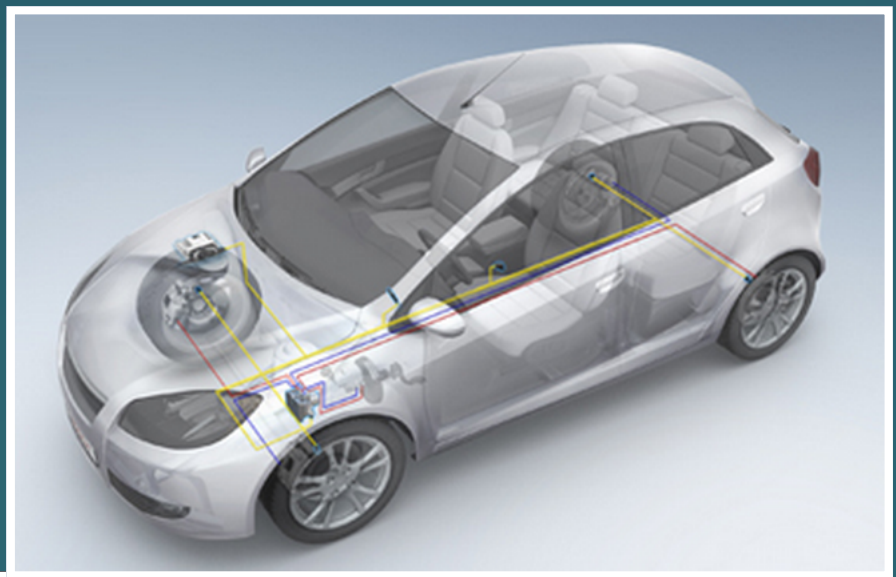
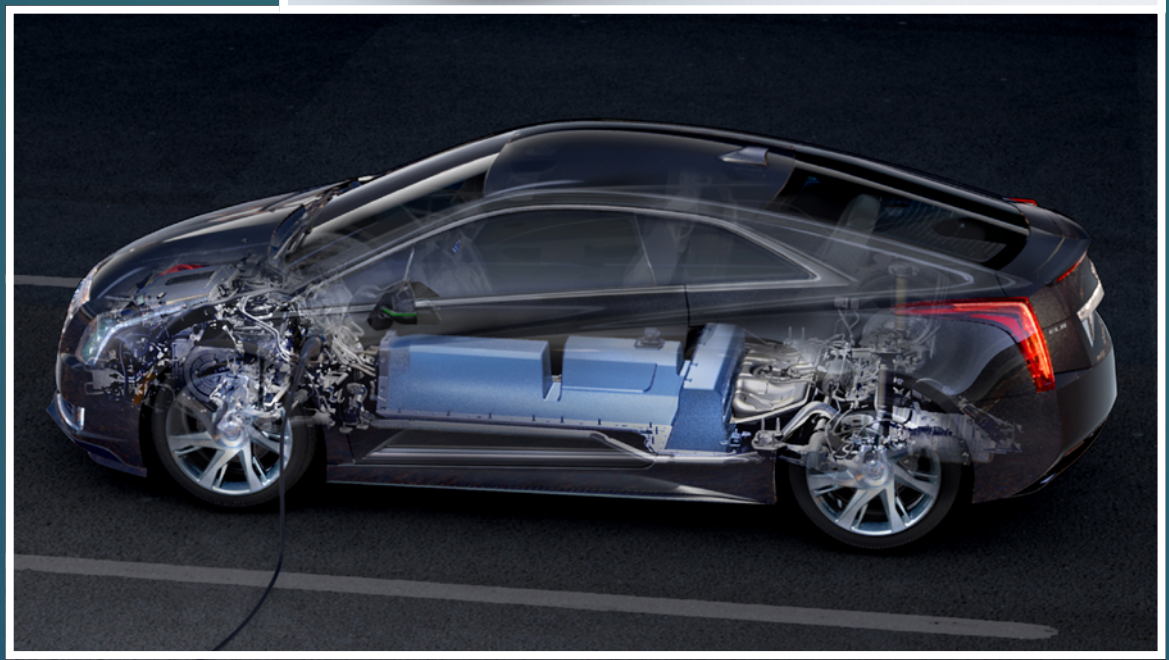
RESEARCH REPORT
ABOUT Automotive

The Global Chassis Sector Report

AN ANALYSIS OF THE BRAKING, STEERING AND SUSPENSION MARKETS





JUNE 2015
BY DAVID SADDINGTON

ABOUT Publishing Group

List of tables

List of figures

and performance requirements and test protocols for replacement braking components for road going motor vehicles and trailers. ECE R90 will apply to passenger vehicles from November 2016 and the regulation is likely to favour aftermarket OEM brake manufacturers who can afford the significant additional cost of testing.

2.2 STEERING

The growth in installation rates of electric power assisted steering (EPAS) has been rapid with a swift and decisive replacement of hydraulic power steering as the dominant technology within the past 10 years. In 2005 hydraulic steering claimed a 56.3% share of the global steering market compared to 25.8% claimed by EPAS. By 2014 those figures had almost reversed, with EPAS holding 67.8% of the global market compared to just 24.8% with hydraulic. The share held by unassisted and electro-hydraulic steering also lost out to EPAS, falling from 17.9% in 2005 to just 7.4% by 2014.

Looking forward to 2022, we will see EPAS continue to increase its market share. In the tough environment created by the tightening emissions targets manufacturers are scrambling to meet, EPAS's contribution to fuel consumption savings of up to 6% plays a large part in its popularity. Another huge contributing factor is its relative low cost, and lower costs over the life of the vehicle, which also reduce warranty claims and leads to large overall cost savings to OEMs.

Through the 2000s, EPAS's mainstream acceptance was held back by issues, including concerns around lack of steering 'feel' compared to hydraulic systems, which made EPAS unpopular with many drivers. However, improvements in software control technology have largely solved this problem, and in the last few years we have seen even manufacturers of traditional 'drivers' cars', including Audi and BMW roll out EPAS across their ranges. By 2022, we anticipate that EPAS will be fitted to around 86% of the world's new light passenger vehicles.

Full steer-by-wire systems came to market in the 2013 Infiniti Q50, which featured a 'fail-operational' redundant steering column, which is engaged automatically in the event of power failure. The acceptance and success of the Q50 will no doubt be closely monitored by other OEMs. However limited forms of autonomous vehicle control are also available from Mercedes-Benz and Audi. The 2014 Mercedes-Benz S-Class equipped with Intelligent Drive option of traffic-jam assist, allows the car to steer, brake and accelerate itself at speeds lower than 37 mph. Available first on the S-class sedan as a $2,800 option, Intelligent Drive is also offered on the re-engineered 2014 E-class lineup. Currently the take-up rate for Intelligent Drive on the S-class sedan is 50%. It falls to 15% for the E class. Audi has said it will have a traffic-jam function on the redesigned A8 flagship, due in 2017. Mercedes-Benz, General Motors, Nissan, Google and Volvo all have said they will have a self-driving car on the road by 2020.

3 KEY MARKET DRIVERS

3.1 CO_2 REGULATION DRIVING CHANGE

Today, CO_2 emissions targets are the single most significant factor that is driving change in all aspects of the automotive industry. It is fuelling a revolution in engine technology with internal combustion engine (ICE) downsizing and optimising, and adding urgency to increasing levels of vehicle electrification. The increased trend particularly in Europe and China for SUV ownership has brought a counter-intuitive effect in terms of CO_2 emissions due to their relatively larger mass. As a result there has been a strong emphasis on reducing vehicle weight with implications for all systems and their associated components.

3.2 CO_2 LEGISLATION IN THE MAJOR VEHICLE MARKETS

3.2.1 Europe

TABLE 1 Current EU emission standards for passenger cars (ECE + EUDC chassis dynamometer test)

		Grams per kilometre (g/km)					
Standard	Introduced	CO	HC	HC+NOx	NOx	PM	PN
PETROL							
Euro 1	Jul-1992	2.72	–	0.97	–	–	–
Euro 2	Jan-1996	2.20	–	0.50	–	–	–
Euro 3	Jan-2000	2.30	0.2	–	0.15	–	–
Euro 4	Jan-2005	1.00	0.1	–	0.08	–	–
Euro 5	Sep-2009 (a)	1.00	0.1(b)	–	0.06	0.005(c)(d)	–
Euro 6	Sep-2014	1.00	0.1(b)	–	0.06	0.0045(c)(d)	6×10^{11}(c)
DIESEL							
Euro 1	Jul-1992	2.72	–	0.97	–	0.140	–
Euro 2, IDI	Jan-1996	1.00	–	0.70	–	0.080	–
Euro 2, DI	Jan-1996(e)	1.00	–	0.90	–	0.100	–
Euro 3	Jan-2000	0.64	–	0.56	0.50	0.050	–
Euro 4	Jan-2005	0.50	–	0.30	0.25	0.025	–
Euro 5a	Sep-2009(a)	0.50	–	0.23	0.18	0.005(d)	–
Euro 5b	Sep-2011	0.50	–	0.23	0.18	0.0045(d)	6×10^{11}
Euro 6	Sep-2014	0.50	–	0.17	0.08	0.0045(d)	6×10^{11}

* Category M1 vehicles. For Euro 1 to 4 vehicles greater than 2,500kg were type approved as Category N1 vehicles

(a) Sept 2010 for all M and N vehicle weight categories

(b) NMHC limit = 0.068 g/km

(c) Applicable only to vehicles with DI engines

(d) 0.0045 g/km using the PMP measurement procedure

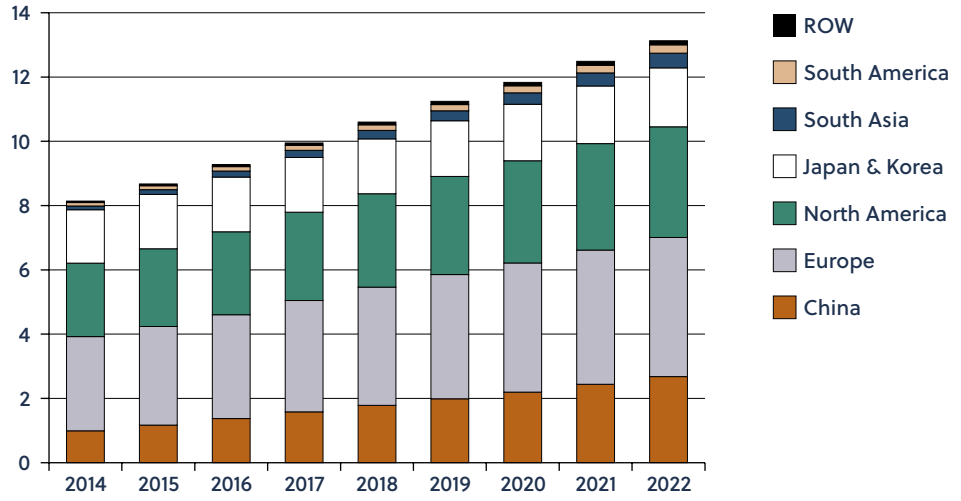
(e) After 30th Sept 1999 vehicles with DI engines had to meet the IDI limits

Source: ICCT

5.7 OUTLOOK AND FORECAST TO 2022

5.7.1 Springs and dampers

FIGURE 20 Global active suspension demand (million units), 2014–2022



Source: ABOUT Automotive

TABLE 11 Active & semi-active suspension demand (thousand units), 2014–2022

	2014	2015	2016	2017	2018	2019	2020	2021	2022
China	989	1,171	1,372	1,578	1,784		95	2	2,076
Europe	2,935	3,065		3,466	3,680		18	4	4,330
North Amer	2,287	20		2,75	,902	3,0	3	3,	
Japan & K	1,657	1		1,6	,707		5	1,7	1,834
South Asia	117				266	311		4	
South America	108				171	194		2	260
ROW		5			88	99	109	120	129
Total	8,	8,676	9,276	9,947	10,599	11,242	11,835	12,487	13,131

Source: ABOUT Automotive

Despite advancements in active and semi-active suspension systems over the past ten years, the fundamental challenge for manufacturers remains balancing the level of safety, comfort, and performance the customer expects, with the price they are willing to pay. While active suspension has been on the agenda of vehicle manufacturers for a long time now, complexity and costs have limited the uptake of more advanced active suspension systems beyond the luxury/performance end of the market. Likewise energy demand has proved a barrier while mainstream vehicles operate with 12V circuits.

What we are seeing at the moment is that sensors developed for other vehicle features are reducing the potential costs of introducing active suspension technologies, at the same time that simpler systems are slowly beginning to

The Global Chassis Sector Report

An analysis of the braking, steering and suspension markets

AUTOMOTIVE

This exclusive new report from ABOUT Automotive concentrates on three of the most important areas within the automotive chassis sector, providing both an up-to-date technological assessment, as well as market analysis and forecasts for:

- Braking components, modules and systems
- Suspension and damping systems
- Steering systems

Chassis sector supplier profiles

Concise profiles for each of the following chassis sector suppliers are included within the report:

- Bosch
- BWI Group
- China Automotive Systems
- Continental Automotive
- JTEKT
- KYB Corporation
- Nexteer
- Magneti Marelli
- Mando Corporation
- NHK Spring
- NSK
- Tenneco
- ThyssenKrupp Bilstein
- TRW Automotive
- ZF Group
- Robert Bosch Automotive Steering GmbH

Comprehensive study addressing the key issues

The report addresses the critical issues facing the automotive chassis sector, and is broken down into eight major sections:

- Key market drivers
- Braking components, modules and systems
- Suspension and damping systems
- Steering systems
- Chassis sector supplier profiles
- OEM system technology trends
- OEM modular sourcing trends
- Technology roadmap

The report defines and examines the key components, systems and modules that make up the chassis of a modern car, with specific regard to market usage, technological trends and forecast developments. This includes mainstream, mass-market technology, as well as innovative and advanced technology where appropriate in each product area.

In addition, the report analyses the approach of each supplier to the market, including its role within the emergence of innovative technologies. Likewise, the research provides an analysis of the technology and sourcing trends apparent among the major global carmakers.

Data coverage

The report includes detailed volume demand forecasts (by region to 2022), for each of the three main sectors covered within this report. Market share analysis for EPS and Steering products is also included. Forecasts are provided for:

- ESC
- Braking (Hydraulic & EHB/EMB)
- Active & semi active suspension
- EPS
- Hydraulic power steering
- Unassisted & EH power steering

Published: June 2015 Price: £495 No. pages: 100 Format: PDF

ORDER FORM

1 Purchase Information

☐ I would like to purchase
The Global Chassis Sector Report: An analysis of the braking, steering and suspension markets

Quantity	Price*	Total
	£495	

*Reports are supplied electronically as a PDF

2 Personal details

(Please attach your business card or complete the following in capitals)

Name (Mr/Mrs/Ms/Dr)

Job title

Company name

Address

City

Zip/postcode Country

Nature of business

Tel

Fax

E-mail

3 Payment method

☐ I enclose a cheque for £ _____ payable to **ABOUT Publishing Limited.**

Customers can pay by cheque with either of the following methods: Sterling cheques drawn on a UK bank; Cheques in US dollars, euros or in any freely convertible currency drawn on the country of origin at current exchange rates.

☐ Please charge £ _____ to my ☐ Visa ☐ MasterCard ☐ AmEx

Account number

Name

Valid from

Signed

Expiry date

☐ Please send me a proforma invoice (Report(s) will be sent on receipt of payment)

The above prices do not include VAT. Customers in EU member countries may be liable to pay VAT if their Registration Number is not supplied. Please enter your EU Registration Number (VAT/TVA/BTW/MOMS/MWST/IVA/FPA) below:

4 Please send your order to

ABOUT Publishing Group Limited, 29 Barnfield Road, Harpenden, Hertfordshire, AL5 5TH, United Kingdom.

Telephone: +44(0)7980 255253

e-mail: sales@aboutpublishing-auto.com • www.aboutpublishing-auto.com

ABOUT Publishing Limited. Registered in England No. 4344194. Registered office: 21 Noel Street, London, W1F 8GP

AUTOMOTIVE

ABOUT Publishing Group
29 Barnfield Road
Harpenden
Hertfordshire
AL5 5TH
United Kingdom

Email: sales@aboutpublishinggroup.com
www.aboutpublishing-auto.com