

A report mapping the automotive sector in the Yorkshire & Humber
Region with a focus on the Leeds City Region – presented as part of the
Yorkshire Universities Technical Assistance Project

Simon Malins

University of Huddersfield

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1. Project Scope

This report follows on from the original report on Innovative Manufacturing submitted by the author to the YUTA in September 2014. One of the findings from that report identified the Automotive Supply Chain as being a significant sector in High Value/Innovative Manufacturing in the Yorkshire & Humber region. The scope of this project was to:

- Map the Automotive Sector in the Region with a focus on Leeds City Region (LCR)
- Understand the research/innovation needs of the sector
- Map the strengths and expertise of YU partners in relation to the automotive manufacturing sector
- Identify sources of funding especially ERDF/ESF and prioritise identified opportunities

2. Introduction

Whilst there are well known sources of information at a national level on the automotive sector in the UK namely through organisations such as the SMMT and Automotive Council, information by region is not readily available. Reports of over a 100 companies operating in the Automotive Sector in the region have been difficult to substantiate. Traditionally the use of SIC codes has been used to investigate particular segments of manufacturing but in the case of the automotive sector this includes many firms in the retail sector. In this particular study we are focussing on the OEMs (Original Equipment Manufacturers) and the automotive supply chain.

3. Methodology

The mapping of the automotive sector has been achieved by taking information supplied by several organisations and individuals who have knowledge of the sector. This information has been checked and researched to ensure the accuracy of the final analysis. A meeting of the YUTA partners with an interest in the automotive sector took place in December 2014 to review and map their strengths and expertise.

4. Executive Summary

- There is a significant automotive sector in the LCR and greater Yorkshire & Humber region employing over 5,500 people with an annual turnover greater than £1.5bn
- Whilst there are no large Original Equipment Manufacturers (OEMs) in the region there are a number of Niche Vehicle and Caravan Manufacturers
- ~75% of companies in the automotive sector are small to medium sized enterprises (SMEs)
- The strength of the sector is in the automotive supply chain
- Over 50% of the suppliers in the sector manufacture powertrain components (e.g. turbochargers, radiators, oil separators etc.)
- Bradford, Huddersfield and Leeds Universities have significant expertise and knowledge in the field of Automotive Engineering
- Powertrain in terms of engine design and components is a strong subject area in these three Universities matching directly to the strengths of the sector in this region
- To further strengthen and develop the sector consideration should be given to establish a pan-northern alliance of automotive sector companies, the so called 'Northern Powerhouse'
- Next steps include setting up workshops with the sector to ensure we have alignment of business needs with academic research, begin discussions on a pan-northern automotive alliance and develop a robust business offer for the automotive sector in readiness for ESIF calls in 2016

5. The Automotive Sector in the Yorkshire and Humber region

Information and data on the automotive sector was collected from several sources to ensure as wide coverage of the sector was achieved. During the analysis of the data it became evident that a significant amount of work was required to 'clean up' the data supplied. For example removing firms which had ceased to trade, those that were in the retail sector (such as garages, dealerships, accessory shops etc.) and those that were clearly not associated with the automotive sector.

5.1 Geographic spread of the Automotive Sector in the Yorkshire & Humber region

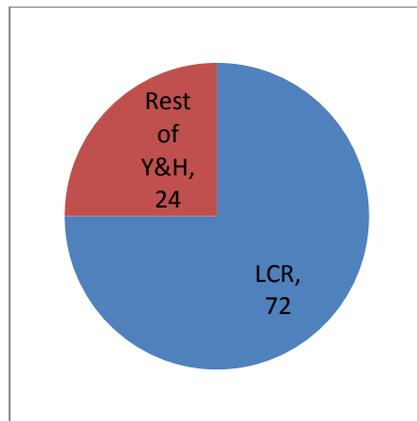


Fig 1. Number of Companies
In the Automotive Sector in Y&H

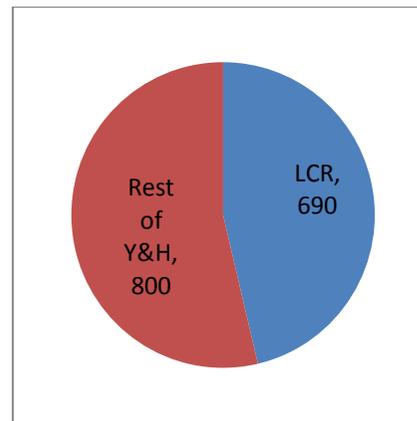


Fig 2. Turnover in £M of Companies
in the Automotive Sector in Y&H

The survey has identified some 96 companies that are operating in the automotive sector in the region of which 75% of these companies are located within the LCR. In terms of size, these companies have a combined turnover of over £1.5 billion and employ over 5,500 people in the region. However, the companies within the LCR have a turnover of just 46% of this total. This is in part due to the large caravan sector in the East Riding and some large Tier 1 companies in South Yorkshire around the Rotherham & Sheffield area. Approx. 75% of the companies identified would be classified as SMEs (<250 employees & <£30M Turnover) which reflects the high dependency that the automotive sector has in the UK on small and medium size companies.

Whilst the above analysis includes some firms that supply in-direct services for example, tooling, specialist machines, automation, welding and heat treatment etc. it has been difficult to identify this category of company due to there being very little in the way of their identification through SIC codes, trade bodies etc. In many cases their involvement in the automotive sector is not their main line of business so they tend to come in under the radar when analysing traditional market data.

From the map in Appendix 1 of this report it can be seen that there is a cluster of automotive companies in the LCR and along the M62 corridor. A smaller cluster is evident in South Yorkshire around Sheffield and Rotherham.

5.2 Leeds City Region (LCR) analysis by automotive business sector

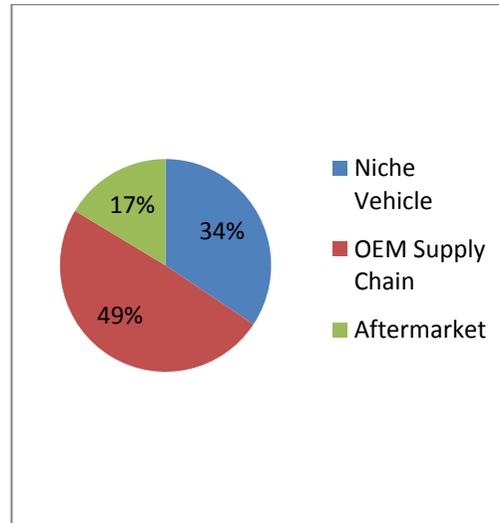


Fig 3. LCR number of companies by Automotive business sector

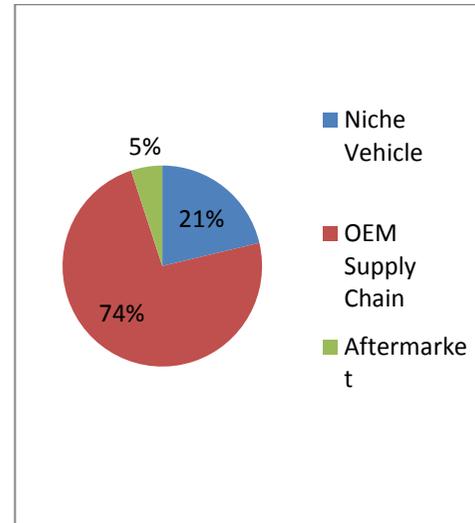


Fig 4. LCR Turnover of companies by automotive business sector

If we now focus on the LCR, 49% of companies in the automotive sector are in the supply chain and account for 74% of the total turnover in the sector in the LCR. 34% of companies can be classed as niche vehicle manufacturers (e.g. bus, sports cars, specialist vehicle builders etc.) accounting for 21% of the total turnover in the sector in the LCR. The remaining 17% of companies operate in the aftermarket and remanufacturing sectors.

Whilst the region does not host any of the major vehicle OEMs, from this analysis it can be concluded that the strength of the automotive sector in the LCR is in the OEM supply chain. A more detailed analysis was carried out to determine if there was any one significant technology or component area that can be considered to be a cluster in the region.

5.3 LCR analysis of the OEM supply chain by product sector

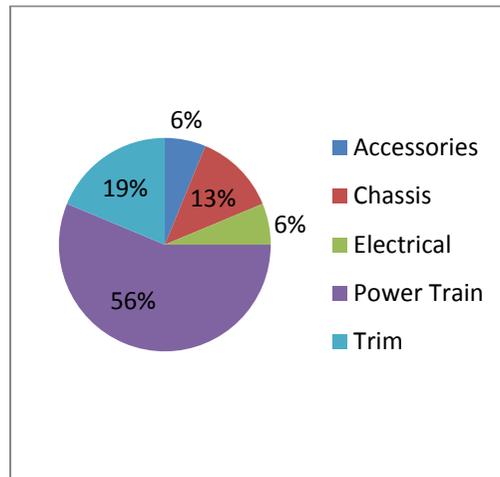


Fig 5. LCR number of companies in each Product Sector

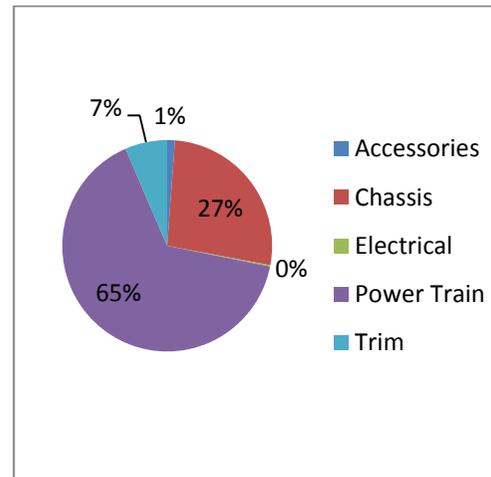


Fig 6. LCR turnover of companies in each Product Sector

It is clear from this analysis that companies manufacturing components for the powertrain (engine and transmission systems) sector dominate the automotive supply chain sector in the region being over half the number of companies in the OEM supply chain and accounting for 65% of the turnover. Within this group, the manufacture of turbochargers (BorgWarner and Cummins Turbo Technologies) and Denso Marston (Medium & Heavy Duty Diesel cooling system components) are three of the largest Tier 1 automotive supply chain companies in the LCR.

6. Strengths of the YU partners in the Automotive Sector

The YUTA Innovative Manufacturing Collaborative Working Group met in December 2014 to review the capabilities of the HEIs in the automotive sector. Bradford, Leeds, Huddersfield and York Universities attended the meeting and a matrix of expertise and capabilities within this group was developed in order to map this against the automotive sector in the region. The results of this review are summarised below however the fully developed matrix has been included in Appendix 2.

Powertrain: There is an overall strength in powertrain research across the 4 Universities especially in engine design and components, e.g. turbocharging, tribology, engine efficiency & emissions and alternative fuels.

Chassis: Brakes (Regenerative Braking Technology at Bradford), suspension development and light weight structures.

Trim: Textiles, polymers & injection moulding.

Simulation, measurement & testing: This is a strong sector with capabilities in electronics, engine test beds, vibration measurement, manufacturing systems modelling, embedded software development, aerodynamics, access to supercomputing facilities, driving simulator & chassis dynamometer facilities.

Business systems: Supply Chain Management, business models, logistics, manufacturing management, quality & maintenance.

Others: Additive manufacturing (3D printing), rapid prototyping, precision machining, high performance computing & surface coatings.

At the last working group meeting in February it was acknowledged that more information was required to complete the University strengths matrix as the original brainstorming was thought to be restricted owing to the mix and knowledge of the participants at the December group meeting. It has been agreed that the Universities will have a further opportunity to update this matrix to ensure a full picture of their

capabilities has been captured which is due for completion by the next group meeting planned for the 7th May 2015. It was also agreed that additional categories for electronics and control systems were added along with a section for the so-called 'disruptive' technologies (i.e. the application of technologies that have been developed for sectors outside of automotive).

7. Research & innovation needs of the automotive sector in the region

The automotive sector in the region is made up of a diverse group of companies from large multinational owned organisations to privately owned SMEs. Their needs are similarly diverse ranging from technical assistance in research & product development through to help in business systems and marketing. If we look at the technical competencies required in the sector then the field of powertrain products appears to be prevalent having a strong alignment with the expertise in local HEIs. It is also evident that within HEIs there is strength in simulation, measurement and testing of automotive components and systems which is the foundation for research and development of powertrain systems and components.

To further understand the needs of this sector it has been proposed by the YUTA that a workshop (or series of workshops) be arranged to bring together the Universities and Automotive Suppliers in order to confirm their main priorities and from this determine how support from the Universities can help them with future growth of their businesses. It is planned that the first of these workshops will take place during the summer of 2015.

8. Next steps to develop an Automotive strategy for future ESIF calls

The working group will focus on building a network of companies, institutions and technology providers in the automotive manufacturing sector to enable a robust business offer to be developed that will underpin a long term strategic plan to assist the future growth in capacity and capability of this sector in the LCR.

As part of the long term strategy for the LCR consideration should be given as to how the LCR could benefit from a larger northern alliance in the automotive sector, the so called 'Northern Powerhouse model', encompassing the North West, North East, Yorkshire & Humber regions. With the proximity of several large vehicle OEMs in the North West (Jaguar Land Rover, Ford and Bentley) and Nissan in the North East, automotive companies in Yorkshire & the Humber region could benefit from being part of a larger automotive community. Whilst this could be an attractive solution for companies in the sector, it will also bring the types of challenges associated with collaboration across several LEP boundary areas.

The North West region already has an established automotive alliance and the North East is just in the process of setting up a similar organisation. Informal discussions have already taken place with the North West Automotive Alliance around the potential benefits of a Pan Northern Automotive Alliance. Carol Holden, the Chief Executive for the North West Automotive Alliance has been invited to attend the next group meeting to give a presentation on how their organisation works with the automotive sector in their region.

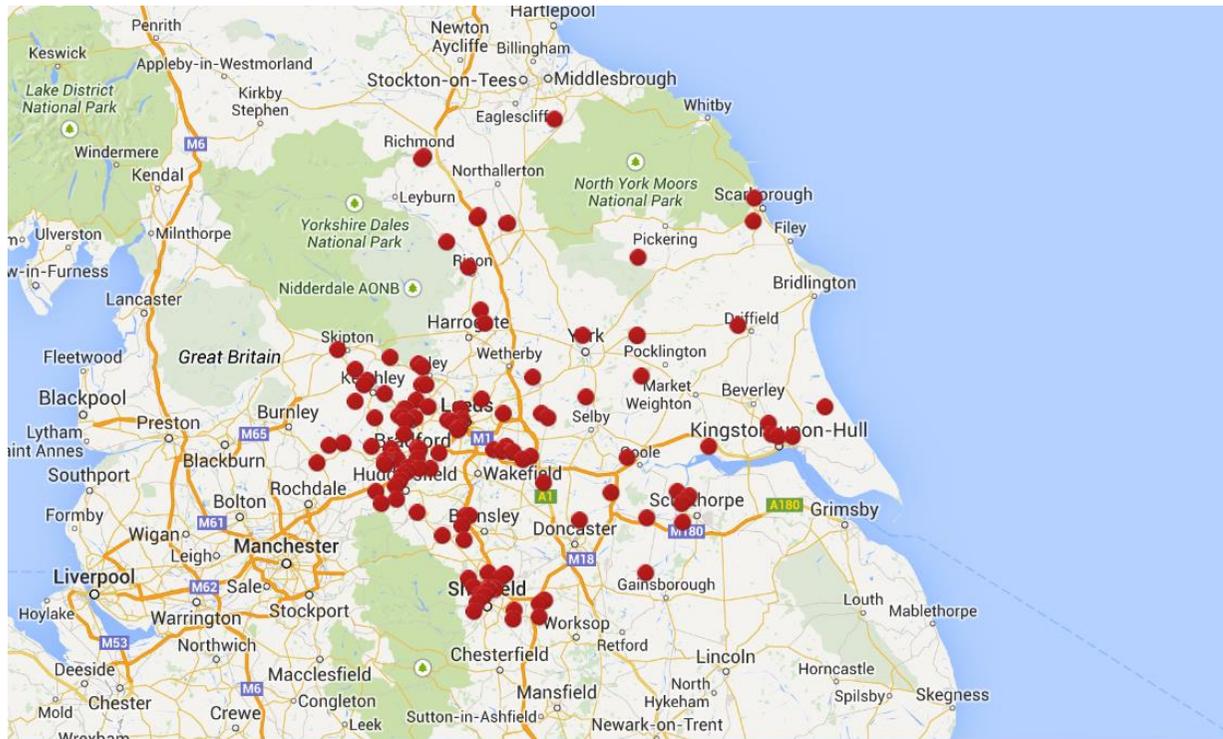
It would also be of great benefit to the project and the working group if we could also include an industry representative to give a wider view of the sector to ensure we include industries/companies that may be able to bring new technologies in the future to the automotive sector. In this respect Stephen Gregory from the Manufacturing Advisory Service (MAS) has been invited to attend the next working group meeting.

There will be an ESIF innovation call in LCR in 2015. YU has been working with a consortium of partners (led by University of Leeds) to submit a proposal to this call, which would focus on providing innovation support to high growth SMEs in LCR. Whilst this project is not specifically aimed at automotive companies, SMEs from this sector that are identified as high growth will be able to access this support. The ambition is that this project would be a precursor to future innovation projects (within and outside of ESIF) which have a more specific sector focus.

The University of Huddersfield, as the lead on this area of work should undertake the following next steps:

- Set up workshops between the universities and automotive manufacturers to ensure alignment of business needs to academic research
- Review the potential for a Pan Northern Automotive Alliance through discussions with the North West and North East Automotive Alliances and the LEPs
- Together with the working group, develop a robust business offer for the automotive sector by the end of 2015 ready for further ESIF innovation calls which are expected in 2016
- Together with the working group continue to build customer relationships with SMEs in the local automotive sector, ensuring that they know how to access HEI expertise and innovation support within LCR.

Appendix 1: Geographical spread of companies active in the automotive sector Yorkshire & Humber Region



Appendix 2: University expertise & capabilities relating to the Automotive Sector

University of Bradford

	INSTITUTIONAL CAPABILITY e.g. physical assets/ equipment, REF Score (if applicable)	INSTITUTIONAL CAPACITY e.g. research infrastructure, number of researchers etc.	INSTITUTIONAL PRIORITY e.g. Low, medium, high
POWERTRAIN Engine Air in to Exhaust Transmission, Gear Axle, Drive Shafts	Engine testing facility – multicylinder transient state of art; Tribology research lab	Around 6 academic and research staff	High
CHASSIS Steering, Brakes, Suspension Stressed body, non-stressed panels	Brakes Research Centre – state of the art brake test / dynos Chassis dyno; full vehicle test / instrumentation capability.	Around 6 academic and research staff	Medium
TRIM Interior - Panels, Seats, Carpets Exterior - Lights, Mirrors, Deflectors Electrics, Motors, Glass	Acoustic laboratory – material characterisation for body trim application Polymer processing – injection moulding, nano & micro moulding, cold phase processing	Around 12 academic and research staff	High
SIMULATION, MEASUREMENT TESTING	FEA and CFD software, LabVIEW DAQ hardware and software	Around 4 academic and research staff	Medium
BUSINESS SYSTEMS	Supply chain and design systems expertise Automotive Product Development Knowledge management	Around 6 academic and research staff	High

	Asset management Product Service Systems		
OTHERS	Manufacturing systems, planning & control Systems engineering design Robustness and reliability Optimisation	Around 8 academic and research staff	High
RAPID PROTOTYPING	3D printing and other advanced manufacturing facilities	Around 2 academic and research staff	Low
MATERIALS	Analytical centre with full range of materials characterisation facilities	Around 12 academic and research staff	High

University of Huddersfield

	INSTITUTIONAL CAPABILITY e.g. physical assets/ equipment, REF Score (if applicable)	INSTITUTIONAL CAPACITY e.g. research infrastructure, number of researchers etc.	INSTITUTIONAL PRIORITY e.g. Low, medium, high
POWERTRAIN Engine Air in to Exhaust Transmission, Gear Axle, Drive Shafts	Turbocharger & Supercharger, Specialised surface treatments and coatings	Around 15 academic and research staff	High
CHASSIS Steering, Brakes, Suspension Stressed body, non-stressed panels	Suspension development	Around 2 academic and research staff	Low
TRIM Interior - Panels, Seats, Carpets Exterior - Lights, Mirrors, Deflectors Electrics, Motors, Glass	Textiles and for interior fabrics and trim. Product design for interior equipment	Around 10 academic and research staff	Medium
SIMULATION, MEASUREMENT TESTING	Suspension testing, and chassis dynamometer testing Aerodynamic simulation and modelling materials characterisation metrology Diagnostics and Sensors Small wind tunnel	Around 15 academic and research staff	High
BUSINESS SYSTEMS	Supply Chain Management, Operational Management, Logistics management	Around 10 academic and research staff	High

OTHERS	Precision machining technologies, HPC Facilities.	Around 10 academic and research staff	High
	3D Graphic Modelling and Visualisation	Around 5 academic and research staff	Medium
	Support for Type Approval	Around 2 academic and research staff	Medium
	Formula Student Team	N/A	Medium
NON DISRUPTIVE TESTING	Acoustic Imaging and other Condition Monitoring techniques	Around 5 academic and research staff	High
	X-Ray/Neutron Imaging	Around 5 academic and research staff	High
RAPID PROTOTYPING	3D printing and other advanced manufacturing and machining facilities	Around 6 academic and research staff	High
	3D Modelling / Rendering	Around 5 academic and research staff	Medium
MATERIALS	Extensive range of materials characterisation facilities including SEM, TEM, AFM, XRDS, CMM, XRF, full suite analytical chemistry capabilities	Around 10 academic and research staff	High
DISRUPTIVE TECHNOLOGY	Cross over opportunities from other research sectors e.g. Rail Innovation.	Around 40 academic and research staff – Rail Innovation	High
	Advanced metrology	Around 20 academic and research staff – Advanced Metrology	High
ELECTRONICS AND CONTROL SYSTEMS	Intelligent/Autonomous systems	Around 5 academic and research staff	High
	High speed electric motors (Turbo)	Around 5 academic and research staff	High

University of Leeds

	INSTITUTIONAL CAPABILITY e.g. physical assets/ equipment, REF Score (if applicable)	INSTITUTIONAL CAPACITY e.g. research infrastructure, number of researchers etc.	INSTITUTIONAL PRIORITY e.g. Low, medium, high
POWERTRAIN Engine Air in to Exhaust Transmission, Gear Axle, Drive Shafts	Internal combustion engine test facilities including laser diagnostics, tribological test facilities including fully instrumented engine test cell	Around 20 academic and research staff	High
CHASSIS Steering, Brakes, Suspension Stressed body, non-stressed panels	Brake dynamometers, materials test machines (up to 50kN), large impact test facility	Around 4 academic and research staff	Medium
SIMULATION, MEASUREMENT TESTING	FEA and CFD software, LabVIEW DAQ hardware and software	Around 20 academic and research staff	High
BUSINESS SYSTEMS	Supply chain and design systems expertise	Around 4 academic and research staff	Medium
RAPID PROTOTYPING	State-of-the-art 3D printing and other advanced manufacturing facilities	Around 6 academic and research staff	High
MATERIALS	Full range of materials characterisation facilities including SEM, TEM, AFM, XRDS, CMM	Around 10 academic and research staff	High