo handling
6323: Other supporting air transport activities
7123: Renting of air transport equipment
62: Air transport
Rail*
3520: Manufacture of railway and tramway locomotives and rolling stock
6010: Transport via railways
Automobiles
2511: Manufacture of rubber tyres and tubes
2512: Retreading and rebuilding of rubber tyres
2931: Manufacture of agricultural tractors
3161: Manufacture of electrical equipment for engines and vehicles not elsewhere classified
3541: Manufacture of motorcycles
341: Manufacture of motor vehicles
343: Manufacture of parts and accessories for motor vehicles and their engines
342: Manufacture of bodies (coachwork) for motor vehicles: manufacture of trailers and semi-trailers
501: Sale of motor vehicles
502: Maintenance and repair of motor vehicles
503: Sale of motor vehicle parts and accessories
504: Sale, maintenance and repair of motorcycles and related parts and accessories
711: Renting of automobiles

**This definition was used when analysing the Annual Business Inquiry for rail. However, this definition undercounts the rail sector and is only used for looking at trends over time. Therefore the Transport iNet data is used wherever possible*

2. **Supply chain** / **wider definition** – We have used ONS' Supply and Use tables to define the supply chain of these sectors. This is outlined in more detail in the Supply Chain Analysis section but in short, these tables identify those sectors that provide services for and purchase services from each of the sectors. These definitions allow us to make assessments of the broader impact of the three sectors across Derby and how the economic activities of sectors that are not directly categorised are involved. For example, in the rail sector there are a number of rail related consultancy companies that would not be picked up in the "core sector" definition but would be covered here. As stated above, wherever possible, this definition has been utilised.

3.4. Data sources utilised

The main secondary datasets that were analysed include:

- **Annual Business Inquiry (ABI), 1998 to 2007**[16] – this is a publicly available, national business survey. It provides estimates of the total population of all UK businesses registered for Value Added Tax (VAT) and/or Pay As You Earn (PAYE).
- **Inter-Departmental Business Register (IDBR), 2004 to 2008** – this is database of 2.1million units representing nearly 99% of known UK economic activity.
- **ONS Supply and Use Tables**[17] – these tables illustrate the whole economy by 123 sectoral industries and 123 products. The tables show links between components of gross value added, industry inputs and outputs, product supply and demand.
- **ONS, Claimant Count, July 2007 to July 2009 –** the figures highlighted in this dataset illustrate an administrative count of those on Job Seekers Allowance (JSA).
- **Derbyshire & Nottinghamshire Chamber of Commerce** – details of all businesses listed within the Chamber database that are within the Derby local authority boundary.
- **Midlands Aerospace Alliance (MAA) –** Contact details for 88 members, most relevant to the study, across the region.
- **Derby & Derbyshire Rail Forum database** – business details for all members of the Rail Forum.
- **Transport iNet Rail database** – business details of all rail related companies in the East Midlands.

3.5. Definition of geographies

Economic activity is not restricted to administrative boundaries but statistical data generally is. We have therefore used a number of geographic boundaries and definitions throughout this report. In order to assess the scale of these sectors within the Derby City Region we mapped where the majority of the economic activity of the three sectors fell to define the economic geography used.

In addition, Travel To Work Area (TTWA) data for Derby City, defined by the Derby Joint Local Trasport Plan (LTP), and Census 2001 data of travel to work patterns, was used to

[16] There is a discontinuity in ABI data between 2005 and 2006 (difference of between 0.6 and 1.3%). Users should therefore use caution when comparing the ABI employment figures over time due to these discontinuities. Further information on the discontinuities can be found in the document: https://www.nomisweb.co.uk/articles/news/files/ABI 2006 discontinuities.doc

[17] It must be noted that ONS only produce the Supply and Use Tables at a national level. Therefore, to make an assessment at a local level we have had to pro rata the data using employment levels, which may not be an exact representation of the relationships at a local level.

identify the scale of these sectors in surrouding areas. The TTWA for Derby includes the whole of Derby City, small areas in the east of neighboruring Erewash, areas to the south of Amber Valley, and a large area of South Derbyshire.

Table 3 below presents the distribution of employment within each sector across the four districts which make up the TTWA.

Table 3: Employment Distribution Across TTWA

Employment (% of Derby TTWA)			
Area	**Aerospace sector**	**Automotive Sector**	**Rail Sector**
Amber Valley	**4**	**9**	**-**
Derby	**92**	**37**	**89**
Erewash	**3**	**9**	**10**
South Derbyshire	**2**	**45**	**-**

Source: ONS, Annual Business Inquiry, 2007

This indicates that the main geographic focus of employment in the three sectors varies. Despite the relative proportion (10%) of employment in the rail sector within Erewash, it is anticipated that the majority of this will be outside the TTWA for Derby. The employment figures are based on the total employment within each district and therefore do not account for the small proportion of Erewash that falls within the TTWA.

The rail and aerospace sectors are primarily concentrated within the local authority boundary area of Derby (this is referred to throughout as Derby or local). The automotive sector is analysed using a broader geography to include South Derbyshire[18] and critically the Toyota plant. As per the discussion and table above, this is due to the employment concentrations of these sectors with the TTWA.

Throughout the report we also make a number of references to East Midlands, which is the standard government office region. This is frequently referred to as the Region.

[18] *Derbyshire includes the following local authorities; Amber Valley Borough Council, Erewash Borough Council, Bolsover District Council, High Peak Borough Council, Chesterfield Borough Council, North East Derbyshire District Council, South Derbyshire District Council, Derbyshire County Council, Derbyshire Dales District Council as well as Derby City Council*

4. QUANTIFYING THE CORE SECTORS

The following section demonstrates the economic contribution of the core sectors to Derby, Derbyshire and the East Midlands in terms of employment size, number of businesses and market penetration. This does not demonstrate the full extent of all three sectors in Derby; this is explored in the Supply Chain Analysis section.

4.1. Overall employment levels

4.1.1. Planes

There are approximately 10,338 people (2007 data) directly employed within the core part of the aerospace sector in Derby, equating to around 8.1% of total employment. 99% of this employment, in Derby, is within the manufacturing of aircraft and spacecraft.

Official sources suggest that there are around 20 aerospace businesses within Derby. Using this core sector definition of the sector, there are over 430 workplaces across the East Midlands employing a total of over 18,600 people.

Table 4 below illustrates a number of other key statistics in relation to this sector. The employees within aerospace are predominantly male and almost all work full time. The size of companies within aerospace, in terms of employees, is substantially larger than average (547 compared to 17). This is skewed by 2 or 3 large employers. At a regional level this average drops considerably (43), but is still almost three times the average.

4.1.2. Trains

There are approximately 5,080 people directly employed across 75 businesses within the core part of the rail sector in Derby, equating to around 4.0% of total employment. It is suggested[19] that there are almost 600 companies, in the region, that are linked in some way to the rail sector. This includes everything from suppliers of components to providing services including as legal advice and training.

Table 4 again illustrates a number of other key statistics in relation to this sector. The employees within rail are predominantly male and almost all work full time. The size of companies within the rail sector, in terms of employees, is substantially higher than average (131 compared to 17).

[19] *Mapping of the elements of the rail sector supply chain in the East Midlands and identifying the main innovation drivers, Derby and Derbyshire Rail Forum, Prepared for East Midlands Transport iNet, June 2009*

4.1.3. Automobiles

There are approximately 17,000 people employed within the core part of the automotive sector in Derbyshire, equating to around 4.2% of total employment in Derbyshire. There are around 1,600 businesses within Derbyshire. Whereas there are over 7,050 workplaces in the core sector across the East Midlands employing a total of over 59,250 people.

When compared to the rail and aerospace sectors there is a greater proportion of part-time workers. In Derby the average business size is small with just 11 employees per business, this is lower than both the aerospace (547) and rail (131) sectors. This can be attributed to the nature of businesses in the sector. For example, 92.6% of businesses in the automotive sector in Derby are identified as involved in the sale, rent or repair of vehicles that would typically employ smaller numbers of people in comparison to large scale manufacturing sites. The automotive sectors in East Midlands and Great Britain have approximately 75% of these types of businesses in their automotive supply chain.

Table 4: Employment Breakdown of the three sectors in Derby as Compared to Other Sectors

	Male	Female	Full-time	Part-time	Average business size (employees)
Agriculture and fishing	45%	55%	87%	13%	15
Energy and water	78%	22%	96%	4%	49
Manufacturing	79%	21%	95%	5%	41
Construction	82%	18%	94%	6%	12
Distribution, hotels and restaurants	47%	53%	51%	49%	11
Transport and communications	80%	20%	91%	9%	19
Banking, finance and insurance	60%	40%	81%	19%	10
Public administration, education & health	23%	77%	56%	44%	42
Other services	47%	53%	49%	51%	11
Average across all sectors	52%	48%	70%	30%	17
Aerospace	**82%**	**18%**	**97%**	**3%**	**547**
Automotive*	**82%**	**18%**	**90%**	**10%**	**11**
Rail	**82%**	**18%**	**98%**	**2%**	**131**

*Source: ONS, Annual Business Inquiry, 2007 *This data is for Derbyshire*

4.2. Employment concentration

We have presented a location quotient analysis. This is highlighted in Table 5 (below) and provides an indication of the degree of geographical concentration relative to regional and national industrial structures

Table 5: Employment Concentration Analysis in Derby Compared to East Midlands and Great Britain

	East Midlands (=1)	Great Britain (=1)
Agriculture and fishing	0.08	0.10
Energy and water	0.70	0.95
Manufacturing	1.16	1.66
Construction	1.14	1.32
Distribution, hotels and restaurants	0.83	0.82
Transport and communications	0.74	0.71
Banking, finance and insurance	1.07	0.88
Public administration, education & health	1.09	1.06
Other services	1.00	0.83
Aerospace	**8.32**	**8.21**
Automotive*	**1.36**	**1.59**
Rail	**8.00**	**8.80**

Source: ONS, Annual Business Inquiry, 2007
Notes: A location quotient greater than 1 reveals that an area has an above average representation of that particular sector compared to the benchmark (in this case East Midlands and Great Britain), a location quotient of 1 shows that an area has the same representation, and an area with a location quotient below 1 has an under-representation.
**This data is for Derbyshire*

4.2.1. Planes

- There are two or three major employers within Derby, most notably Rolls Royce, which contribute to the high level of employment. In terms of business numbers, only 20 out of 430 East Midlands companies reside within Derby, equating to 4.7%.of the regional total
- In employment terms, the aerospace sector has 8.3 times the concentration in Derby than the East Midlands and 8.2 times the concentration than nationally.

4.2.2. Trains

- Over half (53.7%) of all rail sector jobs in the East Midlands are within Derby.[20]
- The rail sector has 8 times the employment concentration in Derby than the East Midlands and 8.8 times the concentration than nationally.

4.2.3. Automobiles

- In employment terms, the automotive sector within Derbyshire is overrepresented relative to the wider region and Great Britain with a location quotient of 1.36 and 1.59 respectively.
- The location quotients show that the sector is not as highly concentrated in employment terms compared to the aerospace and rail sectors.

[20] *Using the SIC code definition rather than the Transport iNet data, as this dataset is only comprehensive at Derby local authority level*

4.3. Turnover by employment banding

Table 6 (below) illustrates the structure of the 'planes, trains and automobiles'[21] sectors broken down by enterprise size and number of enterprises, levels of employment and turnover.

It highlights that businesses with 1 to 10 employees represent almost nine out of ten (88.1%) workplaces but only a small fraction of total employment (2.4%) and turnover (1.9%). On the other hand, those businesses employing over 200 people generate 93.8% of turnover, employ 93.5% of the workforce, but only represent 1.7% of workplaces. This demonstrates the impact a few large firms can have upon the local economy and employment levels.

Table 6: Structure of 'Planes, Trains and Automobiles' Sectors in Derby

Business size (employees)		Count	%
1 to 10	Enterprises	260	88.1%
	Employment	726	2.4%
	Turnover (£000's)	118,677	1.9%
11 to 49	Enterprises	25	8.5%
	Employment	*	1.6%
	Turnover (£000's)	60,606	0.9%
50 to 199	Enterprises	5	1.7%
	Employment	776	2.5%
	Turnover (£000's)	214,758	3.4%
200+	Enterprises	5	1.7%
	Employment	28,791	93.5%
	Turnover (£000's)	5,993,024	93.8%

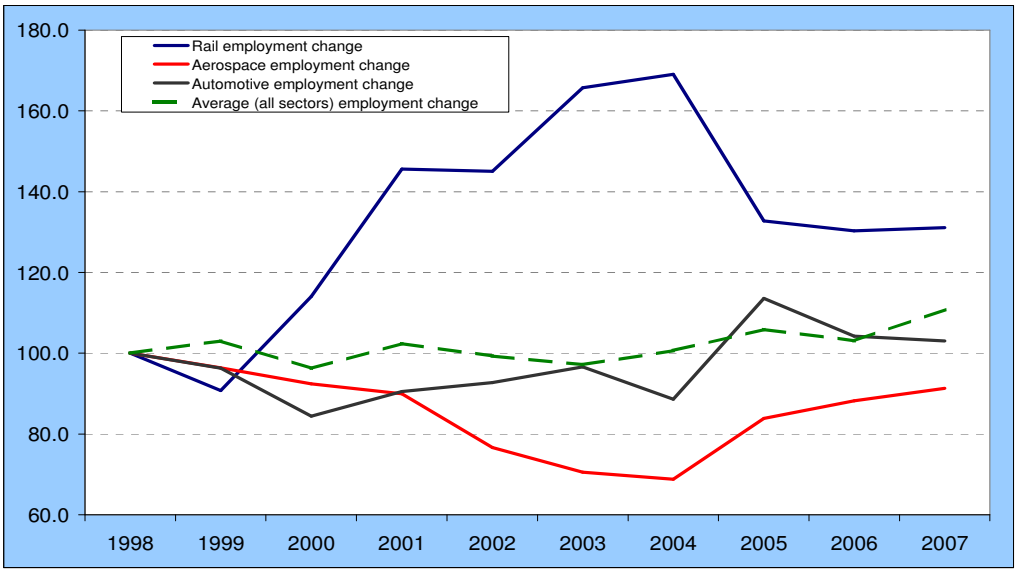
Source: ONS, IDBR, 2007
**data repressed due to confidentiality issues*

[21] *Data not available/reliable at individual sector level*

4.4. Time series analysis (1998 to 2007)

This section illustrates change in employment in the three sectors as compared to total employment, in Derby, from 1998 to 2007.

Figure 1: Employment Change (1998, index = 100)[22]



Source: ONS, Annual Business Inquiry, 1998 to 2007

4.4.1. Planes

- Aerospace witnessed year-on-year declines between 1998 and 2004. However, for the last three years for which data is available, there has been a 33% increase in employment levels.
- It is suggested that the significant decline in employment levels in 2001 was caused by the September 11th terrorist attacks in America. This resulted in a significant decrease in the volume of air travel, and resulted in a decrease in demand internationally for aerospace services. During this time, the largest employer Rolls Royce reduced its workforce by approximately 3,000 people. Employee numbers are slowly recovering, but have not yet reached 1998 levels.

4.4.2. Trains

- Despite a fall in employment between 2004 and 2005 due to redundancies at Bombardier, the rail sector has increased at a faster rate than the Derby average between 1998 and 2007. However, for the last two years, for which this data is available, employment has remained steady in the rail sector.

[22] *There is a discontinuity in ABI data between 2005 and 2006 (difference of between 0.6 and 1.3%). Users should therefore use caution when comparing the ABI employment figures over time due to these discontinuities.*

- This chart helps illustrate the volatility of the rail sector and demonstrates a particular challenge for the industry, not just financially but also in terms of skills retention. This is explored in more detail at a later stage in the report.

4.4.3. Automobiles

- The automotive sector displays shallow fluctuations between 1998 and 2007. There is a small drop in employees in both 2001 and 2003. The overall employment change over this period is positive.

- The number of employees in the automotive sub sectors highlight that over the last nine years there have been a significant increase in the industry of 'renting of automobiles' employees, for example, in 1998 there were 200 employees which has subsequently grown to 800 by 2007;

4.5. Impact of the recession

This section provides an assessment of the potential the impact of the current economic downturn upon the three sectors.

4.5.1. Planes

The UK Aerospace Industry Survey 2009, conducted by Atkins[23], indicates that between 2007 and 2008 industry turnover remained relatively flat, at approximately £20.57bn, equivalent to 1% in real terms. Despite this, the number of new orders dropped from £46bn to £35bn, wiping 24% off the UK backlog.

There has been a sharp fall in domestic sales with civil domestic sales down 30.1%, and the domestic defence market down 13.2%. However, the weakness of UK sterling has helped the export market with defence exports increasing by 21.4% and civil exports up 8.1%. This has resulted in 79% of new orders now coming from outside the UK.

The report also indicates that across the UK employment in the aerospace sector had fallen by 11.1% to 100,740 between 2007 and 2008. This allowed productivity per employee to reach over £200,000 for the first time. The underlying reasons for this increase in productivity is thought to be a number of factors including currency fluctuations, cost reductions and improvements to supply chain practices.

This should be observed in the context of a sustained period of reducing employment in the aerospace industry across the UK. Since 1991, when employment figures for the UK aerospace industry peaked at over 250,000, employment in the industry has reduced by more than 50%[24]. It is anticipated that this continual reduction in employment numbers is due to increasing development of more efficient procedures raising productivity of the workforce, and the relocation of many activities to cheaper foreign markets.

[23] *Atkins (2009) UK Aerospace Industry Survey 2009.*
[24] *Atkins (2009) UK Aerospace Industry Survey 2009.*

In January 2008, Rolls Royce announced plans to make 2,300 redundancies equivalent to nearly 6% of its 40,000 global workforce[25]. Of these redundancies, 240 jobs were from its shop floor in Derby, with a further 140 redundancies announced in November 2008 from its Derby operations[26]. A number of respondents indicated that redundancies had been made as part of wider business strategy to raise productivity and efficiency rather than as a direct response to the recession.

In-turn the redundancies made by Rolls Royce, allowed the firm to remain productive, and in February 2009 the company published preliminary results for the financial year. This detailed an increase in its order book by £9.6bn to a record £55.5bn, equivalent to a 21% rise. This consisted of a 21% increase in the civil aerospace division's engine orders worth £4.5bn, in 2008, and a sales increase of 22% to £9bn[27].

This has allowed Rolls Royce to remain committed to its training and development programme, and they will take on approximately 220 apprentices between 2009-2010, which will provide opportunities and training to people most affected by the recession.

In addition many respondents indicated that the recession has had a greater impact on smaller firms, which supply both aerospace and automotive sectors. These firms have witnessed the combined impact from both sectors, and while it is impossible to discount the impact of the downturn in the aerospace sector, many suggest that the large majority of redundancies in these smaller firms are due to decreased automotive activity.

The aerospace sector is relatively well sheltered from the impacts of short-term economic fluctuations. There are a number of factors which explain this, including:

- Historically high demand for aircraft and services has outstripped supply capacity, which has allowed a significant backlog to develop;
- Long lead-in times for aircraft projects mean they are not as susceptible to short-term economic cycles; and
- Emergence of the Maintenance, Repair and Overhaul (MRO) market, means the sector is supported by long-term, continuous projects that require daily monitoring.

Despite this robust structure and healthy backlog, there are concerns that the sector could be impacted in the future should the shortage of investment continue.

The sector is dependant on R&D to develop new products and design future aircraft. During the current economic climate R&D expenditure has fallen by approximately 32.2%

[25] Rolls-Royce Group plc (2008) Press Release; Rolls-Royce cost reduction and productivity programmes. 11 January 2008.
26 Rolls-Royce Group plc (2008) Press Release; Rolls-Royce consults with employees on future employment. 20 November 2008 .
[27] Preliminary Results 2008 (2009) Rolls-Royce Group plc

from £2.41bn to £1.83bn as firms focus on business development and existing contracts. If this continues it could reduce the global competitiveness of the sector[28].

In addition, as the recession continues there may be a drop in passenger numbers, coupled with higher fuel prices, which may mean fewer flights. The aerospace sector in Derby is increasingly dependant on MRO. There are over 500 MRO sites in the UK, 11% of which are located in the East Midlands, however the majority of this activity is related to Rolls-Royce operations[29].

In Derby, the consensus is that the aerospace sector remains strong, buoyed by the strength and healthy backlog of work, especially from Rolls Royce. While growth has remained static and growth targets have been missed, the sector is performing well compared to other manufacturing sectors.

4.5.2. Trains

There is evidence to suggest that the economic downturn is impacting negatively upon employment levels in the sector. A number of consultees, for example, suggested that smaller projects were delayed for the time being, which would ultimately impact upon employment levels somewhere down the supply chain.

Bombardier has also supported a number of organisations that have struggled recently. For example, at the turn of the year, Bombardier completed the acquisition of Time 24's[30] rail operation located in Derby. They have been a key supplier to Bombardier for the past ten years. It was estimated that around 100 jobs were safeguarded because of this acquisition.

One national study[31] suggests a positive correlation between rail use and the economy. In other words, as the national economy shrinks so do rail passenger numbers which leads to a decrease in the money coming in to the sector.

Having said that, the majority of the anecdotal evidence suggests that the rail sector is generally 'weathering the storm'. The majority of organisations we consulted suggested that they have not made any redundancies. One organisation did state that they had recently made 40 redundancies but this was due to a project ending rather than the recession.

The rail sector in the UK has tended to perform in a cyclical manner historically regardless of national economic performance. The Government has invested in 'fits and starts' and due to the heavy reliance on this investment it leads to the sector performing in peaks and troughs. "Uneven order books" was reported as a key feature in the rail

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[28] *Atkins (2009) UK Aerospace Industry Survey 2009.*
[29] *SEMTA (2006) SEMTA Sector Skills Agreement; Electronics, Automotive and Aerospace Industries.*
[30] *Time 24 is a market leader in the supply of control and panel wiring to the UK rail industry. Its 60,000 sq ft plant in Derby provides a wide variety of rail specialist products and services including internal vehicle loom wiring, cab back wall cubicles, body end cubicles, cab desks, in cab wiring, seat bay panels and interior wiring.*
[31] *Rail passenger use and the Economy, National Union Of Rail, Maritime & Transport Workers, January 2009,*

sector. The levels of investment (often in the billions of pounds) that go into rail infrastructure means that employment can fluctuate greatly especially within smaller organisations, thus making it difficult to make a direct correlation with the economic downturn.

To conclude, the evidence appears to suggest that the recession has impacted negatively upon the rail industry but to a *much smaller* extent than most other sectors, most notably financial and real estate. The economic climate has coincided with a natural downturn in rail which has made it increasingly difficult for a number of rail related organisations. The rail sector is heavily dependant upon Government investment and thus the short, medium and long-term future relies upon continued commitment from Whitehall.

4.5.3. Automobiles

There is a range of evidence to suggest that the economic downturn has impacted negatively upon employment in this sector. For example, consultation revealed that production at major manufacturing plants in the area has decreased significantly resulting in redundancies or reduced hours and pay for sustained periods of time, which inevitably affects the entire supply chain. The Society of Motor Manufacturers and Traders (SMMT) have reported that car production for the year to the end of July was down 45.8% at 518,375 units on the previous year.

One national study[32] into the impact of the recession on the retail automotive industry shows that the East Midlands along with the other eight regions in the country have a higher rate of redundancies in the automotive retail sector than the overall UK redundancy rate.

Having said that, the majority of the anecdotal evidence suggests that the automotive sector is suffering but are managing the impact effectively by reducing hours so to reduce redundancies. And in July of this year, UK car sales rose by 2.4%, the first rise since April last year.

Automotive firms recognise that for a person to buy a car it is generally considered a significant financial commitment and that an upgrade is usually because people 'want' to have a new vehicle, not because they 'need' to have a new vehicle, therefore consumers are keeping hold of their cars for longer, fearing job insecurity, inability to access finance etc. Consumers are reportedly only taking vehicles in for essential maintenance and repair as a way of saving costs. For some types of businesses in the car industry there have been positive effects from the recession, vehicle rental companies have found that people prefer to rent for shorter periods rather than buy a vehicle due to poor consumer confidence. However leasing has seen some negative effects, especially as companies are making staff redundant and reducing business travel which reduces requirements for new vehicles on a lease basis.

[32] *The Automotive Retail Sector – Impact of the Recession, The Institute of the Motor Industry, July 2009*

The SMMT have claimed that the Vehicle Scrappage Scheme had boosted demand, particularly for smaller cars. The UK scrappage scheme continued to help new car sales in August with sales up 6% from a year ago, the second consecutive month of growth. However, total sales since the start of 2009 are still 21.5% lower than the same period last year.

To conclude, the evidence appears to suggest that the recession has negatively impacted the automotive sector, particularly upon manufacturers. However sales have picked up slightly in the last few months. Positive commitments from firms such as Toyota and continued Government support will help the automotive sector 'weather the storm' and extensions of programmes such as the Vehicle Scrappage Scheme will welcomed to avoid a further drop in sales as the UK recovers from the effects of the economic downturn.

5. SUPPLY CHAIN ANALYSIS

The following section presents our analysis of the supply chain of the three sectors. It demonstrates the relationships between these and other sectors by quantifying the value of the services provided and the services purchased by the three sectors individually. One caveat with the data illustrated in this section is that ONS only produce the Supply and Use Tables at a national level. Therefore, to make an assessment at a local level we have had to pro rata the data using employment levels, which may not be an exact representation of the relationships at a local level.

5.1. Intermediate demand

The input-output tables display the flow of all goods and services between 123 sectors in the economy, identifying relationships between producers and consumers and the interdependence between different industries.

Tables 18 to 20 (in Appendix A) illustrate the intermediate demand of 'planes, trains and automobiles'. This is the amount of services purchased by each of the other 123 industry sectors from the planes, trains and automobiles. The second column of the tables illustrate the intermediate demand with the third column highlighting the share that each sector purchases relative to the total purchase value. We illustrate the top ten transactions in terms of value.

5.1.1. Planes

Purchases of aerospace services totalled approximately **£419 million**, with over 90% of which made up from purchases by two sectors. The aircraft and spacecraft sub sector accounted for 51.4% of purchases equating to approximately £215 million. Public administration & defence accounted for 40.2% of purchases, this equates to £168m.

5.1.2. Trains

Purchases of rail services totalled approximately **£157 million**, almost 50% of which was made up from purchases by three sectors. Public administration and defence accounted for 18.5% of purchases equating to approximately £29 million. Other transport equipment, £23.5 million (15.0%) and ancillary transport, £18.7 million (11.9%), also contributed heavily to the demand for rail transport services.

5.1.3. Automobiles

Purchases of automotive services, in Derbyshire, totalled approximately **£1,186 million**, almost 50% of which was made up from purchases by three sectors. Motor vehicles (manufacture of) accounted for 22.7% of purchases equating to approximately £270 million. Motor vehicle distribution & repair, £141 million (11.9%) and construction, £137 million (11.6%), also contributed heavily to the demand for automotive services.

5.2. Value of purchases in each sector

Input-output tables also identify the value of inputs into each sector, that is the purchases made by say the aerospace sector in terms of services and products from across the other 123 sectors. Tables 21 to 23 (in Appendix B) present the top ten purchases, in terms of value, by the aerospace, automotive and rail sectors from the other 123 sectors.

5.2.1. Planes

In 2007, purchases made by the aerospace sector in Derby totalled **£493 million.** Just over two-fifths of these purchases were for aircraft and spacecraft services, equating to £215 million.

Aerospace spent a further £71 million on metal forging/pressing, equivalent to 14.4% of its total spend. Other significant purchases include £29.9 million (6.1%) on architectural activities, and £21.7 million on non-ferrous metals (4.4%).

5.2.2. Trains

In 2007, purchases made by the rail sector in Derby totalled **£303.8 million**. Two-fifths of these purchases were for ancillary transport services, equating to £121 million.

The rail industry spent a further £47.4 million on renting machinery, equivalent to 15.6% of its total spend. Other significant purchases include £28.8 million (9.5%) on other transport equipment, and £9.3 million on computer services (3.1%).

5.2.3. Automobiles

In 2007, purchases made by the automotive sector in Derbyshire totalled **£1,427.3 million**. Two-fifths of these purchases were in the manufacturing of motor vehicles, equating to £377 million.

5.3. Summary

This section has illustrated the flow of goods and services between the three sectors and the rest of the economy. It has highlighted the relationships that exist between producers and consumers and the interdependence between the differing industries. Alongside the economic contribution demonstrated later in the report, this section goes some way to highlight the importance of the three sectors by the high level of goods and services that are purchased by other industry sectors.

The following section looks more closely at the linkages that exist between the three sectors and suggests stronger relationships between the skillsets of people rather than at a supplier level. The analysis above complements this to an extent, suggesting that the purchasing of services between the three is not significant at this level and that a greater level of purschasing exists between other sectors (see Appendix A and Appendix B for more detail). However, anecdotal evidence suggests that the relationships are stronger and more significant locally than nationally. Therefore, we would suggest that the figures slightly underplay the purchasing of goods and services between the three sectors.

6. INTER-RELATIONSHIPS BETWEEN SECTORS

The following section identifies the linkages between the three sectors. The evidence has been collated through a detailed consultation process, a literature review as well as analysis of some quantitative data. We have explored the relationships at both the employee and supplier level.

6.1. Employee linkages

In order to understand the linkages at an employee (individual) level the research explored; whether skills are transferable between the three sectors, if people move across the sectors, what if any, skill gaps exist and whether these are similar for the different sectors.

Consultations highlighted that there are a substantial number of occupations and skills that are transferable between the three sectors. On average it was reported that **around half of the skills could be "*easily* transferred"** to one of the other sectors. The general consensus was that **20-40% of occupations were sector specific and significant training and re-skilling (to overcome technical and processing barriers) would be required** to enable these employees to transfer from one industry to another.

A number of instances have been illustrated where people have moved across sectors. For example, JCB and Rolls Royce previously employed engineers who currently work at Bombardier and there are production line workers who have moved from Toyota to Bombardier.

Career Chain (previously known as The Midlands Engineering Redeployment Group), is an example of good practice locally. It was originally set up to help the aerospace sector following a decrease in demand post 9/11. Funded by emda the project continues to support, retain and develop the engineering skills and people across the region.

The three sectors also share a number of similar skill-related issues, including:

- **A lack of graduates moving into the sectors leaving an ageing workforce.** This was often attributed to the fact that these industries are perceived negatively by potential entrants. Commonly these sectors are viewed as declining in employment, offering limited career opportunities and less stability and ultimately being less attractive compared to alternatives in wider knowledge and creative sectors.
  - Rail has suffered particularly badly, in this respect, with a period of 10-15 years, post-privatisation, where there was little graduate recruitment. Bombardier have only opened up a graduate scheme in the last four years and SME's were unable to commit to graduate programmes in this period as they had only been established a short while. In order to reduce costs, SME's have recently been running joint graduate programmes through the Association of Train Operating Companies (ATOC) – which is an example of good practice. The level of graduate recruitment is still substantially below levels of pre-1990;

- It has also been suggested that these sectors suffer from an unusually low retirement age (below 55) which exacerbates the problem;
- Rolls Royce recruit over a quarter of their graduates from overseas[33] which illustrates the problem that they are encountering. Despite this, they take on around 200 graduates each year. This is usually more than they require, which enables other local engineering firms to recruit them.

- **All three sectors report skills gaps**. This is not specific to Derby and is a national problem that is widely recognised. For example, one of the key reasons for establishing a National Rail Skills Academy is to address these shortages. The types of skills that have been highlighted across the three sectors include:
  - Specific technical skills including design engineering, production engineering, welding, Computer Aided Design (CAD) and machine operatives;
  - Generic skills such as; team working, customer handling, communication, problem solving and IT.[34]
  - GoSkills, the Sector Skills Council for passenger transport has also undertaken extensive research into skill shortages. They suggest that **just over half of businesses (53%) within these sectors have at least one skills gap, 48% lacked at least one generic skill and 28% lacked a technical skill.** The generic skill gaps most commonly cited were foreign languages and job-related IT skills.
  - A related issue is the lack of interest in STEM (Science, Technology, Engineering and Maths) subjects at school, college and university.
  - One way local firms are trying to address the skill shortages is through an apprenticeship scheme. For example, Rolls Royce and Bombardier have established a joint scheme.[35]
  - SEMTA (Sector Skills Council for Science, Engineering and Manufacturing Technologies) undertook a nationwide survey exploring a number of sectors in detail. This included aerospace and automotive where it was found both sectors have hard-to-fill vacancies in machine operatives and craft level occupations. The study goes on to suggest that this led to increased workloads, higher recruitment costs, the need to retrain and up-skill the existing workforce and broaden their job specifications.

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[33] *Future Story, Derby and the East Midlands, 2008*
[34] *Sector Skills Council for Science, Engineering and Manufacturing Technologies, 2006*
[35] *15 apprentices will undertake three and a half years of training splitting their time between the two organisations and working on a range of different projects. As part of this scheme, the apprentices undertake further education gaining at least NVQ level 2 qualifications. Since the scheme was launched in 2005, 44 have been recruited.*

- **The three sectors have highly skilled workforces but are often in competition for the same employees.** It was suggested that this is more detrimental to the smaller companies as the larger employers "cherry-pick" the best staff and can offer better wages, benefits packages and training programmes.

- Anecdotal evidence highlighted another concern for these three sectors in that **the UK is becoming less competitive internationally in R&D related activities.** The main worry is that less innovation will occur in the UK and the East Midlands and thus investment is lost to other locations.

Despite the fact that the three sectors do share a similar skills base and a number of skills related problems, the majority of observers suggested that there was little movement and / or networking between them locally. Although most admitted that there is some difficulty in increased knowledge sharing, as a lot of companies are in competition with each other (if not directly, in terms of recruitment), a number of consultees suggested that there should be greater linkages across the sectors at senior management level to explore opportunities for other joint activities.

6.2. Supplier linkages

In order to assess the supply chain linkages we reviewed the members of the Derby and Derbyshire Rail Forum to assess the sectors they supplied, asked specific questions relating to supply chains in consultation and conducted a thorough literature review. The main conclusions from the research are:

- Through a range of consultation and analysis of websites belonging to members of the rail forum we found **only 3 companies out of 59[36] that supplied goods and services to all three sectors.**

- However, it must be noted that, members of the Forum are not suppliers solely to the rail sector. In fact, **half (48%) supply to a wide range of other business sectors.** For example, Abacus Lighting Ltd are not restricted to the supply of floodlighting for railway depots; they can cater for all floodlighting requirements including sports grounds, car parks, and airports.

- The recent iNet study[37] describes the market dependency of aerospace as a "typical U-shape pattern". In other words there are a number of companies who are wholly dependant upon aerospace. However, there are a larger number who are less than 50% dependant on this market. The study goes on to describe inter-industry links and claims that **"links to non-transport sectors are at least as important, including power generation, oil and gas, defence, telecommunications, medical and electronics".**

[36] *this was the number of members after taking out companies located outside of East Midlands and those not directly involved in commerce such as Derby City Council*

[37] *Aerospace in the East Midlands: industry structure, industry dynamics and innovation drivers, Midlands Aerospace Alliance, Prepared for East Midlands Transport iNet, June 2009*

- Anecdotally it has been suggested that the **supplier relationships are strongest between aerospace and automotive (with rail the most independent)**. The iNet study discussed above also found that the inter-industry links with aerospace were substantially stronger with automotive than rail. There was evidence indicating that the supplier relationship between automotive and aerospace is strengthening:

  - One possible explanation for this is that Rolls Royce reviewed their supply chain to decrease supplier dependency on one market. This diversification ensures smaller firms are less dependent on one market, or one manufacturing contract, and therefore less susceptible to downturns in either sector. Whereas, for larger firms this is an attractive prospect, which can enhance supply chain security and ensure suppliers can deliver during difficult financial circumstances.

  - This trend has been particularly prominent for manufacturers and suppliers of composite materials, which are used in the construction of body parts for high performance motor sport vehicles, and are increasingly used for the construction of aircraft frames to decrease weight and increase efficiency.

  - Composite materials feature heavily in the manufacture of high performance sport cars, increasingly accounting for 100% of the body work weight. A strong cluster of composite firms has developed in the region to supply the automotive cluster including the Formula 1 presence. These materials are becoming increasingly important for aircraft design. Currently only 20% of aircraft bodywork weight is of composite materials, however in the future in order to increase fuel efficiency, this will increase to 50%, and aircrafts will be larger.[38]

- The **relationship between the suppliers to the rail and other two sectors was described more as "on the edges" of the supply chain** and that examples[39] of sharing suppliers with aerospace and automotive were isolated or down to the "nuts and bolts" suppliers.

- This research reviewed the importance of the local supply chain and importance of the three sectors to employment and economic output. It was almost universally recognised that rail has the strongest (of the three) local supply chains, followed by aerospace and then automotive.[40]

- It is **widely accepted that having suppliers within the region has importance in terms of shortening timescales, logistics, improving communication and networks and ultimately facilitating cost savings.** In most instances the parts provided by suppliers to the different sectors are *fairly* bespoke and usually unique within Derby and the region. However, it was reported that supplies could usually be

[38] *Personal. Communication. 23/09/09*
[39] *Time 24 is an example of one organisation who previously supplied to the aerospace sector and now supply panel wiring to the UK rail industry*
[40] *this is demonstrated by the strength of the multipliers in measuring the total economic impact*

accessed elsewhere in the UK, but in some instances they would have to be accessed internationally.

- **The current economic climate has forced a number of these key suppliers into administration and because of their importance some have been bought out.** For example, Bombardier have purchased three suppliers in the last 18 months and Rolls Royce at least one company in their supply chain. The main reasons for these acquisitions is that transferring to other suppliers can be costly and in some instances the contracts are designed and built around the suppliers bespoke components.

Examples where the three sectors direct supply chains overlap can be identified but in general terms these are the exception rather than the rule. **The key finding here is that the links between the three sectors direct supply chains are relatively weak**. One other important issue that needs to be considered are the **indirect benefits that are associated and exist with the close proximity between the planes, trains and automobile sectors.** In other words, what would happen to the other two sectors if for example, Rolls Royce, Bombardier or Toyota (and their associated supply chain) left the region for any unforeseen reason? It was generally accepted that although the employment loss within its own sector would be significant the impact upon the two other sectors would be minimal, in the short-term. In fact if anything it could be positive as there would be a greater resource of highly skilled workers available. However, **it was universally accepted that in the medium and longer term the indirect impact would be hugely significant and costly to the East Midlands:**

- This is attributed to the loss of agglomeration benefits through the declining strength of the engineering and manufacturing cluster. In other words, companies would be less willing to invest in East Midlands due to the loss of the diverse engineering and associated skills base. There are three main benefits of agglomeration:

  - **Sharing**: Large firms in Derby benefit from a large pool of suppliers that compete to earn contracts and therefore bring the cost of inputs down. Small firms benefit due to the continued exposure to larger markets provided by the large firms and so there are more opportunities for these larger firms. If these large firms were to leave the region, there would be less incentive to locate in Derby, and less opportunities for the smaller firms.

  - **Matching**: Spatial proximity increases the chance and quality of matching between employers and employees. In the long term, the loss of a major employer would reduce the opportunities for people to find work in the area. This would therefore reduce the level of skilled labour locally and further deplete the labour force.

  - **Learning:** Spatial proximity increases the opportunities for face-to-face interaction and learning between employees and firms, which can lead to increased innovation. The loss of one of the larger businesses would lead to a reduction in regional spending on R&D, and decrease the opportunities for future innovation.

7. TOTAL ECONOMIC IMPACT

This section illustrates the total economic impact of each sector on the Derby economy. We start by outlining the definitions and approach used in these calculations.

7.1. Definitions of economic impact

There are three ways in which the economic impact of a sector can be measured:

- **Direct impact** – This is the immediate impact of the companies directly involved in each of the three sectors.
- **Indirect impact** – The changes in production and employment in businesses that supply goods and services to the aerospace, automotive and rail sectors.
- **Induced impacts** – This is the effect of employees in the three sectors spending on a variety of items in the wider economy.

7.2. Using multipliers to assess impact

The size and impact of multipliers differ for every industrial sector and economy. For example, the strength of the supply chain linkages and the proportion of goods and services sourced locally will affect the multiplier. The stronger the supply chain linkages the less leakage that will take place and the greater the multiplier effect.

The size of the local economy is also an important factor, leakage decreases as the size of the geographic area increases. In this instance, the multiplier will always be greater in East Midlands than in Derby as the economic impacts are unlikely to be captured entirely within an area the size of the city, due to commuting, supply chain and expenditure patterns extending beyond these administrative boundaries.

In order to calculate the multiplier for the sectors we have used a range of approaches to provide an objective view. This includes analysis of employment estimates generated through the purchases by the sector, guidance taken from English Partnerships,[41] benchmarks from other similar studies and evidence taken from the consultations.

[41] *The National Regeneration Agency, English Partnerships, has written a guide to assessing the additional impact of regeneration projects. This includes estimates of economic multiplier effects based on evidence from studies and research for four types of property-related project/activity:*

7.2.1. Aerospace benchmarks

In 2006, Oxford Economic Forecasting (OEF) estimated that in total the aerospace industry in the UK supported approximately 523,000 jobs, equivalent to 2.0% of the UK workforce. Of this, indirect employment accounted for 167,000, while induced employment accounted for 88,000 jobs. In addition OEF suggested that 80% of all travel agent employees are associated with the arrangement of air travel and package holidays that include air travel. This implies that 80,000 such full-time equivalent jobs are supported by aviation after allowing for estimates of part-time jobs and the proportion of work that depends on aviation[42].. OEF **suggested that the total multiplier effect of the aerospace industry ranged from 1.14 to 5.18.**

A study of the air freight sector by The Department of Transport suggests that the top end of this range is unrealistic as a large proportion of the supply-chain for the aerospace industry is in-house, and so expenditure has a lower impact on other industries. This research **suggested that the multiplier effect would be no greater than 2.0** at a national level.

In 2005 the Airport Operators Association (AOA) reported that the economic and social impacts of airports **assumed a multiplier of 2.1** for indirect and induced employment.

7.2.2. Rail benchmarks

A study by Invensys which assesses the case for investment in UK rail suggests that the creation of 100 additional direct rail jobs supports a further 140 indirect and induced jobs, creating 240 jobs in total. **This equates to a multiplier of 2.4 at a national level.**

An economic impact assessment of the rail sector in the Highlands, conducted by Glasgow University, suggested that 404 individuals were employed directly by the rail sector, with a further 246 attributable to multiplier effects, equating to 650 jobs in total. This equates to a **multiplier of 1.6 for the Highlands.**

7.2.3. Automotive benchmarks

A study carried out into the impact of the Toyota factory identified a composite employment **multiplier of 1.6 for an area** covering Derbyshire, Nottinghamshire, Leicestershire, Staffordshire and the West Midlands.

A study by Invensys compared the number of additional jobs created in the motor industry as compared to rail suggesting automotive is considerably lower. It suggests that the creation of 100 additional direct jobs supports a further 48 indirect and induced jobs, creating 148 jobs in total. **This equates to a multiplier of 1.48 at a national level.**

[42] *Oxford Economic Forecasting (2006) The Economic Contribution of the Aviation Industry in the UK.*

7.2.4. Estimated multipliers

Approaches using multipliers are frequently optimistic and overstate wider impacts [43].

English Partnerships produce 'ready reckoners' which express multipliers from neighbourhood through to a regional level. These ready reckoners are more conservative than a number of the benchmarks used above.

Table 7: English Partnerships Multiplier Effects

Level	Description	Neighbourhood level	Regional level
Low	Limited local supply linkages	1.05	1.3
Medium	Average linkages. The majority of projects will be in this category	1.10	1.5
High	Strong local supply linkages	1.15	1.7

Source: English Partnerships, Additionality Guidance 2005

As mentioned above, estimating multipliers is notoriously difficult. They vary by geography and sector. For this reason we have used a range of methods to calculate them including benchmark studies, guidance from English Partnerships and consultations with key stakeholders within each of these sectors locally. Our estimates broadly fit in between the benchmark studies and the English Partnerships guidance. We have identified the following multipliers:

- **Aerospace** - we suggest a multiplier of 1.5 at a local level (Derby) and 1.8 regionally;
- **Rail** - we suggest a multiplier of 1.7 at a local level (Derby) and 2.0 regionally; and
- **Automotive** - we suggest a multiplier of 1.3 at a local level (Derby) and 1.6 regionally.

7.3. Total economic impact

Table 8 presents our assessment of the total economic impact of the three sectors in Derby, whilst Table 9 demonstrates the impact across the region. Please note that this second table illustrates the impact of Derby's clusters upon the region as a whole. Table 10 illustrates the significance of the sectors in terms of the economic output generated and as compared to other sectors locally.

[43] *Employment and public infrastructure: An estimation framework, May 2009, Department of Treasury and Finance, Australia*

Table 8: Economic Impact of the Core Sectors in Derby, 2007**

Sector	Measure	Direct impact	Indirect and induced impacts	Total impact
Planes	Output (£m)	3,055	1,528	**4,583**
	Employment	10,399	5,200	**15,599**
Trains**	Output (£m)	1,542	1,080	**2,622**
	Employment	5,010	3,507	**8,517**
Automobiles*	Output (£m)	2,389	717	**3,106**
	Employment	16,979	5,094	**22,072**

Source: ONS Supply and Use Tables, 2004-2007 and URS calculations
** This data again relates to Derbyshire*
*** Rail data is for 2009*

Table 9: Economic Impact of the Core Sectors in Derby across East Midlands, 2007

Sector	Measure	Direct impact	Indirect and induced impacts	Total impact
Planes	Output (£m)	3,055	2,139	**5,194**
	Employment	10,399	7,279	**17,678**
Trains**	Output (£m)	1,542	1,542	**3,084**
	Employment	5,010	5,010	**10,020**
Automobiles*	Output (£m)	2,389	1,433	**3,822**
	Employment	16,979	10,187	**27,166**

Source: ONS Supply and Use Tables, 2004-2007 and URS calculations
**This data again relates to Derbyshire*
*** Rail data is for 2009*

Table 10: Top Ten Direct Output Generators in Derby, 2007

Industry Description	Direct Output £m	% of Total
Planes, Trains and Automobiles*	**6,986.1**	44.3
Aerospace	**3,054.7**	19.4
Automotive*	**2,389.0**	15.2
Rail	**1,542.4**	9.8
Construction	1,471.4	9.3
Health and veterinary services	956.0	6.1
Other transport equipment	757.9	4.8
Public administration and defence	600.1	3.8
Letting of dwellings	576.3	3.7
Banking and finance	516.7	3.3
Other business services	514.7	3.3
Sub-total	**9,837.9**	62.4
Aerospace including supply chain	**4,583**	29.1
Automotive including supply chain*	**3,106.4**	19.7
Rail including supply chain	**2,622.0**	16.6
Total output generated across all sectors	**15,763**	100.0

Source: ONS Supply and Use Tables, 2004-2007 and URS calculations
** The automotive output figure relates to Derbyshire, but is shown as a proportion of Derby output and is therefore not strictly comparable*

7.4. Summary of total economic impact

7.4.1. Planes

We estimate that aerospace is contributing over £3bn in direct economic output[44] to the local economy and over £1.5bn in indirect and induced output, totalling almost £4.6bn (and almost £5.2bn across the region as a whole). This equates to over a quarter (29.1%) of the total output generated in Derby. Aerospace contributes the largest amount of economic output in Derby.

In terms of employment, the aerospace sector in Derby supports 15,600 jobs locally, equating to around 12.2% of all jobs within the local authority. This equates to 6% of all aerospace jobs with the UK. There are approximately 2,079 further jobs supported which

[44] *This is the total value of all of the goods and services produced*

are located within the rest of the region. Including the supply chain, aerospace is around the same size as health and veterinary services, which is the largest industrial sector employer in Derby.

7.4.2. Trains

We estimate that the rail sector has contributed over £1.5bn in direct economic output to the local economy and £1.1bn in indirect and induced output, totalling £2.6bn (and over £3.1bn across the region as a whole). This equates to 16.6% of the total output generated in Derby. Rail contributes the 3rd largest amount of economic output in Derby, behind aerospace, and automotive.

In terms of employment, the rail sector in Derby supports almost 8,500 jobs locally, equating to around 6.6% of all jobs within the local authority. This equates to 13.1% of all rail related jobs with the UK. There are approximately 1,500 further jobs supported which are located within the rest of the region. Including the supply chain, rail is the sixth largest industrial sector employer in Derby.

7.4.3. Automobiles

In terms of employment, the automotive sector in Derbyshire supports 17,000 jobs, equating to just fewer than 4% of all jobs within Derbyshire. There are approximately 1,220 further jobs supported which are located within the rest of the region. Including the supply chain, automotive is the eighth largest industrial sector employer in Derby.

However, the automotive sector has contributed almost £3.1bn to the Derbyshire economy and £3.8bn across the whole of the region.

8. INVESTMENT

The following section illustrates a number of the key investment decisions that have been made in relation to the three sectors in recent years. We start off by estimating the level of Foreign Direct Investment[45] (FDI) in East Midlands over the past three years before moving onto sector specific information.[46]

The table below presents the jobs created and safeguarded through foreign direct investment in the East Midlands over the last three financial years between 2006 and 2009. In terms of jobs regional investment has created and safeguarded over this time period, nearly 60% have been within the City of Derby and Derbyshire. Of the jobs created / safeguarded in Derbyshire and Derby 44% and 99% respectively were transport related investments, which illustrates the importance of these sectors regionally.

Table 11: Jobs created / safeguarded through foreign direct Investment in the East Midlands over the three-financial year period 2006-7 to 2008-9

	Jobs Created / Safeguarded		Total
	Transport Related	Non Transport Related	
East Midlands	8,161	9,127	**17,288**
Derbyshire	3,175	5,714	**8,889**
Derby	1,278	2	**1,280**

Source. Foreign Direct Investment, emda.

8.1. Planes

The most significant investment in the aerospace sector in the region over the last few years has come from Rolls Royce. In 2007, Rolls Royce invested around £100 million in two additional world-class aerospace facilities in Derby, including the manufacturing centre for aero engine components, and one of the world's largest test bed sites. This investment comes in addition to the £250 million the company has invested in aerospace infrastructure in Derby over the last 10 years.

In October 2009, Rolls Royce announced that it has received orders worth up to £12bn for its Trent aero engines that will help to sustain 7,000 jobs in Derby. In 2001, it was announced that the UK government is providing £250 million for the development of Trent 900 and 600 engines. This investment continues to have a huge impact on the security of the local and regional industry, and helps to ensure that Derby remains a centre of excellence for aero engine design, development and production for years to come.

[45] *FDI is defined as a company from one country making a physical investment in another country.*
[46] *Source: emda*

In addition to investment made in Derby, Rolls Royce is looking to expand its UK operations. In July 2009 the company announced their decision to invest more than £300million in construction of four new factories in the UK, with £45million of this investment coming from the Building Britain's Future programme, a £151m Government scheme to support the manufacturing industry during the recession. Three of the factories will focus on aerospace manufacturing, and one will focus on nuclear activity. Two of the new facilities will make parts for aero engines constructed at the company's Sinfin site.

However, it is unlikely any of this investment will be in Derby, with the company wishing to open new facilities in areas, which qualify for grant-assisted government funding. Derby does not qualify, and therefore will miss out on this investment, however none of the new facilities will replace any work currently undertaken by the facilities in Derby.

This investment comes as part of the record order book that was announced for the company at the start of the year. While this investment will not be directed towards Derby, it again demonstrates the commitment of Derby's largest employer to remain in the UK.

In addition to the major investment in infrastructure in the region, there has also been a substantial amount invested in supporting Research and Development (R&D) activities, both by the private sector, the UK government and *emda*.

In 2008 the total spend on R&D activities in the UK aerospace industry was approximately £1.8bn, of which 65% was aimed at the defence sector. The main funding sources for R&D activity in the UK aerospace defence sector are self-financing (23%), UK government grants (18%), other government (17%) and other sources (9%). For the civil aerospace sector the main sources are self-financing (28%), UK government (1%) and other sources (3%). This demonstrates the commitment of firms within the sector to contribute heavily to R&D[47].

The UK Government set up the Technology Strategy Board (TSB), to drive forward innovation and applied technology to benefit the UK economy (across all sectors not just aerospace). From 2005 to 2008, £320 million of funding has been available to businesses to support research and development in key technology areas in aerospace.

Between 2008/2009 the government has committed a total of £90million for R&D for the sector. This includes funding from TSB, Engineering and Physical Sciences Research Council (EPSRC), regional development agency grants and devolved assembly grants. In addition there are approximately £70m of R&D tax credits being claimed between 2008/2009.

The Environmentally Friendly Engine (EFE) programme was launched in 2006, and is expected to run until 2010. The £95 million scheme is funded by a range of public sector bodies, including £6million from *emda*, with 50% of the funding coming from the private sector. The programme is being lead by Rolls Royce in Derby, initial component manufacture has begun at facilities in Belfast, Birmingham, Bristol, Derby, Hucknall, Wolverhampton and Burnley, and is now entering the test phase in Bristol.

The EFE is an aero engine technology demonstration programme that will validate new fuel-efficient technologies, aimed at achieving industry targets of 50% lower CO^2 emission and 80% lower Nox emissions by 2020. This will ensure that the region remains at the forefront of environmental innovation.

Rolls Royce invests more than £800 million globally every year on research and technology, two-thirds of which is aimed at improving the environmental performance of its products. In addition, the company invests around £350 million each year on the development and introduction of new products that embody these technologies, thereby enhancing environmental performance.

Rolls Royce is currently leading a £90 million project into low carbon aircraft engine technologies. This project is partly funded from a £45 million UK government grant, via TSB. Also The Strategic Affordable Manufacturing in the UK through Leading Environmental Technologies (SAMULET) project is a Rolls Royce led collaborative programme worth £90 million over four years, to accelerate the development of manufacturing and product technologies.

In 2008 aerospace R&D investment fell to its lowest level since 2001 in all sectors, falling 20% to just £180million. The largest fall has been R&D in engines, which fell by 33%. This fall was almost entirely within the defence sector as public spending was held back to tackle the wider economy.

8.2. Trains

Almost all funding for the UK rail sector comes from two sources; revenue generated by fares and from Government grants. The rail sector is heavily dependant on Government investment with one study[48] suggesting that the ratio of Government to non-Government funding is approximately 1.0 to 1.3. In other words, for every £1.00 invested by Government, the industry generates £1.30 in its own funding.

Billions of pounds of Government money are invested in UK rail infrastructure every year. At the start of this year, for example, there was an announcement that Network Rail will receive £25.5bn of investment to lengthen platforms and replace old parts of the network. However, this is a reduction in the levels of investment that have been granted in recent years and only a small fraction of the upgrades will be in and around Derby.

There was also the recent announcement by the Prime Minister and Transport Secretary Andrew Adonis who unveiled £1.1bn plans for the first big electrification of the rail network since the late 1980s. This investment is not likely to be realised for another five years or so and does not fill the order books in the shorter term.

There also appears to be a growing level of frustration, within the East Midlands, about the levels of investment that are leaving the UK. At the start of the year, Japanese manufacturing firm Hitachi were selected ahead of Bombardier for a £7.5bn Intercity

[47] *Atkins (2009) UK Aerospace Industry Survey 2009.*
[48] *UK Rail: A Case For Investment, Invensys, 2009*

Express Programme contract. There was a great deal of media coverage in the regional press about the possible negative consequences of this.

As mentioned in the SWOT analysis there are also a number of possible opportunities that can arise from Hitachi winning this contract, such as increased competition and an increasing engineering/manufacturing capacity. There is also the opportunity to lobby Hitachi to base the Intercity Express contract from the East Midlands or elsewhere in the UK. This would have a number of benefits for the UK rail sector supply chain.

It has also been announced in the last few weeks that plans to build a £15m UK Rail Centre in Derby have been scrapped. The Centre would have provided a showcase for the industry but has fallen through due to a lack of much needed further investment from the private sector for the project. Although there is still the possibility that a scaled down version of the Centre is pushed ahead this is still a disappointment for Derby and the rail sector.

DfT has already started discussions with the industry regarding the development of the designs for next generation multiple units. It is proposed that this family of trains meets the long term aspirations for both regional and urban diesel and electric trains, making best use of emerging technologies.

The first contract based around these 'next generation' requirements is the £1.4bn Thameslink rolling stock contract, and Bombardier is one of two companies shortlisted. If successful, production would take place between 2011 and 2014, and the local supply base would also be well placed for future 'next generation' multiple unit contracts, which may follow from 2015. However, consultees indicated that if the contract goes abroad, or is significantly delayed, the bulk of the regional rail sector and it's associated supply chain could struggle to survive because of the dearth of other rolling stock projects planned by DfT for the period 2011-2015.

Crossrail, which requires the phased introduction of approximately 600 vehicles by 2017 to operate across London, represents the next visible requirement for 'next generation' multiple units.

8.3. Automobiles

There is a great deal of uncertainty concerning future government activity, this coupled with the squeeze on public sector spending does not provide a positive outlook in terms of public sector investment.

At risk investments include the Automotive Assistance Programme which is a £2.3 billion package of loans and loan guarantees for the UK automotive and related supply sectors. The package consists of £1 billion government guarantees and £1.3 billion from the European Investment Bank. It began this year as part of the Government's range of actions to help secure the long-term future of the automotive sector. Eligible businesses include those who are based in the UK, those who propose to operate in the UK, have a turnover of a least £25 million and are proposing an investment of at least £5 million.

Other relevant government initiatives include the Vehicle Scrappage Scheme, the Enterprise Finance Guarantee, The Trade Credit Insurance Top-up, Train to Gain and Capital for Enterprise Funds.

The Vehicle Scrappage Scheme is designed to encourage consumers to trade in their vehicle (if ten or more years old) for scrappage and to buy a new vehicle with a discount of £2000. There are 41 manufacturers who take part in the scheme in the UK, Toyota, located in South Derbyshire are one of the companies taking part.

Feedback about this Scheme from stakeholders in the automotive sector is overall very positive; there is a strong desire for the scheme to be extended due to the success of it to date. It was felt that if the Vehicle Scrappage Scheme ends before or in February 2010 there will be still be low consumer confidence and sales will drop again to similar lows experienced throughout the recession, but an extension will see the sector through the downturn.

Sales figures and order numbers have persuaded Lord Mandelson to announce the extension of the Vehicle Scrappage Scheme at the Labour Party Conference (September 2009). So far the government have spent £227 million and the scheme was due to end once £300m had been spent or at the end of February 2010, however they have now committed to extend the scheme to cover 100,000 more cars. Increasing the scheme's budget to £400 million which should give the industry the vital boost it needs and help to counter the likely negative impacts of a return to the higher rate of VAT and the introduction of first year Vehicle Excise Duty rates.

Other modifications to the scheme will see the age qualification changed by six months to any car registered before 29 February 2000, and cutting the minimum age of vans being scrapped from 10 years to eight years. The US, UK and German governments have spent a total of £8bn euros on similar scrappage schemes that have impacted positively on the automotive sector.

Toyota has recently announced the production of the Auris hybrid vehicle to be assembled at the Burnaston site in South Derbyshire. It will be their first mass-produced 'green' car built in Britain. Production of the petrol electronic version of the Auris will be begin mid 2010 with investment from the Government and Toyota. It was part of the Government's intention to make the UK the best place in the world to develop 'green' vehicles.

9. SWOT ANALYSIS

An analysis of East Midlands' strengths, weaknesses, opportunities and threats (SWOTs) for the three sectors are provided below. Evidence was taken from the consultations as well as existing literature.

9.1. SWOT analysis summary tables

Table 12: Planes

Strengths	Weaknesses
Rolls Royce	Reliance on Rolls Royce
Barriers to entry	Reliance on civil aerospace
Established supply chain	Continued investment in R&D
Skilled workforce	Negative perceptions
Long lead-in time	Potential skills gap
Long term growth	Susceptible to global shocks
High demand	Global competition
Aftercare market	Barriers to entry
Opportunities	**Threats**
Environmental pressure	Environmental pressure
Civil aviation	Global shocks
Defence aviation	Global fuel prices
Healthy backlog	Global competition
Supply chain development	Composite Materials
Perceptions	Reduction in supply chain
Emerging markets	Ageing workforce
Investment	Reduced investment in R&D

Table 13: Trains

Strengths	Weaknesses
Bombardier	Over reliance on Bombardier
Well established local supply chain	Dependant on Government investment
International reputation	Lack of graduates
Highly skilled workforce	Competing on uneven field internationally
History	Low confidence for the short-term outlook
Innovation and research centre	Lack of some specialist professionals
Strong link with universities	Inward looking
Expertise within DDRF	Lack of transferable skills
Central location in the country	Cyclical nature of sector
Proximity to other related clusters	Difficulties for new businesses
The sector is seen as green	Negative public perception
Large, long term contracts (when let)	Engaging with SMEs is difficult

Opportunities	Threats
Future Government investment	Not winning Thameslink contract
Highly skilled workforce	Losing more work internationally
Willingness to work locally / network	Current economic climate
Sustainability agenda	Cuts in Public spending
Work with local public sector organisations	Banks not lending
Opportunity for R&D	Ageing workforce
Major opportunity to exploit foreign markets	Poor image
Hitachi moving to region	

Table 14: Automobiles

Strengths	Weaknesses
Toyota	Badly hit in recession
Engineering heritage	Low consumer confidence
Skilled workforce	High level of redundancies
Flexibility to market demand	Lack of local cluster
Links with Europe and rest of the world	High levels of imports
Transferable skills sets	Used car market
Proximity to West Midlands	Limited opportunities
Vehicle Scrappage Scheme	Limited opportunities
Highly desired consumable	High fixed manufacturing costs

Opportunities	Threats
Skilled workforce	Lack of opportunities
Developing environmentally friendly products / vehicles	Current economic climate
Lessons learnt from recession	Cuts in public spending
Extension of Vehicle Scrappage Scheme	Banks not lending
Sustainability agenda	Environmental restrictions / regulations
Work with local sector organisations	Poor media image
Motorsport industry	Losing work internationally

9.2. Planes

9.2.1. Strengths

- **Rolls Royce -** Their presence in Derby provides major benefits to the local, regional and national economy. The company employs approximately 12,500 people in Derby, 10,500 at its Sinfin site and a further 2,000 at Raynesway site. The Sinfin site is the heart of the manufacturing process for the Trent aero engines, while the Raynesway site is mainly focused on the Marine and Nuclear sector. The company has a broad customer base comprising more than 600 airlines, 4,000 corporate and utility aircraft and helicopter operators and 160 armed forces. It is estimated that the firm supports over 100 firms in the regional supply chain, contributing to a further 13,000 jobs. The firm contributes heavily to the aerospace infrastructure and R&D in the region. The ability of the firm to bring major global contracts of significant value into the region, is a huge asset on all geographical levels.

- **Barriers to entry** – The manufacture of aircraft is heavily regulated to ensure the end product is high performance and suitable for the purpose. Suppliers of aerospace products and services are required to achieve accreditation from a number of regulatory bodies. To develop capability and accreditation in the sector, requires substantial investment in equipment, facilities, and workforce training. While this may be viewed as a weakness that will reduce the number of firms emerging in the market, a number of respondents indicated that this is a strength of the local cluster. The local cluster is already globally competitive and has the required capacity, knowledge and accreditation. Therefore high barriers to entry will reduce the likelihood of competition from foreign firms who do not currently have this capability, and therefore strengthen the local clusters position. This provides security to the investment already made in the region.

- **Established supply chain** – The Midlands represents one of the largest aerospace clusters in the world. There are over 700 firms involved in the aerospace sector, over half of which are located in the East Midlands. 20 firms are located in Derby, including Rolls Royce, which is the focus for the sector and has been established in Derby for over 100 years. Rolls Royce interacts with approximately 75% of the firms in the region. Firms located here cover a wide variety of inputs into the design and manufacture of an aircraft, including engine design, MRO and composite materials. This presents opportunities for firms to work together and develop close relationships.

- **Skilled workforce** – The existing workforce in the area is highly skilled with Rolls Royce indicating that approximately 85% of their staff is qualified, or working to a equivalent, NVQ4 level[49]. There has been a great deal invested in training and development of the existing workforce and the skills of the labour in the area are valuable. In addition it is also suggested that in some areas skills gaps are small, with some firms reporting over 100 applicants for one position, and many suggesting

[49] *Pers. Comm. 22/09/09*

that labour could be sourced locally. While this is a major strength some areas of skills are lacking locally, and with Rolls Royce able to pick the best candidates, other supply chain firms may find it more difficult to recruit.

- **Long lead-in time –** The lead in times for the development and production of a new type of aircraft or component are relatively large, with initial research and development taking many years prior to final development. This leads to long-term investment and protects the sector against short-term fluctuations in the economy.

- **Long-term growth –** the sector has demonstrated strong growth over the last 50-years as demand for air travel has increased and innovation and product development has allowed the sector to remain competitive. This gives confidence for investment in the sector regionally.

- **High demand –** as indicated above the sector has demonstrated consistent growth over the last 50 years, with demand for aerospace services, outstripping the supply capacity. This is forecast to continue with the emergence of new markets resulting in increased demand, which will ultimately impact positively on employment in East Midlands.

- **Aftercare market –** Rolls Royce has become a world leader in the provision of after care services and the development of the Maintenance, Repair and Overhaul (MRO) market. Commercial aircraft generally have a lifespan of between 25-30 years, equivalent to approximately 50,000 cycles, and require continuous monitoring and maintenance though its life to ensure it remains safe and fit for purpose. Rolls Royce in Derby now continuously monitors over 3,500 aircraft in-flight, and this aftercare service has continued to grow and in 2007 contributed to over 50% of the company's revenue. This leads to long-term contracts for the continuous monitoring of aircraft, and the supply of services for the repair and maintenance of aircraft, and the existing facilities present a significant barrier to rivals.

9.2.2. Weaknesses

- **Reliance on Rolls Royce** – The local and regional aerospace sector is heavily dependant on the success of Rolls Royce. The company supports many firms directly in Derby, and is involved with a further 75% of the 700 firms in the Midlands region[50]. It is reasonable to conclude that Rolls Royce is the heart of the aerospace sector in the region, which leaves the supply chain vulnerable to the success of one firm. However Rolls Royce is aware of this dependency and during its last supply chain review, it sought suppliers who could demonstrate independency, and work in a number of sectors. This has helped to reduce the dependency of the supply chain.

- **Reliance on Civil Aerospace -** The sector is heavily dependant on the success of civil aerospace and the demand for air travel. Changes in the volume of passenger numbers and fuel prices can affect the profit margin of airlines, which operate the

[50] *Pers. Comm. 22/09/09*

aircraft. This can effect the MRO market by reducing the number of flights; it can also reduce the development of new aircraft.

- **Continued investment in R&D –** In order to remain globally competitive, the sector must continue to be at the forefront of developing new technology and products. R&D activity is essential to both large manufacturers and smaller supply chain firms, to develop globally competitive products. Typically the level of investment in R&D is reduced throughout economic recession and can result in the sector failing to innovate. UK R&D has been cut by approximately 34% in 2008, and there has been a trend in recent years of R&D activity being moved abroad. If this were to continue the East Midlands sector could be left behind and fail to innovate as quickly as other locations.

- **Negative perceptions of sector –** Many still view the sector as a heavy manufacturing industry. Many also view employment in the sector as unreliable with poor job security and characterised by redundancies and short-term contracts. This has resulted in a significant decrease in the number of graduates coming out of education and seeking employment within the sector. Therefore many firms in the sector find it difficult to attract the same number of graduates as previous years, and more have been looking to recruit graduates from abroad. This is also a problem in the education system not demonstrating and communicating the benefits of STEM subjects.

- **Potential skills gap –** Some commentators describe the existing workforce within the sector as 'on a cliff edge', indicating that in the next 2-5years many of the most experienced skilled workers will reach retirement age, leaving behind a skills gap, which may not be filled in the short term. In addition a trend emerged during consultations that a high proportion of people who leave the sector, either through redundancy or choice, do not tend to return to employment within the sector. In one example, of 43 people who were made redundant from one firm in the sector, only 3 returned to similar employment. Resulting in vital experience, and investment in skills being lost. It is essential that skilled graduates continue to be encouraged to enter the industry;

- **Susceptible to global shocks –** The sector is susceptible to global shocks, such as health epidemics (Swine Flu and SARS) and terror acts and threats (9/11), which reduce the volume of aircraft flights demand and resulted in nearly 3,000 redundancies at Rolls Royce. This became apparent especially after 9/11 when there was a significant reduction in flight numbers and passenger volume also decreased. Due to the importance of the MRO market for the sector, this resulted in reduced activity and redundancies.

- **Global Competition –** Emerging foreign markets and governments understand the importance of aerospace as a value added sector and are keen to develop their capabilities. In recent years there has been a trend for lower value added manufacturing activity to be re-located in these emerging markets to utilise low cost labour. This has resulted in a reduction in the supply chain locally. While high value

manufacturing techniques have been retained in the region, supply chain is suffering from increased global competition.

- **Barriers to entry** – While the high levels of investment required to develop facilities and capacity to be competitive in the sector, will benefit those firms in the area who have capacity, it will reduce the opportunities for other firms within the sector to take the step-up and become globally competitive.

9.2.3. Opportunities

- **Environmental Pressure –** The UK aerospace sector has experienced strong growth over the last 40 years, which is expected to continue into the future. The environmental implications, in terms of noise, air quality and climate change, of meeting the increased demand are significant, and must be met by the sector or these implications will become a constraint to growth. Aviation emissions currently account for only 2% of man-made CO^2, however with healthy growth projections for the sector, the impact on the environment is increasing. In addition as the cost of fuel continues to increase, airlines are demanding more fuel-efficient aircraft. The local and regional cluster is well placed to deliver an effective response to climate changes, and open up new commercial opportunities. Rolls Royce has a long tradition of technological and engineering excellence and has been focused on the environmental challenge for over 10-years, with research programmes aimed at improving environmental performance. The company has facilities with world-class levels of environmental performance. The company is also continuing to invest heavily in R&D for environmental schemes, and involves a number of regional partners. Due to the excellent position of the sector regionally and collaborative working, the sector will be able to unlock the potential opportunities the environmental challenge raises. Additionally, Rolls Royce are leading an 'Environmentally Friendly Engine' (EFE) programme. This is a key element of the National Aerospace Technology Strategy, and involves 11 leading UK organisations from industry and academia[51].

- **Civil Aerospace Sector** – There are a number of civil aerospace programmes which will provide significant opportunities for the aerospace sector in the region in the future, these include:

    - Construction for Airbus A350XWB and A400M models, Boeing 787, Bombardier C-series;

    - New Short Range (NSR) airframe/engines/systems/advanced materials. These are the most important programme(s) for sustaining and developing the existing UK industrial base, and are crucial as the technology driver for other next generation aircraft;

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[51] *The EFE programme is focusing on developing and validating key technologies to reduce emissions, fuel burn and noise from aircraft, and supports the environmental performance targets set by the Advisory Council for Aeronautics Research in Europe*

- Future Air Traffic Management (ATM). This will be a crucial enabler of traffic growth in the civil sector. Optimised routes and flight paths trajectories will be an essential contributor to the aviation sector meeting its overall emission targets; and

- Other innovations including the development of the next generation of rotorcraft, offering low noise and high efficiency, will provide opportunities to the UK industry;

Rolls Royce forecast from 2009-2028 demand for approximately 141,000 engines, worth over $800 billion. This demand comes from fast-growing markets in Asia, the Middle East and Latin America, but also from replacing many thousands of older aircraft in Europe and North America. In addition aftermarket services are expected to provide a further $600 billion over their service lives.

- **Defence Aerospace Sector –** There are a number of UK and global opportunities for the regional cluster in the defence aerospace sector. These include the emergence of the Unmanned Aerial Systems (UAS) market as a long-term opportunity which is a significant opportunity for the composite materials firms in Derby and the wider region.

- **Supply chain development –** 21ST Century Supply Chains (SC21) is a programme developed by the Society for British Aerospace Companies (SBAC) aimed at achieving supply chain improvements for the aerospace sector to increase competitiveness. The programme aims to develop a more competitive supply chain, which can present opportunities for companies in the region.

- **Perceptions -** Rolls Royce currently operates a number of University Technology Centres (UTC), including two at the University of Nottingham and one at Loughborough University. These aim to develop graduate skills in areas of high-tech engineering. In addition Rolls Royce are committed to graduate and apprentice recruitment and will recruit a further 200 in 2009. This will develop the younger workforce and maintain skills levels in the future.

- **Emerging markets –** Many commentators consider there to be major opportunities in emerging markets of Asia and Africa, with huge potential for the replacement of existing aircraft and upgrade of facilities as the population becomes more mobile;

- **Investment –** Continued investment in aerospace infrastructure and R&D in the region from both private and public sector bodies will increase the capability of the sector and increase confidence for investors.

9.2.4. Threats

- **Environmental Pressure –** As mentioned above, there is increasing pressure on the aerospace industry, by airlines who require efficient aircraft, and regulators who require reduced pollution. The size of this challenge is increasing, and will threaten future growth of the sector if it fails to rise to these challenges. While the sector

locally, is already engaged and advancing more efficient technologies, this activity must be maintained into the future and at a faster rate compared to competitors to ensure the sector can seize the opportunities. If the sector cannot seize these opportunities, the existing technology will quickly become obsolete and the sectors strength undermined.

- **Global Shocks –** As mentioned above the sector is highly susceptible to major global incidents, which can reduce the volume of air traffic and passenger numbers. Outbreak of a major epidemic, or terror threats could significantly impact the aerospace sector.

- **Fuel Prices –** Continued increases in fuel prices will have a significant impact on airlines, reducing their profit margins. While this may increase demand for fuel efficient equipment, it would have a significant impact on the aerospace sector in the region should such innovation not be forthcoming.

- **Global competitiveness –** A number of governments are determined, especially in emerging countries, to develop capability in the aerospace sector. This could threaten the future of the aerospace sector in the UK and the region, as subsidies and incentives to relocate are offered by competing locations to manufacturers of high value products. For example, Rolls-Royce and Brandenburg Technology University (BTU) of Cottbus recently opened a University Technology Centre (UTC) that undertakes wide ranging research work for Rolls-Royce. This follows a co-operative agreement signed by Rolls-Royce Deutschland and BTU back in 2003 to fund a joint competence centre for engine technology. BTU is already working on a number of specific projects in the area of multidisciplinary gas turbine process integration in collaboration with high-tech company Rolls-Royce Deutschland, which has a base in Dahlewitz, Brandenburg[52].

- **Composite materials –** The latest shift in the sector has been the emergence of the use of composite materials in the construction of airframes. At present it is suggested that up to 20% of an aircraft frame is constructed from composite materials, with the remainder consisting of metal materials. In the future almost 50% of aircraft frames will be composites. While the sector has a good capability in the region to supply such products, most of the materials, such as carbon fibre, are sourced from foreign markets. If the UK sector fails in developing its own capability to produce carbon fibre materials, it will become dominated by foreign suppliers, which could easily undercut local suppliers. This may mean a diminishing advantage of previously invested capital in the UK sector, and present an opportunity to emerging markets.

- **Reductions in supply chain –** In order to reduce costs and increase productivity many key manufacturing firms are reviewing their supply chain. Firms are reducing the number of suppliers used, and looking for larger suppliers who can provide a range of services, this reduces the burden of managing a number of small suppliers.

[52] *Source: www.rolls-royce.com/deutschland/en/news/pdf/2005/110405btu_e.pdf*

In addition many manufacturers are now working to a Just In Time (JIT) schedule for delivery of supplies. This process will reduce the number of firms directly involved and may also lead to manufacturers switching to foreign suppliers who can provide a range of services and can guarantee to meet deadlines. While foreign suppliers may take small offices in the region or sequencing facilities, they are by no means necessary, and can be footloose. Some respondents also indicated that the past performance and attitude of the supply chain regionally to deadlines was a major factor in the implementation of the JIT programme, and that regional suppliers may loose out due to a lack of reliability. The cluster must maintain its size, capacity and capability if it is to remain globally competitive.

- **Ageing workforce** – There are a lack of graduates entering the sector, and many who leave the sector are unlikely to return. This has created an ageing workforce. This has a number of potential implications including a labour shortage and knowledge loss when this workforce retires.

- **Reduced investment in R&D** – As mentioned above, the aerospace sector requires continued investment in R&D to maintain global competitiveness. Over the past few years regional spend on R&D has remained static, meanwhile spend in other countries has been increasing. During the recession R&D spending suffers.

9.3. Trains

9.3.1. Strengths

- **Bombardier** – Their presence in Derby has a large number of potential benefits. They are the only train builder in the UK that brings a number of obvious benefits to themselves and their supply chain. They are also a major employer with a global reach. A lot of the work that Bombardier has won in the UK is supported by a local supply chain. The firm have also supported a number of local firms who have gone into administration.

- **Well established local supply chain** – East Midlands represents the largest rail cluster in Europe, some argue in the world. This has obvious benefits for the local economy but it also helps create high levels of competition locally which keeps costs down and makes the cluster more competitive on a global scale. There is also the benefit of greater exposure and closer working relationships.

- **International reputation for rail excellence** – East Midlands has an international reputation, which can help to encourage rail related firms to locate and invest in the area. For example, Australian-owned firm, Sydac, a leading company in developing and supplying technological solutions for train driver simulation and training systems, chose Derby as a location for their permanent UK office to support their growing client base in the UK and across Europe little over two years ago.

- **Highly skilled workforce** – There are a great number of highly skilled professionals working within this sector who are in high demand. The majority of vacancies within the sector can be filled locally which results in savings in recruitment costs.

Manufacturing / engineering is strongly represented in Derby and has been for many years. The clustering of these industries and the skills required provide a possible unique “labour pool” locally.

- **History** – The rail sector has had a strong presence in the region for over a century. This history and heritage is a major strength as it helps in attracting other rail firms to the region and demonstrates the areas ability to sustain the sector.

- **Technical innovation and research centre** – The sector within East Midlands is diverse and brings a lot of innovation to the area. Transport iNet has been established to allow individual sectors to work together, share ideas, technologies, intelligence, innovation and create a link between operational industries and the academic community. There is a range of specialist advice and financial support available to support innovation in the region. The railway technical centre business park (formerly British Rail’s national rolling stock engineering and research headquarters) remains a centre for innovation in the sector, with a number of start-up businesses based there. This also helps to retain skills locally.

- **Strong link with universities** – There are eight research led universities within the region that have a close link with the business community and help to increase innovation. The East Midlands Universities Association work to enhance the links between universities and business.

- **Expertise within the Derby and Derbyshire Rail Forum (DDRF)** – The DDRF help to promote the region as a world-class centre of rail excellence. DDRF has 85 members that provide excellent knowledge sharing opportunities. They also continue to enhance the reputation of the sector and bring new companies into the region.

- **Central location in the country** – The location in the centre of the country makes it an important node of the rail network.

- **Presence and proximity to other related engineering and manufacturing clusters** – The proximity to the aerospace cluster has a number of benefits. Rolls Royce and Bombardier, for example, share an apprenticeship scheme where apprentices spend their first year being trained at the Rolls-Royce Training Centre, before working through a programme at Bombardier's Derby site.

- **The sector is seen as green** - With increasing emphasis on green travel, the future for rail as compared to other transport modes, looks bright. This should ultimately see rail travel grow across the country as a whole and as the front-runner for the sector; the region is well placed to take advantage of this. To show their commitment to the sustainability agenda, Bombardier were the first vehicle manufacturer to sign the International Union of Public Transport’s (UITP) Sustainability Charter in 2003. They followed this with a report in 2006 outlining their progress and commitment to sustainability in a publicly available report. They also have a dedicated Centre of Competence to create products designed with the environment in mind and some trains they manufacture are around 90% recyclable.

- **Large, long-term contracts (when let)** – The size of the investment granted from the Government is usually so vast that it covers 5 years and beyond.

9.3.2. Weaknesses

- **Over reliance on Bombardier** – Although there are a significant number of companies in the rail sector across East Midlands, a number are heavily reliant on the work that Bombardier brings to the region. However, it must be noted that not all rail companies within Derby depend on Bombardier; many do have national and sometimes international markets themselves.

- **Hugely dependant on Government investment** – The sector right across the country is reliant on funding from the Government. Post war investment has been in fits and starts making it difficult to plan forward.

- **Lack of graduates coming into the area/sector** – A number of consultees highlighted the lack of 'fresh talent' coming into the sector. The reasons given for the lack of graduates were that neither the area nor sector was seen as the most appealing to young professionals.

- **Competing on uneven field internationally** – Businesses that we consulted with felt that this was a major disadvantage to the sector across the country. This relates to an earlier point that other European countries, such as France, manufacture all their own trains and we do not. The recent decision to grant Hitachi the £7.5bn Intercity Express Programme contract led commentators to reinforce the message that the UK rail sector is on an uneven playing field as we are unable to bid for similar work in Japan. There is a sense that the UK "plays by the rules" and whilst not seeking to encourage national protectionism, some views were that we (in the UK) have strong political support for the rail sector but that does not always translate into action.

- **Low confidence for the short-term outlook** – Although the majority of consultees felt that the rail sector was performing well in the current economic conditions, many felt that the worse was yet to come and felt quite pessimistic about the short-term prospects.

- **Lack of some specialist professionals** – Due to the lack of graduates coming in to the sector there is a shortfall of a number of specialists and technical trades. This not only leads to difficulty in recruiting these professionals but it also means that the few that there are in Derby can demand high wage, leaving some businesses less competitive.

- **Inward looking** – It was suggested by a handful of consultees that the rail industry within the East Midlands is quite inward looking. For example, one business stated that innovative solutions that derive from outside the region are frequently ignored.

- **Lack of transferable skills** – Although there is evidence that skills acquired in this sector can be easily transferred to other work, this mostly relates to higher-level

skills. It is the lower skilled and temporary staff who are most vulnerable to employment loss and would struggle to transfer their skill sets to other sectors.

- **Cyclical nature of sector** – As already outlined, rail is generally a sector that performs in cyclical manner. This makes it difficult for companies to plan for the future in terms of investing in technology, skills of the workforce and research and development. When major investment is granted it means that significant capacity needs to be provided quickly which is often difficult and can lead to delays in project delivery and consequently hefty penalties.

- **Difficult for new businesses to enter the cluster** – Although the well-established supply chain is a major benefit, the strength of it makes it difficult for new businesses to start up locally. Some suppliers operate within a "comfort zone" and only deal with known clients and thus miss fresh opportunities

- **Rail sector has a negative public perception** – A number of consultees suggested that the public tend to view trains as unreliable. Rail infrastructure in the UK, is also described by many, as poor in comparison to other European countries.

- **Engaging with SMEs is difficult** – This weakness is not unique to the rail sector. However, it has been noted that a large proportion of networking and knowledge sharing events for the sector is made up of the same organisations that tend to be the larger more established organisations.

9.3.3. Opportunities

- **Future Government investment** – Billions of pounds of Government funding has been earmarked over the next five years to boost performance and capacity across the network. These include:

  - £1.1bn worth of funding for the first significant investment in the electrification of the rail network since the late 1980's. Although as noted earlier this may not be realised for another five years or so and any initial projects will not be in the East Midlands.

  - £1.4bn Thameslink contract, of which Bombardier is one of three companies bidding for the work.

  - Network Rail will receive £28.5 billion to be spent on Britain's rail systems to lengthen platforms and replace old infrastructure related equipment (track signals, etc). However, as already noted, this is less than previous investment that has been made for upgrades.

  - Future possible high-speed rail link between Scotland and London.

- **Highly skilled workforce** – This presents a number of opportunities as a highly skilled workforce generally leads to a more productive employer. Stakeholders have highlighted an early indication of a rail skills academy that will help to promote the sector, the skills and the opportunities within rail. It will also help industry understand

in more detail the skill gaps of employers. One consultee suggested that this may or may not be a physical entity and could be web based. Either way there is an opportunity to lobby for the National Academy for Rail Skills to come to Derby. The importance of the Skills Academy should not be understated as it will play a major role in future skills development in the sector. Having this locally would not only have financial benefits but would also attract talent to the area.

- **Willingness to work locally / network** – Businesses we consulted showed a strong desire to network and share good practice across the sector. Although this is being exploited by the likes of DDRF and Transport iNet there is a greater opportunity to be had especially in the current economic climate.

- **Sustainability agenda** – The ever-increasing priority placed on sustainability and the environment presents a number of opportunities for this sector and will encourage continued long-term investment from the Government.

- **Work with local public sector organisations** – Businesses we consulted with demonstrated a great desire to work closely with local public sector organisations, which is not always present across the business community. The industry in East Midlands demonstrates a good understanding of how the public sector can support the sector to grow. This research has been evidence of this in that once we were able to demonstrate we were working closely with DCC and *emda* we could easily engage employers. The recommendations section illustrate examples of how the public sector can intervene and maximise this opportunities.

- **Opportunity for R&D** – There was a suggestion that this quiet period in the industry presents business the opportunity for more research and development. However, businesses suggested that financial assistance for this type of activity was related to contract value and thus it was not possible to get support without having the work in place. A number of consultees felt that greater flexibility in this type of financial support would help create a more innovative and productive rail sector, whilst keeping people in employment.

- **Foreign markets** – Derby rail companies have the skills, expertise and track record to take greater advantage of opportunities on the international stage. Foreign markets are growing (China and India especially) and Derby firms could be doing more to exploit these markets.

- **Hitachi** – There is an opportunity to persuade Hitachi to base in East Midlands for the assembly of its new intercity express. This would have a number of obvious benefits for the region and the local rail supply chain.

9.3.4. Threats

- **Not winning Thameslink contract** – The main short-term threat to the sector in the East Midlands, as described by almost all businesses we consulted, was Bombardier not winning the Thameslink contract. Not winning this contract or delays

in the contract could have a detrimental effect on employment within this sector locally.

- **Losing more work internationally** – Related closely to the above threat is the fear that companies based outside of the UK will win more work, as was the case recently. Countries such as India and China are also becoming increasingly competitive and generally offer cheaper labour and costs.

- **Current economic climate** – As previously mentioned, the impact of the recession upon the sector has not been great to date. However, many businesses we consulted with feel that the worse could still be to come. There was almost universal belief that the downturn would impact upon the sector in the short term and it would then recover quickly. There is the threat, however, that if redundancies were made it could be difficult to recruit some of the highly skilled specialists that are in short supply.

- **Cuts in Public spending –** Although there is significant Government investment committed over the next five years or so, there is the threat that there is less significant funding following this. A change in Government would see priorities change and it is unknown whether there would be an increase or decrease in funding.

- **Ageing workforce** – As there are a lack of graduates coming into the sector and area it means that the workforce is ageing. This has a number of potential implications including a labour shortage and knowledge loss when this workforce retires and a shortfall of “fresh” and innovative solutions.

- **Banks not lending** – The fact that banks are less willing to award credit in the economic climate presents a major problem for this sector. Typically, when a major contract is won, smaller business have to increase capacity as they have scaled down in the quieter period. In the past, the evidence of guaranteed work has been enough to receive a loan from the banks to cover some of the upfront outlay costs with recruitment and purchasing equipment and materials. Securing finance is more difficult at present leaving suppliers unable to carry out the work. This has knock on effects further up the supply chain with delays in production.

- **Poor image of sector** – this could pose a serious threat for industry in Derby if partners are unable to quash the negative perception of this sector. This does present an issue in terms of getting young people excited about the range of career opportunities available in this sector.

9.4. Automobiles

9.4.1. Strengths

- **Toyota –** are a global company employing approximately 3,500 people and are a significant contributor to the local and regional economy. They are seen a good local employer, have one first tier supplier in Derby; they also purchase approximately

20% of their indirect purchases locally. They are managing the recession effectively and have avoided making any compulsory redundancies. Toyota has also secured investment to build the Auris hybrid, a 'green' vehicle to begin production from mid 2010. This will safeguard a high proportion of the workforce at the Burnaston site that is approximately 6 miles from Derby City. Approximately 40% of Toyota's workforce resides in Derby.

- **Engineering heritage –** Derby has a significant industry base which still makes a significant contribution to the wider region. Derby has prospered over the centuries as a centre of invention, engineering and trade and this provides an important element in marketing the city and surrounding area as a place for high value added manufacturing and engineering.

- **Skilled workforce –** a highly skilled workforce exists in Derbyshire and the region. It was highlighted that most businesses could source labour locally, with high percentages of the workforce living in Derby. A recent report[53] claims a general increase in skills needed for repair and maintenance jobs; this was not highlighted as a problem for the sector in Derby throughout consultation.

- **Flexibility to market demand -** many companies have adopted flexible shift patterns to allow production shortfall by reducing hours when work is slack and increasing hours when demand picks up. Others have used varied shift patterns and the introduction of a banked hours system to combat inefficiency and fluctuating demand.

- **Trading links with Europe and rest of world –** manufacturers can currently offer low priced exports whilst the value of the sterling pound is weak, giving British manufacturers a competitive edge in the short term.

- **Transferable skills sets –** consultation revealed that there are many generic skills sets that are transferable between the automotive, rail and aerospace sectors. For example, jobs in assembly, maintenance, purchasing and accounts. It was felt that the manufacturing skills needed for both automotive and rail were transferable to a lesser extent. When Toyota released temporary staff early this year, Bombardier interviewed some of this group and as a result a number of individuals were taken on.

- **Proximity to West Midlands –** the adjacent region has a strong automotive cluster with a larger manufacturing base and high employment concentration of automotive employees. The East Midlands are at an advantage being so close to a strong cluster.

- **Vehicle Scrappage Scheme –** the government and private sector investment in this scheme has positively influenced sales of new cars since its inception. It has helped increase production and combat the negative impacts of the economic downturn

[53] *The Automotive Retail Sector – Impact of the Recession, The Institute of the Motor Industry, July 2009*

through increased sales of new vehicle. The feedback from companies consulted with in the region confirmed the positive impact they believe it to be having.

- **Highly desired consumable –** some people see vehicles as a necessity and that they will at some point need to purchase or replace their vehicle indicating a continual demand. Also it was noted that as long as new businesses start up there would always be demand for vehicles, whether it be renting, leasing or buying.

9.4.2. Weaknesses

- **Badly hit in the recession –** it was felt that the automotive sector has suffered more so than other sectors in the recession. When compared to rail and aerospace sectors, it was agreed that automotive had suffered the most. Production has fallen dramatically for manufacturers and sales have dropped considerably.

- **Low consumer confidence –** businesses commented that for most people, after buying a house, a car is the second most expensive thing to buy. The problem this causes when the economy is contracting is that people would rather hold onto their asset while consumer confidence is low, trade in for a used/cheaper model if they need to or sell their vehicle without replacing.

- **High levels of redundancies –** a report completed this year by the Institute of the Motor Industry into the impact of the recession of the automotive retail sector. Where demand has fallen dramatically in the supply chain redundancies and closure of workplaces has been high. The report claims that redundancy rates in the East Midlands automotive sector are higher than the average UK redundancy rate.

- **Lack of local cluster –** it was felt by the majority of businesses that a strong cluster did not exist and that they didn't benefit from having local firms in the same sector near by.

- **High levels of imports –** over time more suppliers are locating outside the UK, therefore imports are continually increasing. Businesses noted that they think suppliers find it cheaper to locate out of the UK leaving the perception that the supply chain progressively weaker in the UK regions.

- **Used car market –** because of the current market conditions, high unemployment and credit crunch, the used car market is performing stronger due to the cheaper prices it can offer compared with the new car market. Therefore, there is less demand for the manufacture of new vehicles.

- **Limited opportunities –** consultation revealed that very few businesses thought there were many opportunities available to them at present because of the recession.

- **High fixed manufacturing costs –** production sites often involve large plants which were reported to have 'cash tied up in them', high fixed costs mean that through the recession businesses are restricted in reducing their outgoings even when production slows down.

9.4.3. Opportunities

- **Skilled workforce –** the region has the opportunity to market their skilled workforce as an attractive place for automotive firms to locate. Derbyshire attracted Toyota partially because of the availability of a large skilled and flexible workforce close by with strong roots in engineering and manufacturing and a first class environment in which to live and work.

- **Environmentally friendly vehicle production –** having secured the development of the hybrid Auris at Toyota which is their first 'green' vehicle to be produced in the UK and the East Midlands, this could attract businesses to the region and additional FDI. Toyota's investment in a low carbon vehicle could signal the beginning of other models of hybrid vehicles to be produced in the region with the opportunity to strengthen the supply chain in this market and for Toyota to take the lead.

- **Lessons learnt from the recession –** throughout consultation businesses reflected upon practices that have delivered improved efficiency and reduced miscellaneous costs. There is an opportunity for businesses to operate more efficiently through the lessons learnt and also have the experience of dealing effectively with a downturn in the economy should it happen again.

- **Extension of Vehicle Scrappage Scheme –** an increase in year on year sales could be attributed to this Scheme, which has left businesses in the automotive sector requesting an extension to the Government initiative because of its success. The National Franchised Dealers Association (NFDA) and The Society of Motor Manufacturers and Traders (SMMT) have expressed the need for an extension to avoid the relapse of demand, and although an opportunity exists over the potential extension, as of yet the Government have not announced any plans for this to happen.

- **Future Government investment** – The Automotive Assistance Programme is not being utilised, this programme is available to those businesses eligible, it can make investment more attractive and encourage new investments in the UK. The East Midlands could benefit from this opportunity should firms located in or firms who could potentially locate in the region take up this opportunity. The East Midlands would need to market the area as an attractive place to invest to take advantage of the £2.3 billion Government programme.

- **Sustainability agenda** – The ever-increasing priority placed on sustainability and the environment presents a number of opportunities for this sector and will encourage continued long-term investment from the Government.

- **Work with local public sector organisations** – Businesses we consulted with demonstrated a desire to work closely with local public sector organisation but did not know where they could help in the current situation. It was suggested that local government could reduce business rates for SME's whilst the economy is increasing financial pressure. It was also suggested that the Government should perhaps keep the 15% VAT for at least another 18 months.

- The **Motorsport** industry - this generates a £4.6billion turnover in the East Midlands (2002). The East Midlands are home to the Donington Park, Rockingham Speedway and Silverstone circuits. The current strengths this industry presents and the growing popularity of the sport presents opportunities for the automotive sector.

9.4.4. Threats

- **Lack of opportunities** – the sector found it difficult to identify where the opportunities lie in the short term, with many businesses claiming they would like to 'sit tight' until the economy picks up. The sector is restricted in terms of potential growth opportunities in the near future.

- **Current economic climate** – the length of the recession will determine how deeply they will be affected and how long it takes them to recover. There was generally a positive outlook and that the sector is starting to stabilise, however, most businesses felt this could be because of the Vehicle Scrappage Scheme.

- **Cuts in Public spending** – if the Automotive Assistance Programme does not have the desired effects and the Vehicle Scrappage Scheme is not extended, there is a risk that the sector will suffer further and we will see a further drop in sales of vehicles. The future could see a change in Government, which could result in investment priorities changing and potentially reduce the amount of spending dedicated to the automotive sector.

- **Banks not lending - t**he fact that banks are less willing to award credit in the economic climate presents a major problem for this sector. Lack of cash flow in the supply chain has proved to be very problematic with businesses left unpaid and dealerships unable to purchase vehicles. For the consumer, banks not lending reduces consumer confidence and people do not want to take risks with their cash until the economy improves, the quicker the economy improves, the less of a threat this will be.

- **Environmental restriction** / **regulations –** a change in direction of car design, engineering and manufacturing will change the dynamics of the automotive supply chain. Regulations and restrictions regarding emissions will impact the manufacturing of vehicles in the UK.

- **Poor media image –** consultation revealed that the automotive sector feel they are poorly portrayed in the media, which is detrimental to consumer confidence and also for investment potential. Businesses did not think this was isolated to the East Midlands and that it was a national issue. Some businesses commented that the media focus on negative activity in the sector disproportionately to the positive activity that is having an adverse effect on perceptions.

- **Losing more work internationally** – Related closely to the above threat is the fear that companies based outside of the UK will perform better and the UK will lose a further share of the global automotive market. Countries in Central and Eastern

Europe and Russia are also becoming increasingly competitive and generally offering cheaper labour and costs.

10. EVALUATING THE OPPORTUNITIES AND THREATS

It is difficult to make economic predictions based on 'what if' assumptions. This is because there are so many inter-related and unanticipated factors affecting the economy. This is reflected in recent economic forecasting models that have shifted towards less stringent assumptions. These are based on a greater understanding of the dynamics of the economy, which is becoming increasingly prone to sudden shifts. The speed and scale of the current recession is a prime example of the unpredictability of the economy.

With this in mind, we have produced three alternatives scenarios for the three sectors and their supply chains, within the local economy. Employment scenarios were based on our consultations with key stakeholders by assessing the potential employment impacts of the opportunities and threats coming to fruition along with a review of historic trends. The scenarios cover optimistic, reference and worst-case scenarios. Economic output has also been forecast based on current output per employee calculations. Therefore the same percentage change is demonstrated as with employment. It is unlikely that employment and output would change at the same rate but the latter is shown for illustrative purposes.

10.1. Planes

These scenarios have been developed with the understanding that since the 1990's employment in the aerospace industry in the UK has decreased by more than 50%. While this has been caused by the general decline of manufacturing in the UK, increases in employee productivity have also led to reduced employment levels.

10.1.1. Optimistic scenario

- This scenario is based on the assumption that major opportunities come to fruition and that expansion demands are met in Derby (rather than elsewhere). Based on views gathered from Rolls Royce we have predicted growth of around 3% per annum;
- Under this scenario, we suggest that overall employment (including the supply chain) would increase by approximately 5,350 employees in the next ten years or 34.4%;
- The total output in 2019, based on the additional employment, could reach over £6.1bn.

10.1.2. Reference case scenario

- This scenario is primarily based upon the trend of the previous ten years. The assumption here is that although Derby seizes a number of the opportunities, a number of the threats are realised also.

- Employment would fluctuate under this scenario, but we suggest that in light of the known/impending skills gap employment would be around -3% lower in 2019 than currently, equating to a reduction of 532 jobs. This is due to the trend of decreasing employment in the aerospace sector over the last 50-years, however it does not take into account the position of Derby as a globally competitive centre where employment may accumulate rather than dissipate.

- Economic output would reach over £4.4bn.

10.1.3. 'Worst case' scenario

- This scenario is based on a number of major global shocks, such as the onset of a Swine Flu Pandemic or another terrorist atrocity such as 9/11, impacting an already weakened aerospace sector. It also takes into consideration the potential increase in taxes that will affect passenger numbers.

- In the short-term this would result in reduced passenger numbers, reduced aircraft flights and reduced investment by airlines in developing new aircraft. This would lead to Rolls Royce scaling back its MRO services from Derby due to reduced flight numbers and reduced R&D, which a larger proportion of the workforce are involved in;

- In the longer-term, lack of R&D leaves the sector susceptible to loss of business from foreign competition, and while there may be an underlying market for maintenance of existing stock, the development of new more fuel efficient engines elsewhere would continue to reduce the regions share of the market;

- Under this scenario, we suggest that overall employment (including the supply chain) would fall by nearly 5,500 people in the next ten years or –35.2%. This would leave around 10,000 people working in the aerospace sector and the related supply chain.

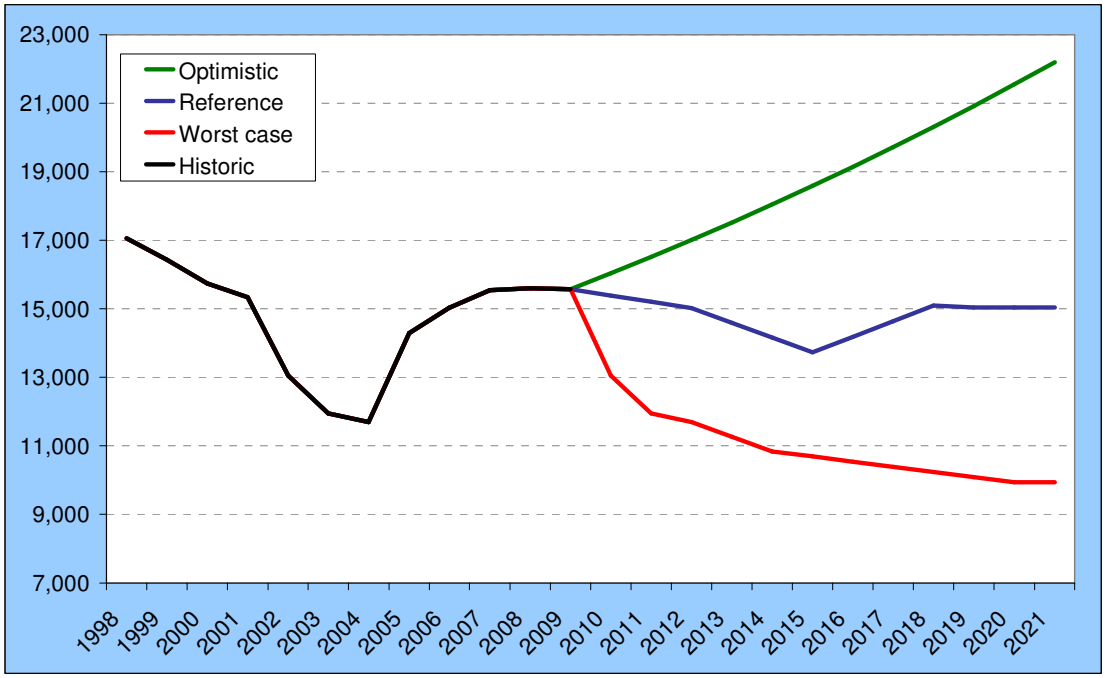
- Based on these employment projections, total economic output would drop to around £2,964m (£1,610m below current levels).

Table 15: Employment and output estimates 2009-2019 based on the above scenarios (Derby)

	Employment (inc supply chain)			Economic output (£m)		
Scenarios	2009*	2019	% change	2009	2019	% change
Optimistic	15,567	20,921	34.4	4,574	6,147	34.4
Reference	15,567	15,035	-3.4	4,574	4,417	-3.4
Worst case	15,567	10,089	-35.2	4,574	2,964	-35.2

Source: ONS, Annual Business Inquiry, 1998 to 2007 and URS Calculations, 2009
**2009 data estimated from ABI*

Figure 2: Employment Forecasts of the Aerospace Sector and Associated Supply Chain based on the above scenarios (Derby)[54]



Source: ONS, Annual Business Inquiry, 1998 to 2007 and URS Calculations, 2009

10.2. Trains

10.2.1. Optimistic scenario

- This is based on the assumption that the majority of the opportunities come to fruition. Most notably the Thameslink contract would be delivered in Derby which could have a number of positive spin-offs such as the potential for follow on contracts with Crossrail. One stakeholder suggested that the winning bidder for Thameslink would be the front-runner for Crossrail as the trains are of a similar specification. This scenario also suggests that investment in future years would be steady rather than in fits and starts. A more skilled and productive workforce would be an outcome of this scenario.

- We have suggested significant and sustained growth over the next 7 years (based on similar growth rates as in the turn of the century). With a steadier flow of investment, companies can continue to grow with greater resources put into research and development.

[54] *There is a discontinuity in ABI data between 2005 and 2006 (difference of between 0.6 and 1.3%). Users should therefore use caution when comparing the ABI employment figures over time due to these discontinuities.*

- Under this scenario, we suggest that overall employment (including the supply chain) would increase by over 5,600 employees in the next ten years or 66%. This would equate to almost 14,150 people[55] or 21.8% of total rail employment in the UK.
- The total output in 2019, based on the additional employment, could reach £4.4bn or 27.6% of all output generated within Derby.

10.2.2. Reference case scenario

- This scenario is primarily based upon the trend of the previous ten years. The assumption here is that although Derby seizes a number of the opportunities, a number of the threats are realised also.
- Employment would fluctuate under this scenario, but we suggest that employment would be around 9% higher in 2019 than currently, equating to an additional 800 jobs.
- Economic output would reach almost £2.9bn.

10.2.3. 'Worst case' scenario

- Under this scenario the assumption is that the short-term opportunities are not realised. This leaves little investment for the rail sector in Derby. Ultimately Bombardier, the largest employer in the area, moves out of the UK and transfers all their services abroad. Our scenario assumes that Bombardier leaves in 2013, but employment starts to decrease beforehand as no major investments are brought into the rail sector in Derby.
- The worst-case scenario assumes that the majority of the supply chain (75%) would cease to exist within Derby long after Bombardier leaves due to the high concentration of local rail firms.
- Under this scenario, we suggest that overall employment (including the supply chain) would fall by over 6,800 people in the next ten years or 80%. This would leave around 1,700 people working in rail sector and the related supply chain. Rail would become increasingly insignificant within the local economy and represent around 1.3% of total employment.
- Based on these employment projections, total economic output would drop to around £528m (£2,094m below current levels). This would represent only 3.3% of Derby's economic output compared to the 16.6% it does today.

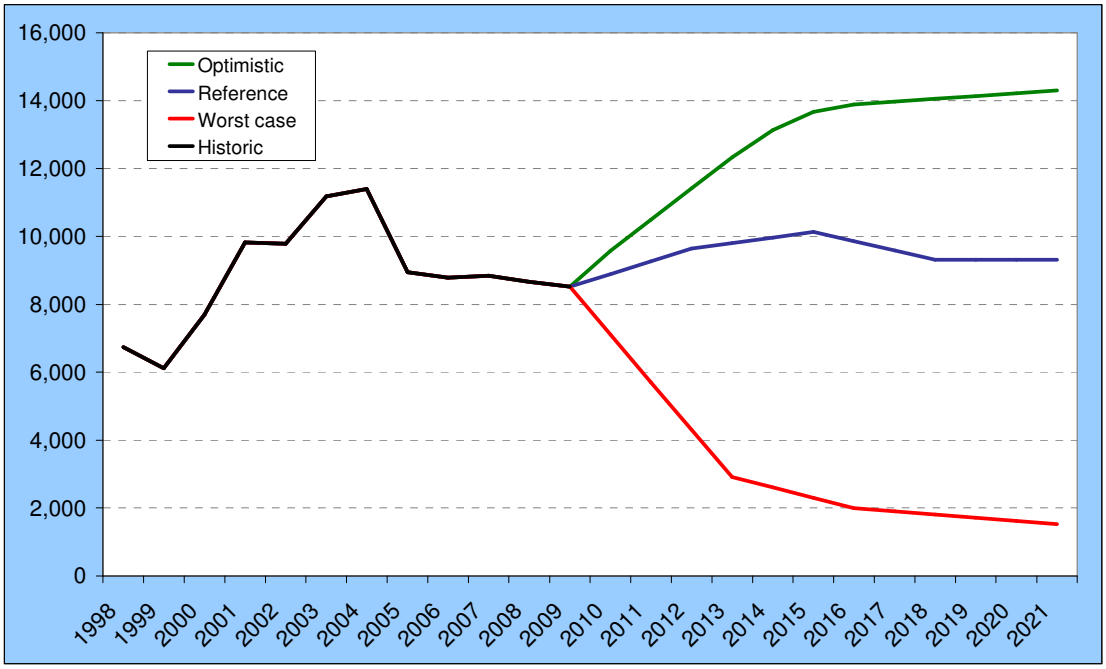
[55] *There would have to be further research conducted to assess whether there is the capacity to cope with level of increase*

Table 16: Employment and output estimates 2009-2019 based on the above scenarios (Derby)

	Employment (inc supply chain)			Economic output (£m)		
Scenarios	2009	2019	% change	2009	2019	% change
Optimistic	8,517	14,136	66.0	2,622	4,352	66.0
Reference	8,517	9,309	9.3	2,622	2,866	9.3
Worst case	8,517	1,716	-79.9	2,622	528	-79.9

Source: ONS, Annual Business Inquiry, 1998 to 2007, Transport iNet and URS Calculations, 2009

Figure 3: Employment Forecasts of the Rail Sector and Associated Supply Chain Based on the Above Scenarios (Derby)[56]



Source: ONS, Annual Business Inquiry, 1998 to 2007, Transport iNet and URS Calculations, 2009

10.3. Automobiles

10.3.1. Optimistic scenario

- This is based on the assumption that the majority of the opportunities come to fruition. In the short term, an extension of the Vehicle Scrappage Scheme that would help the automotive sector stabilise. Long-term opportunities in developing the low carbon vehicle market and increasing the production and sale of environmentally

[56] There is a discontinuity in ABI data between 2005 and 2006 (difference of between 0.6 and 1.3%). Users should therefore use caution when comparing the ABI employment figures over time due to these discontinuities.

friendly vehicles and parts in the East Midlands. Also the attraction of new investment/s into the region as a result of the Automotive Assistance Programme with a supportive Government would increase the number of businesses and number of employees in the automotive sector over the next 10 years.

- We have suggested this would sustain low level growth over the next 10 years (based on similar growth rates at the turn of the century). With a steadier flow of investment, the supply chain will be strengthened and the market of low carbon vehicles will be in its early stages.
- Under this scenario, we suggest that overall employment (including the supply chain) would increase by almost 4815 employees in the next ten years or 21.9%. This would equate to almost 26,785 people[57].
- The total output in 2019, based on the additional employment, could reach £3,395m.

10.3.2. Reference case scenario

- This scenario is primarily based upon the trend of the previous ten years. The assumption here is that although Derbyshire seizes a number of the opportunities, a number of the threats are realised also.
- Employment would fluctuate under this scenario, but we suggest that employment would be around 5.9% higher in 2019 than currently, equating to an additional 1301 jobs.
- Economic output would reach over £2.950m.

10.3.3. 'Worst case' scenario

- Under this scenario the assumption is that the short-term opportunities are not realised which means the effects of the recession will be deeper. The largest manufacturer in Derbyshire, Toyota, will reduce production significantly resulting in a dramatic fall in production volumes and employees, reducing their operation in the UK. This would result in a diminished supply chain, business closures and further loss of employees. Ultimately leading to a weaker automotive sector in the East Midlands, which would then fail to attract investments.
- The worst-case scenario assumes that 20% of the supply chain would cease to exist within Derbyshire.
- Under this scenario, we suggest that overall employment (including the supply chain) would fall by approximately 4,300 people in the next ten years or –19.5%. This would leave fewer than 18,000 people working in the automotive sector and the related supply chain.

[57] *There would have to be further research conducted to assess whether there is the capacity to cope with level of increase*

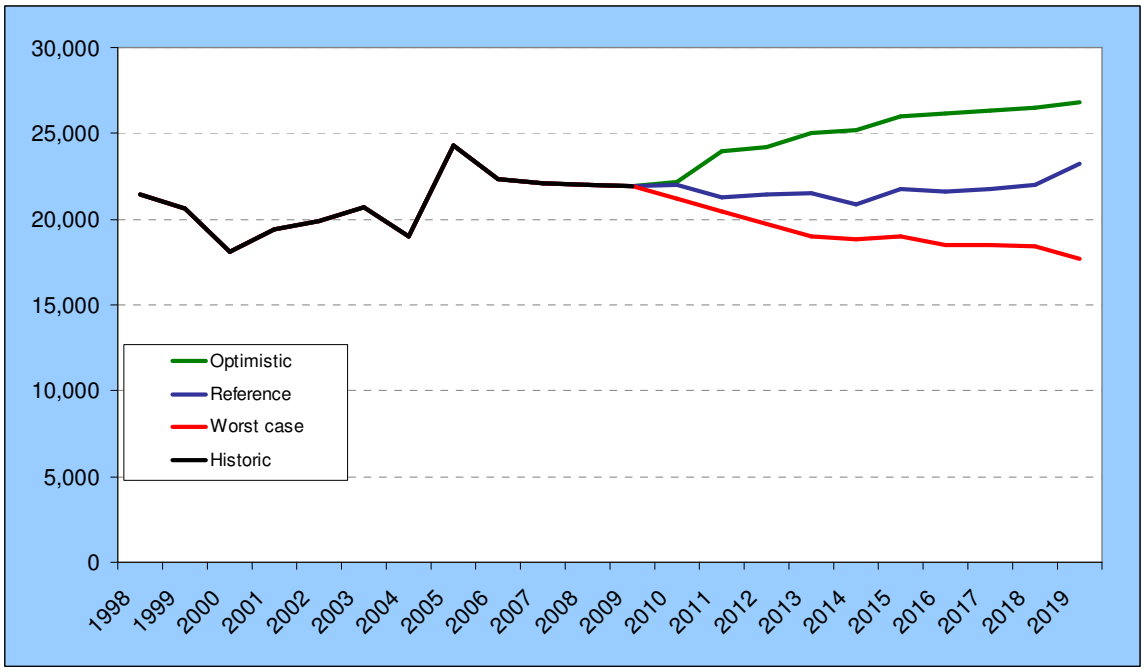
- Based on these employment projections, total economic output would drop to around £2,241m (£544m below current levels).

Table 17: Employment and output estimates 2009-2019 based on the above scenarios (Derby)

	Employment (inc supply chain)			Economic output (£m)		
Scenarios	2009	2019	% change	2009	2019	% change
Optimistic	21,970	26,785	21.9	2,785	3,395	21.9
Reference	21,970	23,271	5.9	2,785	2,950	5.9
Worst case	21,970	17,680	-19.5	2,785	2,241	-19.5

Source: ONS, Annual Business Inquiry, 1998 to 2007 and URS Calculations, 2009

Figure 4: Employment forecasts of the automotive sector and associated supply chain based on the above scenarios (Derby)[58]



Source: ONS, Annual Business Inquiry, 1998 to 2007 and URS Calculations, 2009

[58] *There is a discontinuity in ABI data between 2005 and 2006 (difference of between 0.6 and 1.3%). Users should therefore use caution when comparing the ABI employment figures over time due to these discontinuities.*

11. KEY ISSUES AND RECOMMENDATIONS

In response to the study brief the following section provides a summary of the main issues, opportunities and threats that have been highlighted by the research and a series of recommendations for addressing these. The recommendations fall into the following areas:

- Skills;
- Business support;
- Market intelligence, influence and collaboration; and
- Investment, research and development.

We are aware that a number of the recommendations would require significant funding from partners and as such it will be difficult to meet them all. However, we have chosen to illustrate a longer list of recommendations so that partners can review priorities.

11.1. Skills

The engineering and manufacturing sectors generally suffer a poor image and are seen as “oily rag” trades. This is having a negative impact on the recruitment of graduates to work in the aerospace, automotive and rail sectors. This is despite local businesses in all three sectors identifying that there is a variety of good long-term career prospects within these sectors that people are not aware of. This again stems from an outdated and negative perception of work within these specific sectors and manufacturing more generally.

A number of consultees also suggested that there was difficulty in attracting and retaining graduates in Derby and the East Midlands in general with younger talent drawn towards job opportunities in London and the South East. .

As well as a difficulty in attracting graduate and young talent the workforce in these sectors is significantly older than other sectors. This has a number of impacts including;

- The loss of significant proportions of specialist skills due to retirement in the short term to medium term;
- Potential for staff in lower level occupations to progress into vacant positions; and
- An increase in the level of absenteeism and sickness.

All three sectors have a highly skilled and well-qualified workforce, with a much higher than average proportion of workers qualified to NVQ Level 3 and 4. This is increasingly the case with greater demand for higher-level skills and reducing demand for non-technical and craft occupations.

Allied with the loss of skilled employment due to retirement the sectors suffer from a large number of skills gaps and consequently hard to fill vacancies. Ensuring that the existing workforce receives the appropriate training to fill these gaps and preparing, educating and training the future manufacturing workforce to address skill shortages is a critical element in supporting these sectors and wider manufacturing in Derby and the region. This requires a concerted effort from both the private and public sectors on a number of fronts. It should also be noted that training costs are expected to rise in the future due to replacement demand[59] and the relatively low skills base of the regional population compared to the national average.[60]

RECOMMENDATIONS:

- The National Rail Skills Academy is a key opportunity for the rail sector. It is an acknowledgement by the sector that there are skill shortages nationally. It will not only promote the sector locally but also create jobs and encourage innovation. emda have made a submission for this but it is important that they continue to work with local partners to lobby for it.
- Local universities and colleges can play an important role in retaining graduates within the East Midlands, as well as providing a key link from education and vocational training into work. emda could (part)fund placements across the three sectors, offering incentives to encourage graduates into these industries. For example, the Nuffield Foundation offers funded placements in Northern Ireland, Wales, the North East and the East Midlands for students who are studying engineering courses. Extending this type of scheme to recent graduates could help encourage them to work in these three sectors as well as staying in the East Midlands. An example of good practice exists in the North East, where the University of Sunderland have developed strong links with the local Nissan manufacturing plant. 48 week paid placements are offered at the plant and supervised by both the university and Nissan themselves.
- There are a number of examples within the region of good practice in terms of sharing graduate and apprenticeship schemes within and across sectors, such as ATOC and Bombardier with Rolls Royce. Given the current economic climate, difficulty in recruiting, skills gaps and a similar skills base this type of activity needs to be promoted / encouraged more widely. Organisations such as iNet, the Rail Forum and MAA can play an important role in this context.
- As well as targeting graduates and young people leaving school there was a consensus that there also needs to be more support for people aged 25+ locally

[59] *Replacement demand is a measure of the likely requirement for employees in each occupation over time and is driven by factors such as retirements, people temporarily leaving the labour force, inter-occupational movements and migration.*
[60] *Source: emda, 2009*

as most support is aimed at younger age groups. A number of consultees suggested that the demand for increased work based learning as well as evening classes exists, however, the supply and investment in training courses does not match this. Derby City Council need to work closely with the LSC to review the supply and demand of adult based learning courses to assess whether they address the skill gaps of local businesses within the three sectors given their importance in employment and productivity terms. Tackling this could help address hard to fill vacancies with focussed training.

- On a similar note there is a need to help support the training of the existing workforce particularly those working for larger employers across the three sectors. This could be in the form of support to existing training programmes operated by the companies and/or the development of a new package developed in collaboration with the companies. The role and avoidance of duplication with Career Chain would have to be considered. The presence of significant skills gaps and ageing workforce highlight this as perhaps the key issue for the ongoing health of the rail, automotive and aerospace sectors. Similarly the future "investability" of Derby and the sub-region will be partially dependent on maintaining an adequately skilled workforce. Although there exists a potential conflict here, that must be noted, as Government funded support generally supports up to NVQ Level 2 (or equivalent), whereas, the firms in these sectors require staff upskilling to NVQ Level 4.

- There is generally a low level of awareness of SEMTA who work across the three sectors. They offer valuable advice, guidance and conduct useful research in to a lot of the skill issues that have been highlighted. It would be useful to engage SEMTA and establish the basis for an ongoing relationship with organisations including iNet, Rail Forum and MAA,

- A recently announced government strategy suggests that children as young as 10 will receive careers guidance. As well as offering advice through school assemblies and preparing parents to talk through career choices with their children, there will be online guidance for older children with individuals from the private sector. There is an opportunity here to promote the three sectors to children and help present a more positive image of the type of work and opportunities available. Derby City Council and their partners could develop and co-ordinate a careers awareness campaign across schools in Derby with support from relevant local business. Promoting the new engineering and business academy in Rochester should also be addressed so that more children from

[61] *The Space Academy provides education programmes, summer space schools, road-shows and conferences, built around schools' curricula in science, technology, engineering and maths (STEM) using space as the inspirational hook. It is especially aimed at students from 14-19 years of age, and their teachers, in the East Midlands and beyond, encouraging and supporting them to consider the benefits and challenges of careers in these fields. It will draw on the skills and reputations of Universities in the region, which are international leaders in space-related subjects, and employers who need scientists and engineers (University of Leicester)*

within Derby attend. The Space Academy in Leicester is another opportunity to increase children's interest in science and technology and lead to a more positive outlook for careers in such fields[61].

- The responsibility for 14-19 years education and training is moving from the LSC to local authorities. Derby City Council should take this opportunity to address the longer-term skills issues affecting these sectors. A review of existing vocational provision, such as the BTEC National Diploma in Manufacturing and Engineering, would be a useful first step in understanding how current training matches the needs of local businesses and the level of demand for these courses.

11.2. Business support

The larger employers involved in the research process felt that the existing work and investment from public sector bodies to support the sector was of good quality and targeted in the right areas. Based on the evidence from the interviews the public sector relationships with the major employers in the rail and aerospace sectors were broadly positive. However there are a number of issues and concerns that were raised that relate specifically to SMEs in these sectors:

- A number of smaller businesses that were consulted felt that public sector support and intervention was geared more towards larger organisations. Whether this is perception or reality, the issue needs to be addressed, potentially through further work with SMEs within each supply chain;
- There is confusion and a general lack of awareness of the business support available to help small and medium sized businesses through the current economic crisis. This is not an issue that is specific to these three sectors[62] and is common among small and medium sized businesses.
- In the current climate banks are not giving credit to companies where they would have done so previously and this is affecting smaller businesses in particular. Deposits for goods and services are increasingly needed up front, an area where small businesses struggle generally but is accentuated in current economic conditions. This is still an issue even where companies have orders guaranteed in advance.

[62] *For example, in our previous research work on Business and Climate Change, we found that 48% of businesses with fewer than 10 employees knew where to access support in tackling environmental issues. This is compared to 88% of those with 200+ employees.*

RECOMMENDATIONS:

- Further support to the SMEs within the three sector supply chains is necessary. Good practice examples are evident which could be further supported and expanded – one example here is Rolls Royce work with their supply chain to help diversify suppliers customer bases and reliance on Rolls Royce.
- Although banks are becoming increasingly aware that smaller businesses are struggling, more needs to be done to unlock finance and make the banks understand the economic implications of withholding credit. A number of consultees suggested that the local authorities could put more weight behind the SMEs and lobby for better finance terms.
- A number of SME's also suggested that the council could reduce prices for rented property to support companies during the current recession.
- SME's would benefit from a greater awareness and knowledge of specialist business support that would help them access foreign markets. Although the confusion with availability of general business support has been recognised at a national level with the Business Support Simplification Programme (BSSP) there exists a gap with specialist support. One solution that has been suggested is an "Ask the Expert" or specialist clinic with tailored support in the three sub sectors. This may include the provision of full-time staff that could be posted at locations such as the Derbyshire Rail Forum. This activity would have to consider the existing role of the engineering and manufacturing forum that is led by the Chamber as well as the support offered by the Manufacturing Advisory Service and sector specialists at UKTI.

11.3. Market intelligence, influence and collaboration

The central purpose of the Planes, Trains and Automobiles research has been to gain a better understanding of the economic contribution that the three sectors make to the Derby economy. This improved intelligence can be used in a number of ways to support the sector in the future. The critical point here is that emda, Derby City Council and Chamber of Commerce can demonstrate a better understanding of the key sectors in the local economy to investors and government to help deliver further growth and support.

This is a particular concern in relation to the rail sector in Derby where a significant number of jobs are reliant on a single manufacturer securing government contracts. This makes future business planning more difficult and increases the risks of job loss and wider impacts on the Derby economy.

The evidence suggests that there is only limited interaction between the supply chains of the three sectors. Whilst there are some examples of collaboration between the larger

employers this could be improved and awareness of new networks and organisations that have been developed for this purpose increased.

RECOMMENDATIONS:

- All partners involved in funding the research should use the results to campaign and lobby for further support and investment for the three sectors. Having a set of consistent messages and supporting data is a powerful tool that individuals and organisations can use to attract public and private investment to Derby.
- emda and Derby City Council should lobby government and local MPs to increase the awareness of this issue and the problems it causes to the rail sector in Derby. If public sector investment was released in a more structured, consistent manner organisations, particularly SME's, could plan more efficiently which would lead to a greater investment in people and skills, R&D, technology and innovation.
- Consultation highlighted that the public sector has a key role to play in increasing collaboration between the three sectors. Currently there is a limited level of awareness of Transport iNet and its activities; greater use and promotion of Transport iNet for networking, knowledge sharing and good practice could help to improve communication and strengthen supply chain relationships within the three sectors.
- There may be potential to establish a planes, trains and automobiles sector leadership group. There are already relationships between Rolls Royce and Bombardier that have been mutually beneficial. Engaging Toyota alongside representation from some of the firms within the three supply chains could facilitate further benefits. Initially this could be based around Transport iNet.

11.4. Investment, research and development

There are a number of issues that have been highlighted by the research these include:

- A need to provide more support to help business, especially SMEs, to win work outside of the UK;
- A concern that investment could be lost to more cost effective locations overseas and continued effort to promote Derby and the region as a location for value added manufacturing in these sectors is needed;
- A relatively limited level of research and development activity relative to competing locations for inward investment;
- The rapidly fluctuating pattern of contracts in the rail sector limiting the ability to plan;

- A need to continue promotional work to raise awareness of the strengths of Derby and the East Midlands in value added manufacturing.

RECOMMENDATIONS:

- A number of stakeholders suggested that foreign companies often promote cheaper labour and costs and thus win work on that basis. However, there are usually hidden and other costs, such as logistics, that are not always considered, which usually make the foreign market more expensive than using local suppliers. An awareness raising programme, led by emda, addressing this issue along with the other associated benefits of using local suppliers across businesses within the East Midlands (and further a field) may encourage manufacturers to increase the use of local companies.
- Suppliers need to establish a sound business base within the UK before they can start to enter international markets. Fluctuations in demand, that are experienced in rail, makes this difficult as they can't commit to investments and R&D related activity and do not have a good platform on which to export. This is a further reason to lobby government about the cyclical nature of the rail sector.
- Greater collaboration on research and development activity would help to support all three sectors over the longer term. Currently the proportion of GDP that is accounted for by R&D activity is low compared to other countries[63]. If these sectors are to continue to grow and remain competitive globally this has to change. A number of mechanisms are already in place. At a national level there is the Engineering and Physical Science and Research Council, at the regional level emda is tasked with delivering economic development outcomes with a focus on Lisbon agenda activities including research and development. Transport iNet was highlighted as a positive step in this regard, but as mentioned above, awareness is low and emda need to promote this to a greater extent within Derby and the region.
- There are already precedents for joint working between the higher education sector and businesses within the three sectors. Rolls Royce actively work with 20 University Technology Centres this provides a number of benefits to the company including access to of research, development and innovation activity and well qualified labour at graduate and post graduate levels. This approach will also have a positive effect in terms of raising awareness of the career opportunities available in the sector. This is an area where the public sector may be able to facilitate improved links between higher education and the three sectors in particular

[63] *For example, R&D Intensive Businesses in the UK (DTI, March 2005) suggests that large foreign-owned firms in the UK are more likely to get their R&D input from overseas. This study suggests that the UK's R&D to GDP ratio is 1.9% compared to 2.8% in the United States, 2.5% in Germany and 2.2% in France*

automotive and rail.

- The potential creation of a combined business science park / centre of excellence for engineering and value added manufacturing activities should be explored. Examples already exist elsewhere in the UK that have received investment from private sector companies, university investment and other public sector support. These examples are built around local sector specialisms for example the Advanced Manufacturing Park at Waverley in South Yorkshire. This would also be a good fit with investments such as the National Rail Skills academy to tackle skills issues and with the Manufacturing Technology Centre[64] at Ansty which will be a large, world-class manufacturing research, development and demonstration organisation.
- UK Trade and Investment (UKTI) are also important in helping firms gain exposure to foreign markets. All organisations involved in supporting the research could explore with UKTI the extent of existing trade mission, marketing and promotional and inward investment activity to support the three sectors. The aim here being to co-ordinate a specific programme of activity.
- 21st Century Supply Chains (SC21) aims to increase the competitiveness of the aerospace and defense sector by raising the performance of its supply chains and thus making them more internationally competitive. MAA has a target to help 75 companies, in this respect, over the next 3 years within the region. emda need to review the opportunity to establish a similar scheme for the other two sectors.
- Derby City Council are members of the Rail Forum but do not attend the MAA. It was recommended that there should be representation from the City Council as it would lead to improved links and a better understanding of the sector.

11.5. Summary

Much of what is already being done to support the three sectors is working well – private sector consultation shows that the larger employers are more than happy with the support they are receiving and feel that there is little more the public sector may be able to do to support them. At the other end of the scale small and medium sized companies in the supply chain have identified the need for further support and investment.

Skills is a critical area where the public sector can play a key role to play in workforce training and education/vocational training – graduate attraction and retention alongside work to develop workforce skills are areas where investment needs to be targeted in the short to medium term.

[64] *It will bring together Tier 1 manufacturing companies, and their supply chains, the Universities of Birmingham, Nottingham and Loughborough, and The Welding Institute (TWI). It aims to deliver productivity gains of over 50% in sectors including aerospace, automotive and energy. This is funded by emda and Advantage West Midlands.*

The public sector also has a major role to play in providing the wider environment for investment – through the provision of supporting infrastructure (transport, housing etc.), land and property to facilitate the further development of these sectors and attract the skilled labour the sectors need to grow.

Ultimately the research has aimed to improve the understanding of the relative importance and impact of the three sectors to Derby and the wider regional economy. The work shows that all three sectors play a major role in delivering employment and productivity benefits to the economy. It is these messages that need to be consistently communicated to private and public investors to support and strengthen these sectors.

Appendix A - Intermediate Demand Tables

Table 18: Top Ten Purchases of Aerospace Services in Derby, 2007

Industry Description	Purchases £m 2007 Prices	% of Total
Aircraft and spacecraft	215.4	51.4
Public administration & defence	168.3	40.2
Air Transport	22.9	5.5
Oil and gas extraction	5.8	1.4
Ancillary Transport services	2.1	0.5
Recreational services	1.2	0.3
Telecommunications	0.8	0.2
Construction	0.5	0.1
Motor vehicle distribution & repair, fuel	0.5	0.1
Other land transport	0.4	0.1
Sub-total	**417.9**	**99.8**
Automotive	0.5	0.1
Rail	0	0
Total Value of Purchases across all sectors	**418.8**	**100**

Source: ONS Supply and Use Tables, 2004-2007 and URS calculations

Table 19: Top Ten Purchases of Rail Services in Derby, 2007

Industry Description	Purchases £m 2007 Prices	% of Total
Public administration & defence	29.0	18.5
Other transport equipment	23.5	15.0
Ancillary Transport services	18.7	11.9
Health and veterinary services	17.9	11.4
Railway transport	7.1	4.5
Education	5.9	3.8
Postal and courier services	4.7	3.0
Wholesale distribution	4.0	2.6
Recreational services	3.5	2.2
Iron and steel, Non-ferrous metals, Metal castings	3.3	2.1
Sub-total	**117.7**	**75.0**
Automotive	1.9	1.2
Aerospace	0.2	0.1
Total Value of Purchases across all sectors	**157.0**	**100**

Source: ONS Supply and Use Tables, 2004-2007 and URS calculations

Table 20: Top Ten Purchases of Automotive Services in Derby, 2007

Industry Description	Purchases £m 2007 Prices	% of Total
Motor vehicles	269.7	22.7
Motor vehicle distribution & repair, fuel	141.1	11.9
Construction	137.1	11.6
Other land transport	69.5	5.9
Wholesale distribution	60.2	5.1
Renting of machinery etc	53.0	4.5
Insurance and pension funds	31.6	2.7
Ancillary Transport services	29.2	2.5
Education	28.8	2.4
Retail distribution	25.5	2.1
Sub-total	**845.8**	**71.3**
Aerospace	1.3	0.1
Rail	20.2	1.7
Total Value of Purchases across all sectors	**1,186.0**	**100**

Source: ONS Supply and Use Tables, 2004-2007 and URS calculations

Appendix B - Value of Purchases Tables

Table 21: Top Ten Purchases by the Aerospace Sector in Derby, 2007

Industry Description	Purchases £m 2007 Prices	% of Total
Aircraft and spacecraft	215.4	43.7
Metal forging, pressing, etc	71.0	14.4
Architectural activities and technical consultancy	29.9	6.1
Non-ferrous metals	21.7	4.4
Computer services	15.0	3.0
Banking and finance	14.6	3.0
Mechanical power equipment	12.7	2.6
Office machinery & computers	7.9	1.6
Printing and publishing	6.6	1.3
Electricity production and distribution	5.3	1.1
Sub-total	**400.0**	**81.1**
Automotive	2.2	0.5
Rail	0.3	0.1
Total	**493.0**	**100**

Source: ONS Supply and Use Tables, 2004-2007 and URS calculation

Table 22: Top Ten Purchases by Rail Sector in Derby, 2007

Industry Description	Purchases £m 2007 Prices	% of Total
Ancillary Transport services	121.0	39.8
Renting of machinery etc	47.4	15.6
Other transport equipment	28.8	9.5
Computer services	9.3	3.1
Motor vehicle distribution & repair, automotive fuel retail	8.2	2.7
Electricity production and distribution	7.2	2.4
Other business services	6.1	2.0
Advertising	4.7	1.6
Coke ovens, refined petroleum & nuclear fuel	4.3	1.4
Banking and finance	4.0	1.3
Sub-total	**241.1**	**79.4**
Automotive	1.1	0.4
Aerospace	1.8	0.6
Total	**303.8**	**100**

Source: ONS Supply and Use Tables, 2004-2007 and URS calculations

Table 23: Top Ten Purchases by the Automotive Sector in Derby, 2007

Industry Description	Purchases £m 2007 Prices	% of Total
Motor vehicles	376.8	26.4
Metal forging, pressing, etc	64.9	4.5
Plastic products	58.5	4.1
Other land transport	50.5	3.5
Other business services	49.9	3.5
Motor vehicle distribution and repair, automotive fuel retail	44.0	3.1
Mechanical power equipment	42.3	3.0
Electrical equipment	41.8	2.9
Ancillary Transport services	39.7	2.8
Banking and finance	37.3	2.6
Sub-total	**805.7**	**56.5**
Aerospace	0.3	0.0
Rail	1.9	0.1
Total	**1,427.3**	**100.0**

Source: ONS Supply and Use Tables, 2004-2007 and URS calculations

Appendix C – List of Consultees

There are 39 stakeholders listed below, although 50 consultations were conducted as we consulted with more than one consultee in a number of organisations. Only the organisation name is listed for confidentiality reasons:

Advanced Composites Group

Bombardier Transportation

Brush Traction

Catch the Vision Consultancy

Cocoon Vehicles Ltd

Collis Engineering Ltd

Datum

Derby and Derbyshire Rail Forum

Derby City Council

Derbyshire & Nottinghamshire Chamber

Regional Transport Network

emda

Excel Car Hire Limited

Fibreflight Ltd

Frazer Nash Consultancy Ltd

Futaba Industrial U K Ltd.

Huber and Suhner

Inchcape Toyota Limited

Marketing Derby

Matched Resource

Med-Lab Limited

Midlands Aerospace Alliance

Network Rail Midland & Continental

Pavillion Motor Factors

Porterbrook Leasing Company Ltd

Prysm

Rolls Royce PLC

RTC Group

SEMTA

Smith Partnership

Society of British Aerospace Companies

Stored Energy Technology Ltd

Stratstone Derby

Toyota Motor Manufacturing Ltd

Transport i-Net Strategic Advisory Panel

Trent Instruments

University of Loughborough

Voss (U.K.) Limited

Xian Aero-Engine (Group) Limited