



## **Supply Chain and Technology Trends of Automotive Electronic/Electrical Markets**

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## Outline

- Introduction
- Trends
- Technologies
- Conclusion





## CSM Overview

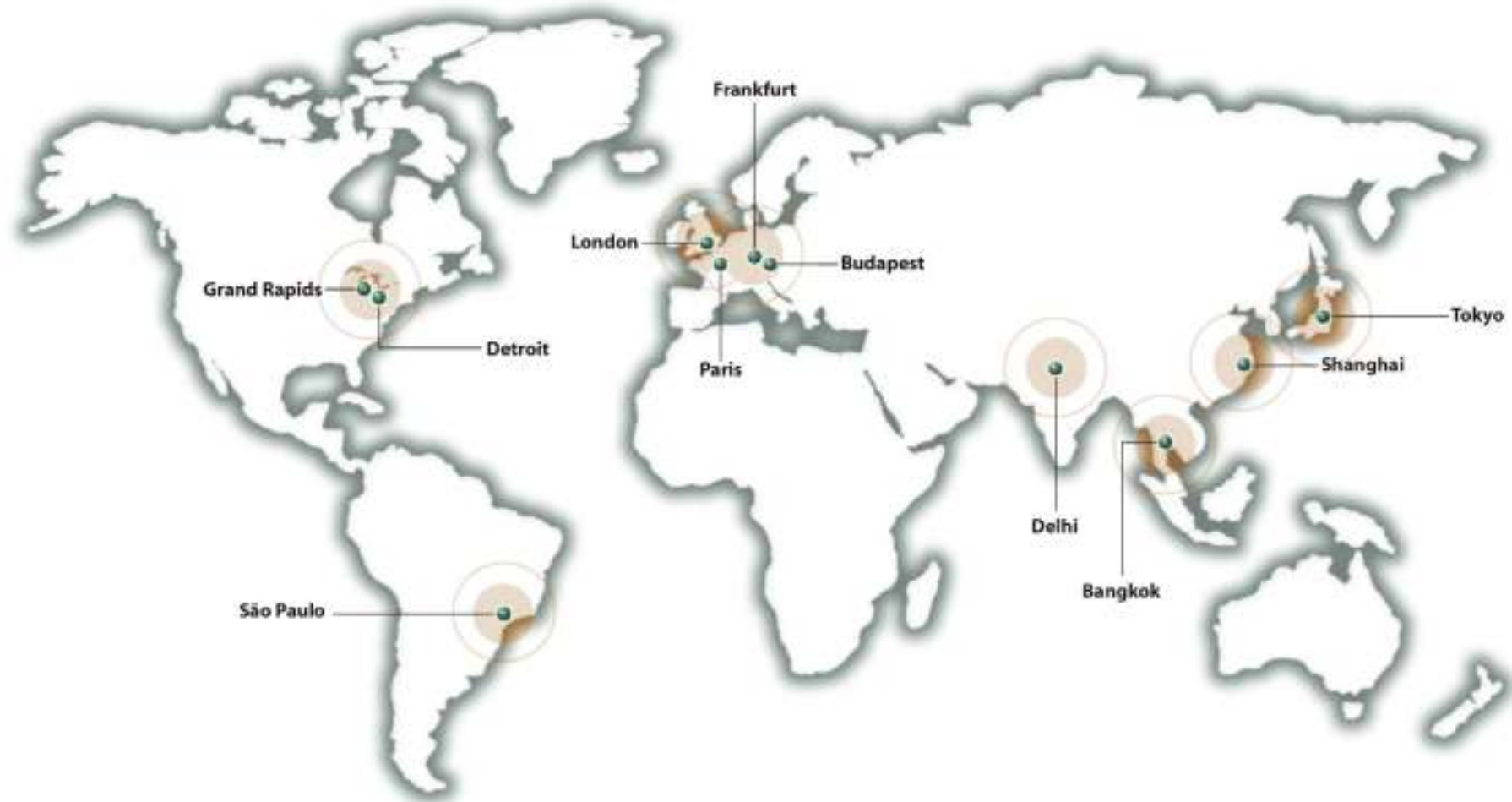
- Established in 1991
- Headquarters in Detroit
- Privately Held
- 120 Employees Worldwide
- 11 Global Offices
- 4 European Offices
- 100% Automotive

**80% of Top Global Suppliers and OEMs Rely on CSM Worldwide\***

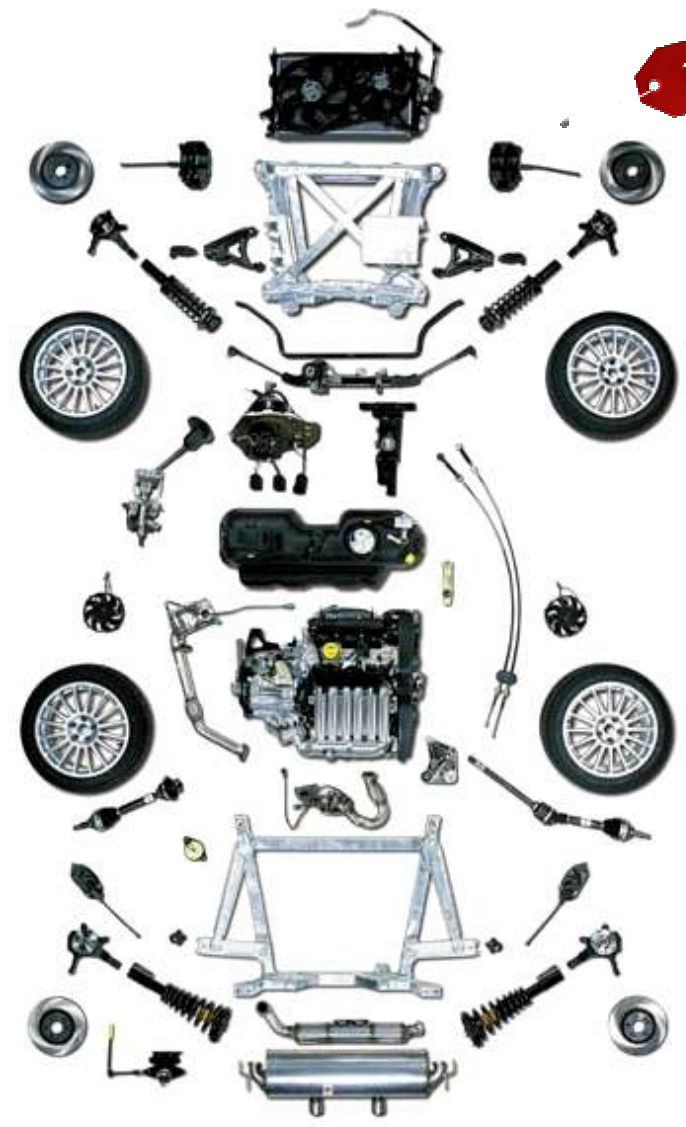


\* Top 100 Global Suppliers – Based on revenue according to Automotive News

# Global Coverage



# 16 Vehicle Systems Globally

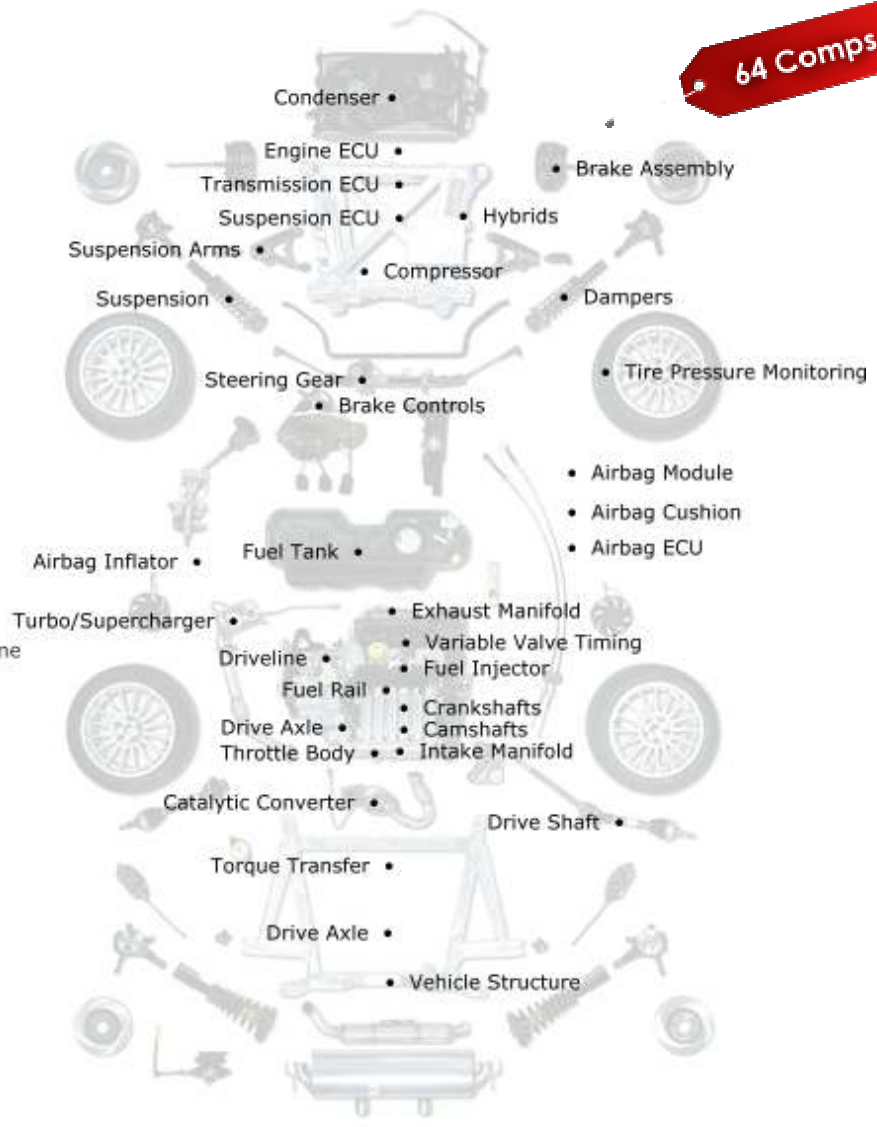
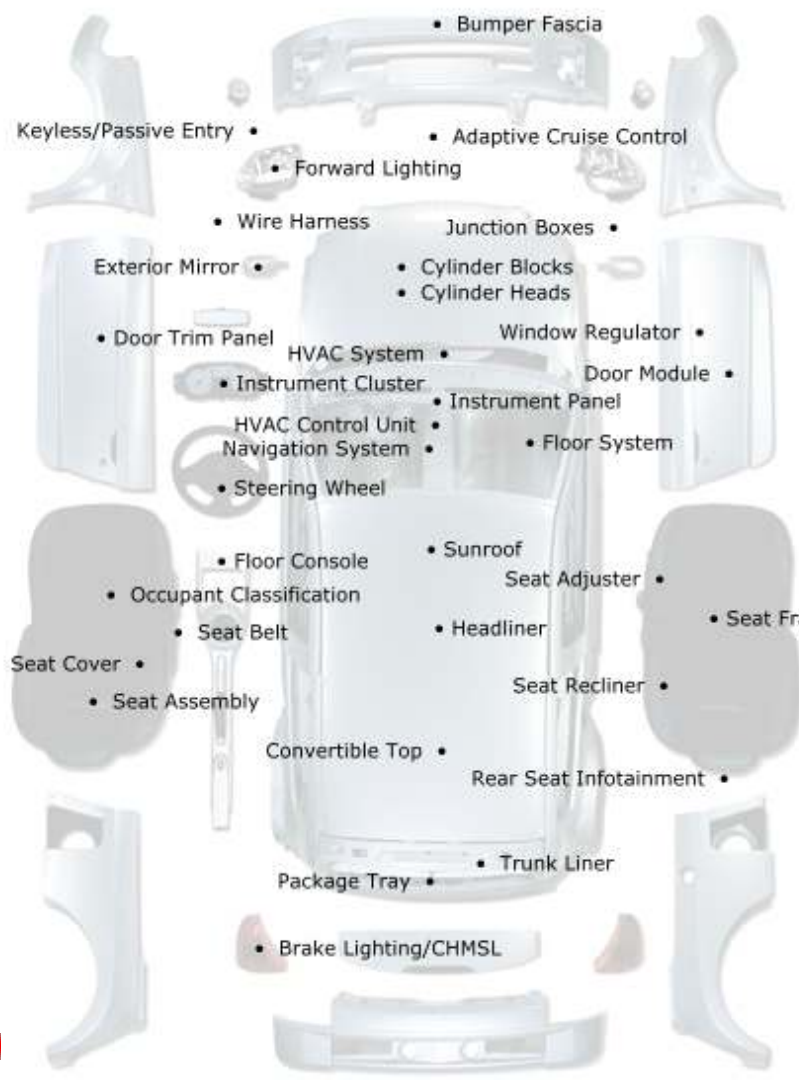


16 Systems



## 64 Scheduled Components/Global Markets

64 Comps

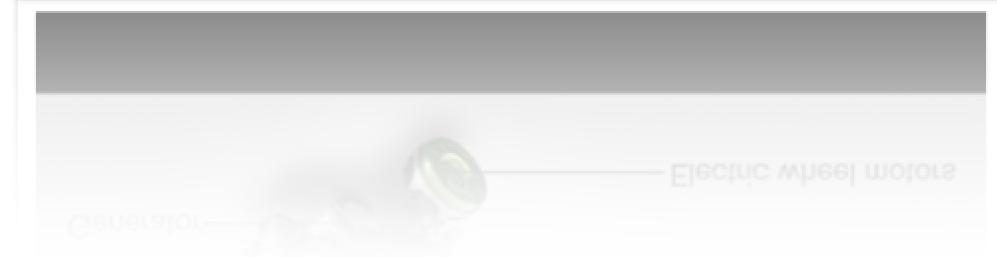
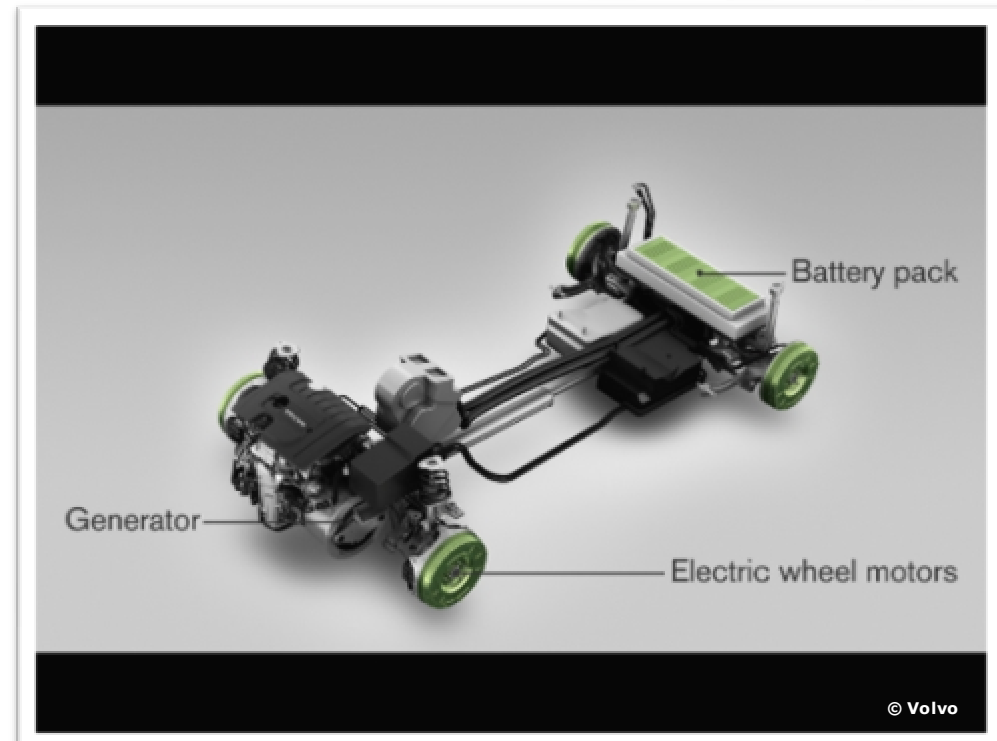


300+ Comps



## Outline

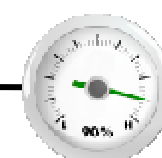
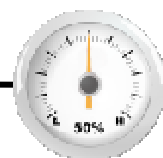
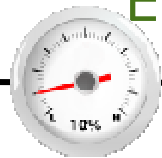
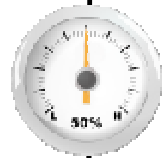
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# Top Trends

1. Fuel Economy
  2. Low-Cost Vehicles
  3. BRIC Markets
  4. Low-Cost Sourcing
  5. Active & Passive Safety
  6. Infotainment
  7. Raw Materials Demand/Cost
  8. Recyclability
  9. X-by-Wire
  10. Car Networking Platforms
  11. Weight Savings
  12. Content Increase
  13. Part Commonization
  14. Interior & Exterior Lighting
  15. Nano Technologies
- Etc...



2008

2013

2018

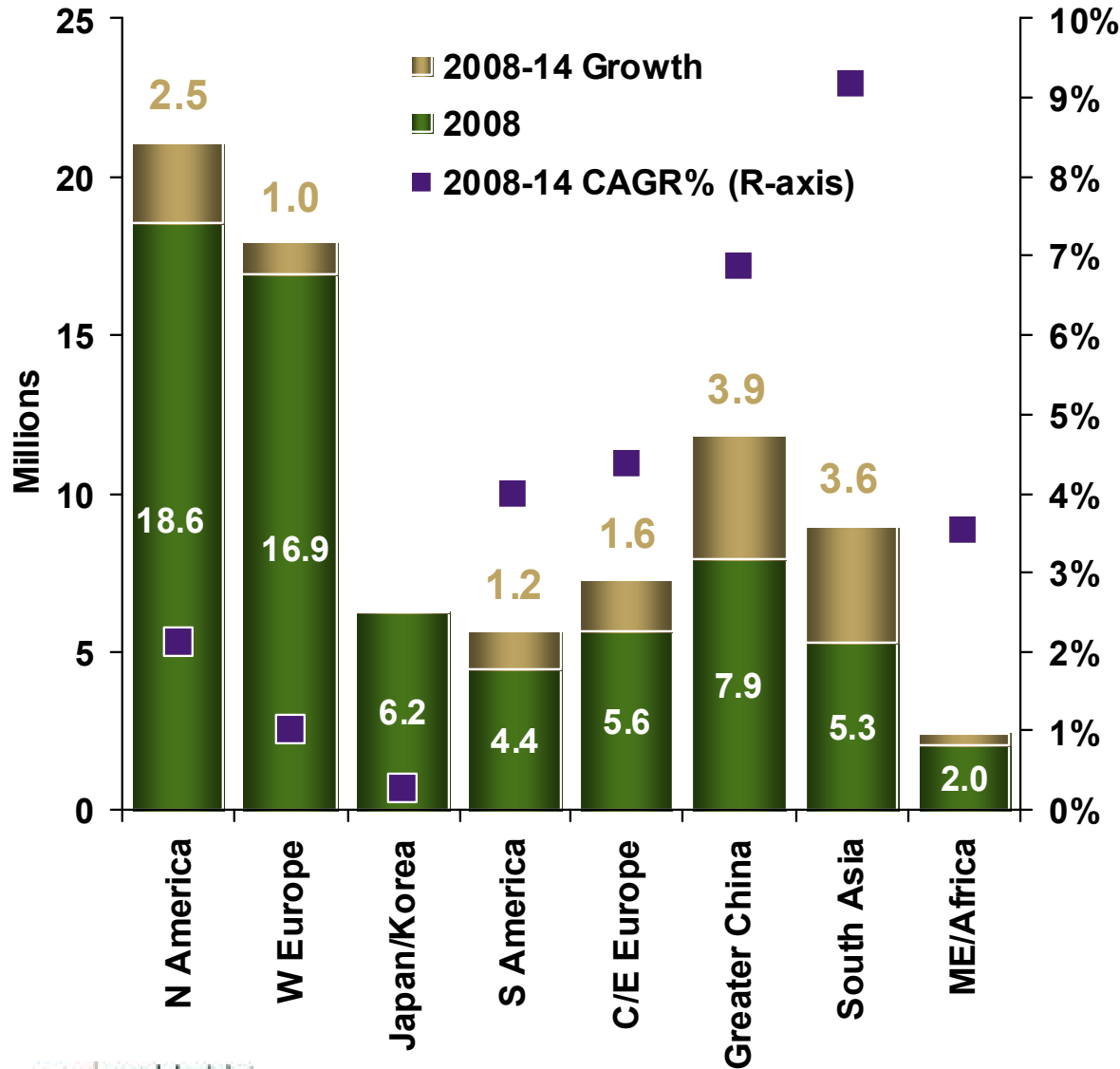
< 5 Years >

< 5 Years >

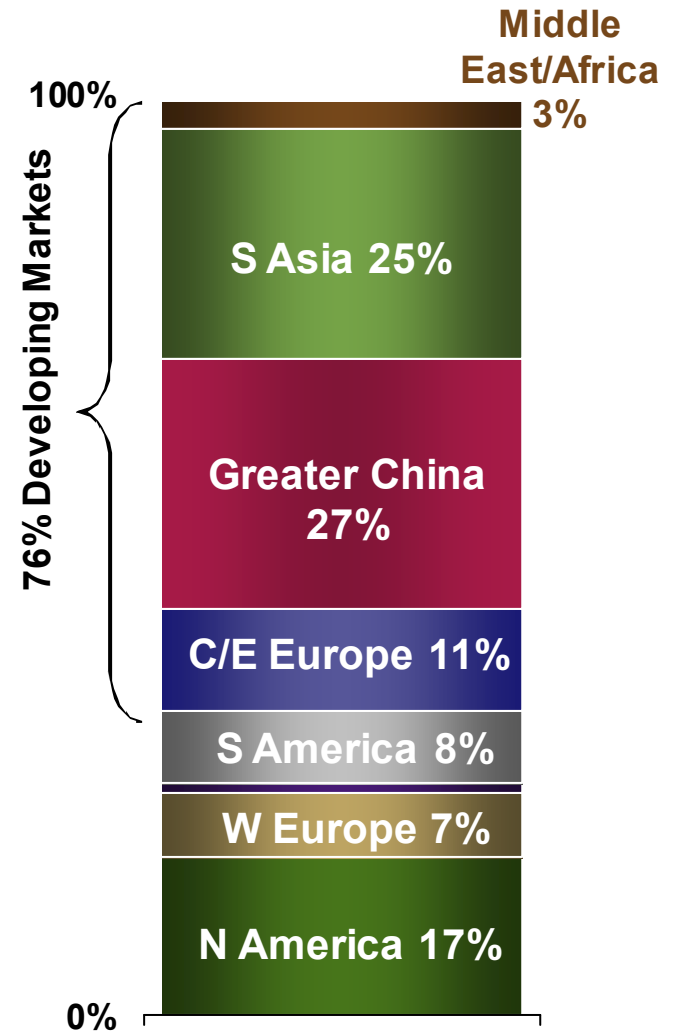




# Global Light Vehicle Sales

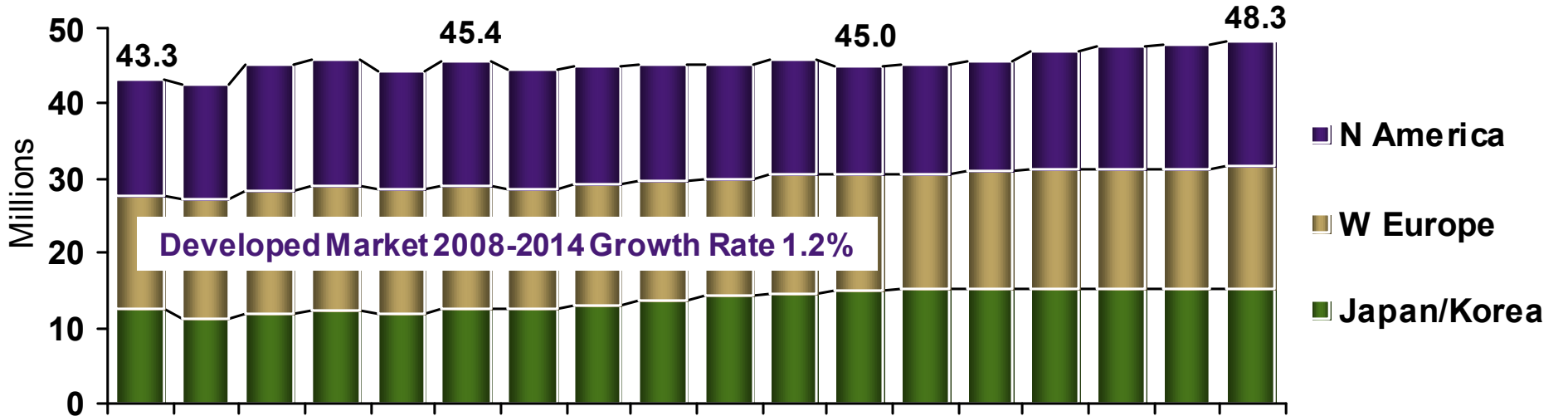
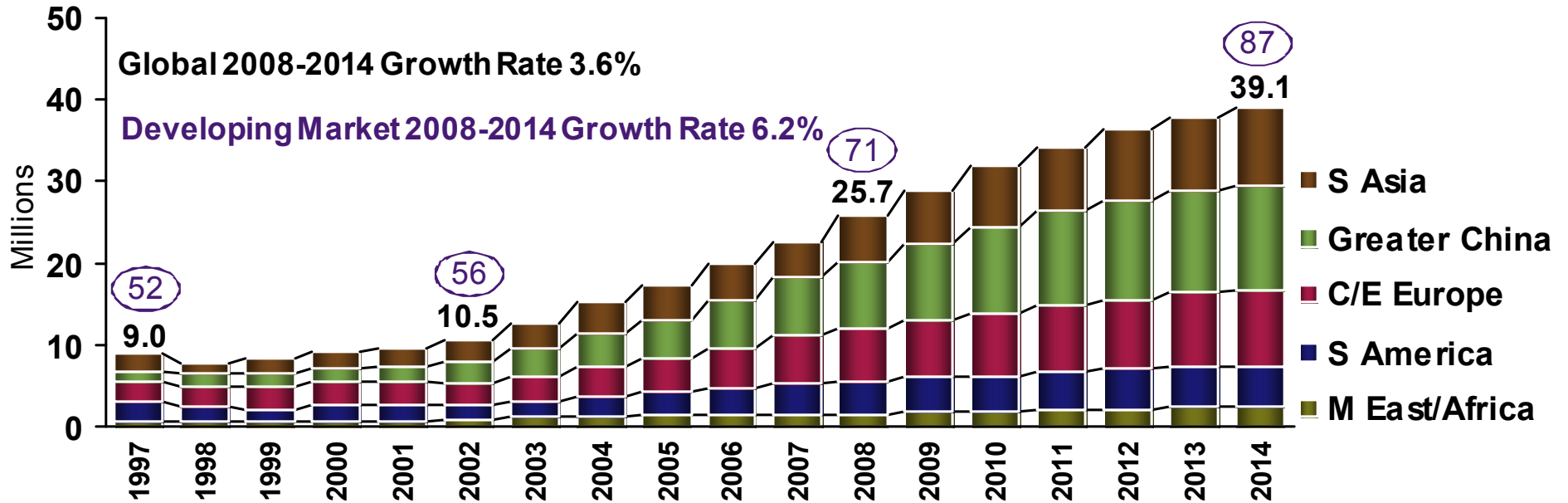


Contribution To Growth  
2008 - 2014



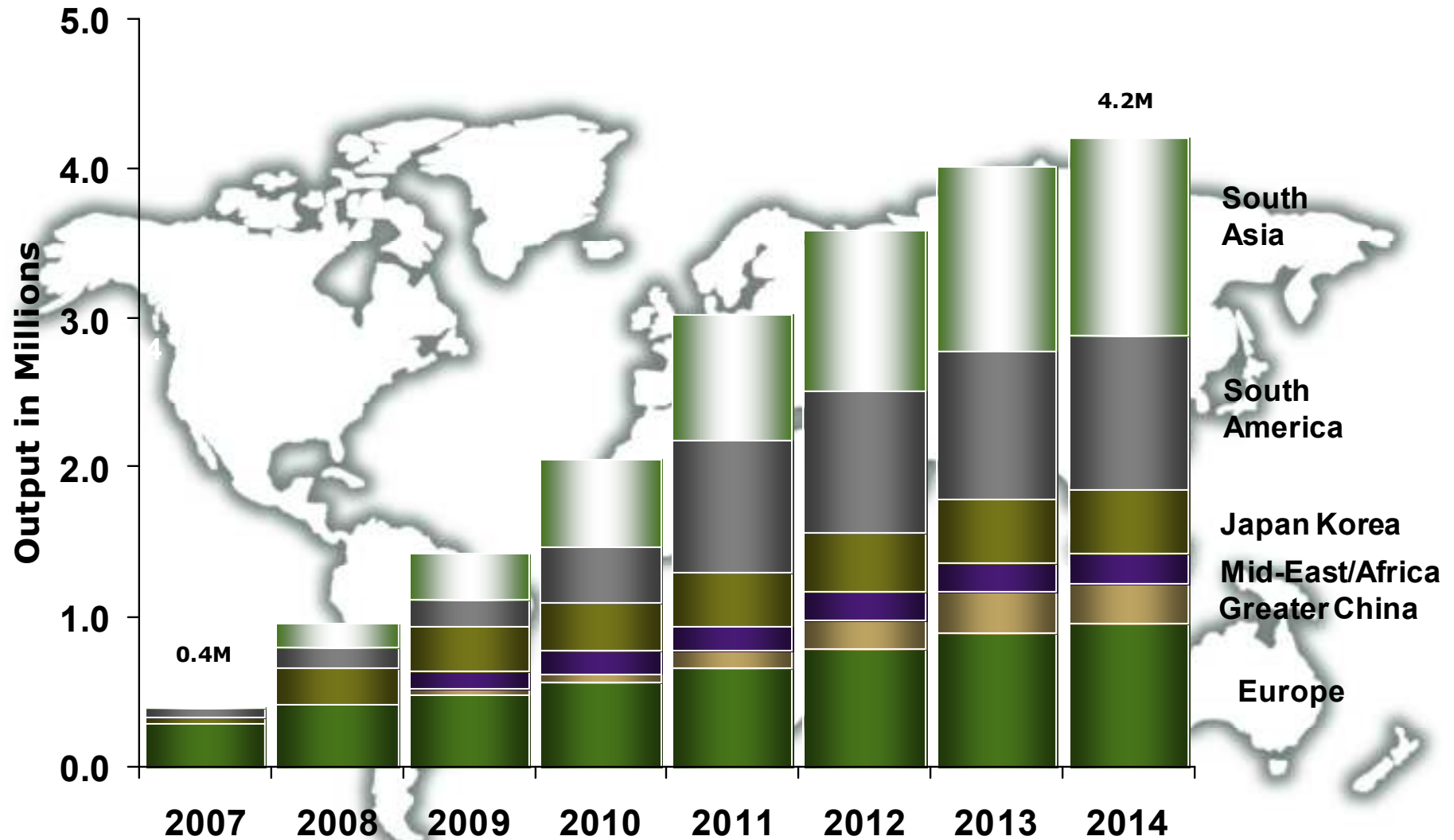


# Global Light Vehicle Production





# Global Low-Cost Light Vehicle Production

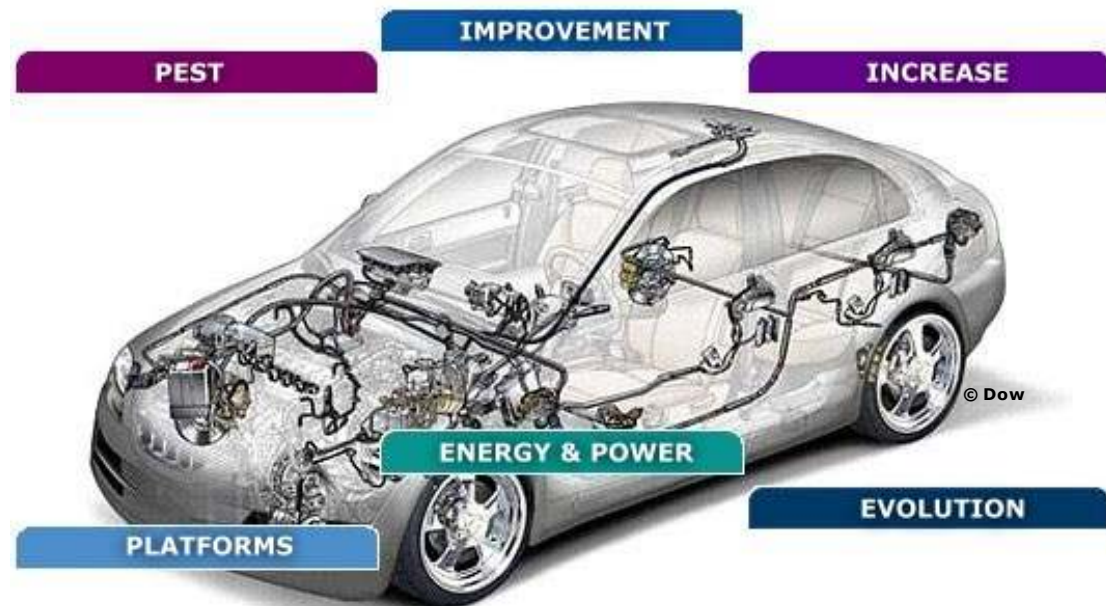




## Present Electronic Trends

- PEST Factors
- Constant Improvement
- Content & Complexity Increase
- Network Platforms
- Energy & Power

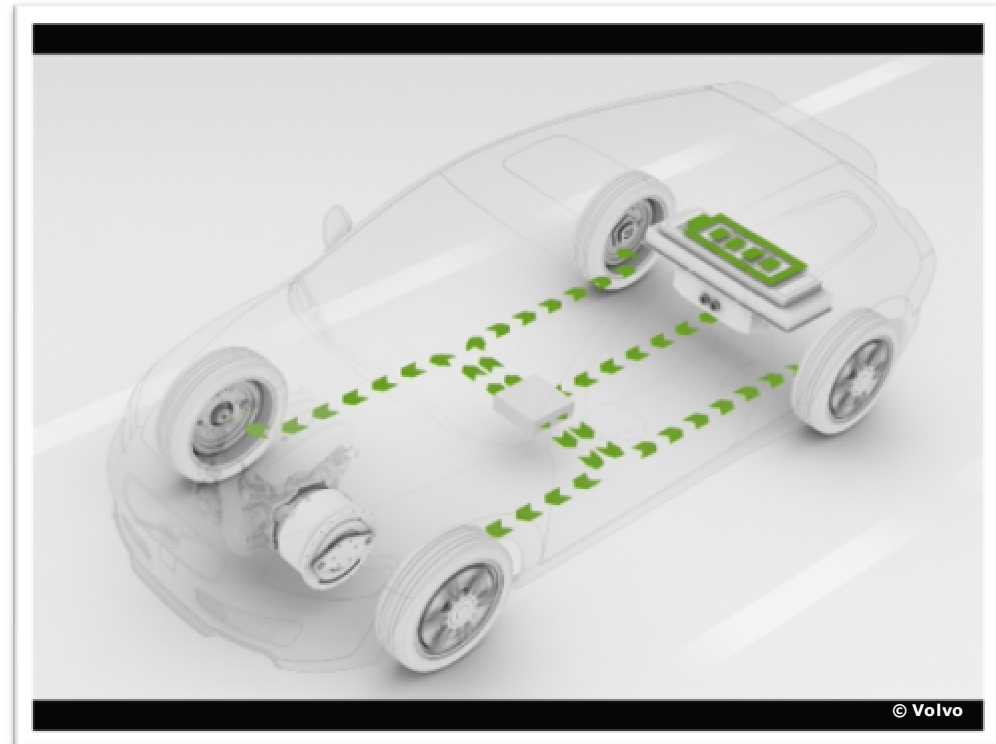
### Evolution NOT Revolution





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## Systems & Components

### ● Brake & Chassis:

- Brake Assembly
- Brake Controls
- Steering Gear
- Damper

### ● Driver Support:

- Keyless/Passive Entry
- Tire Pressure Monitoring
- Adaptive Cruise Control

### ● Electrical:

- Junction Box
- Wire Harness
- Engine ECU

### ● Lighting:

- Forward Lighting

### ● Infotainment

- Navigation System

### ● Engine:

- Hybrid Systems

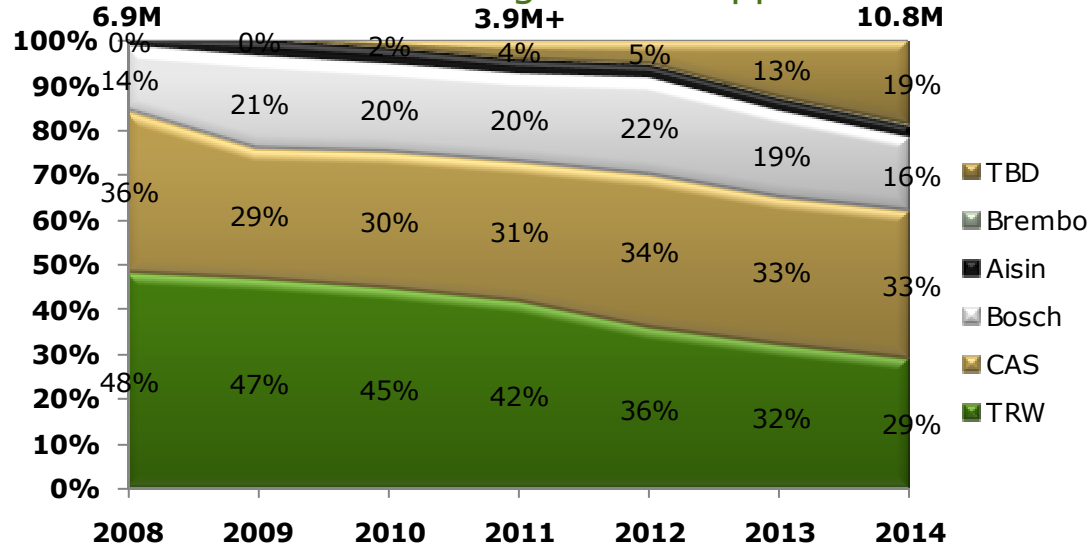
### ● Safety:

- Airbag Module
- Occupant Classification



## Brake Assembly

### EU Electric Parking Brake Suppliers

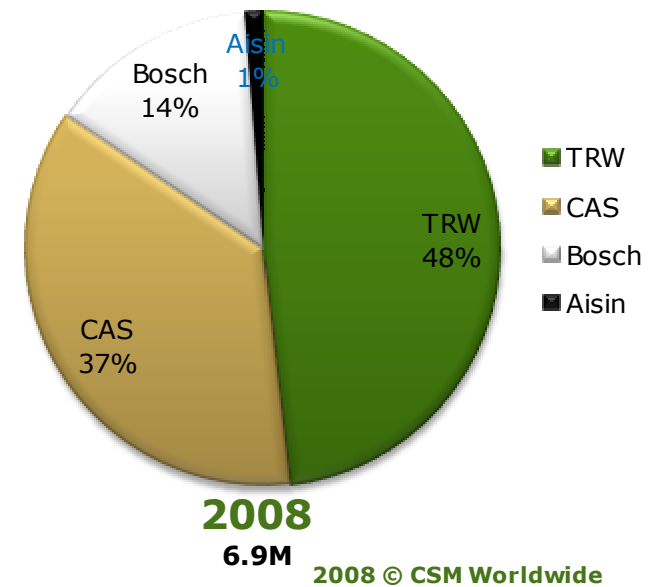


- Cable vs Motor
- Fault Tolerance/Reliability
- Back-up systems
- True vs False Brake-by-Wire
- Braking, Steering and Suspension
- JVs, Partnerships and Acquisitions

### Braking-by-Wire



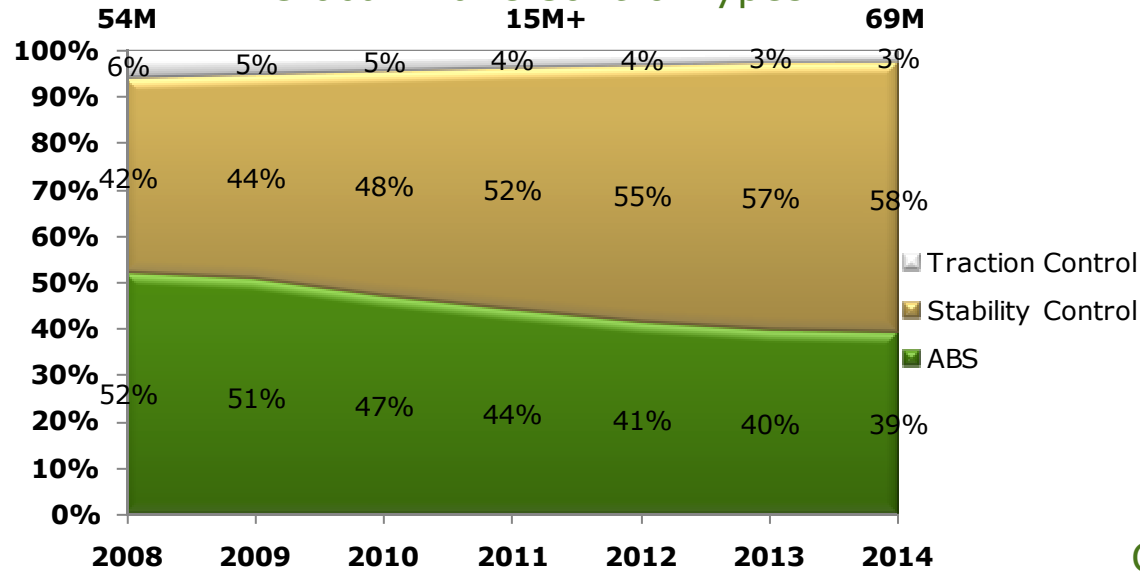
### EU Electric Parking Brake Suppliers





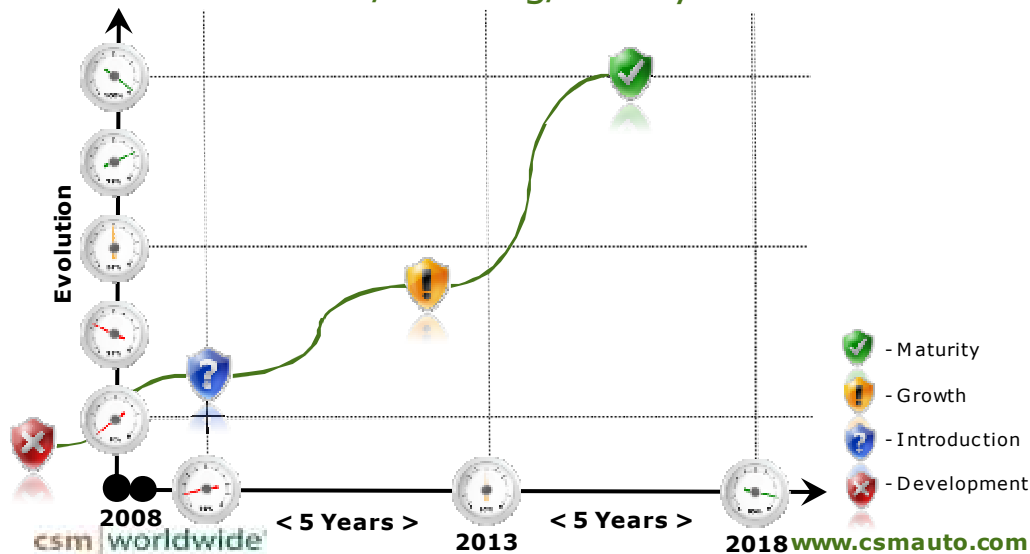
## Brake Controls

### Global Brake Control Types

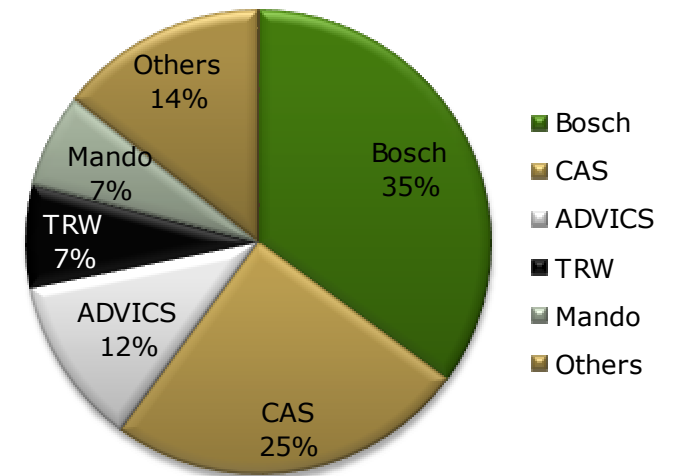


- Premium vs Commodity
- System Generations
- Alternative Propulsion – Vacuum?
- Active Braking/Safety
- Fault Tolerance/Reliability
- Low Cost Sensor/Actuator Integration
- Essential for X-by-Wire

### Shared Chassis/Braking/Safety Platforms



### Global Brake Control Suppliers



2008  
54M

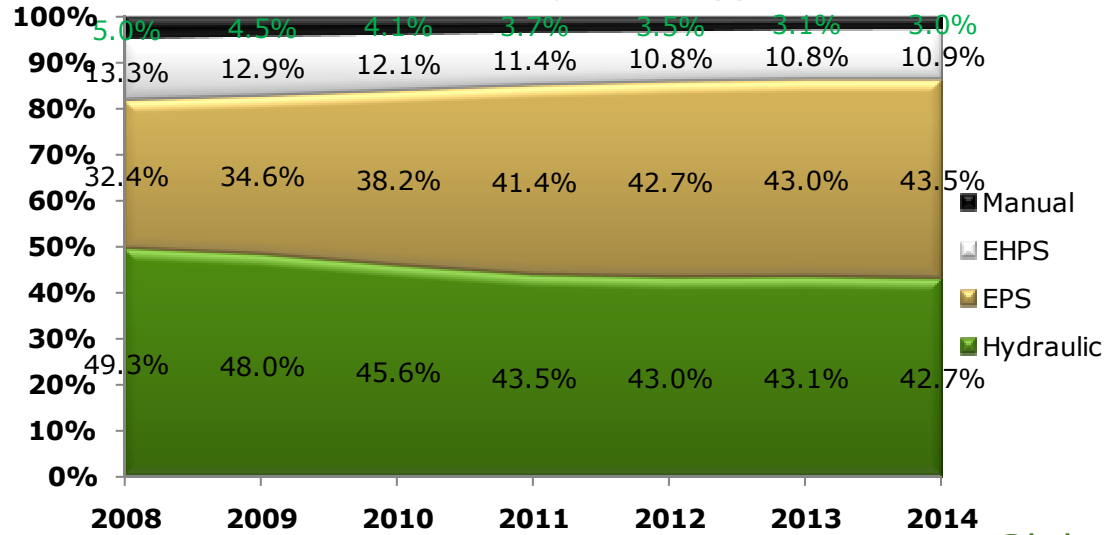
\* Global: EU, NA, JK, CH  
2008 © CSM Worldwide





## Steering Gears

### Global Steering Gear Types

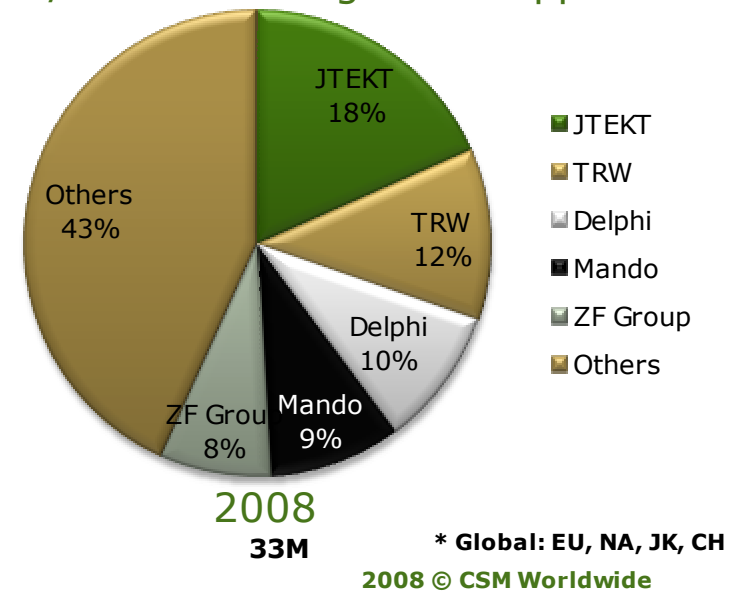


- Semi-Mature Technology
- Limitations on Motor & Sensor Tech
- Fuel Economy
- Reduction of Parasitic Losses Trend
- Automated Parking
- Braking, Steering and Suspension
- JVs, Partnerships and Acquisitions
- Not X-by-Wire

### Steer-by-Wire

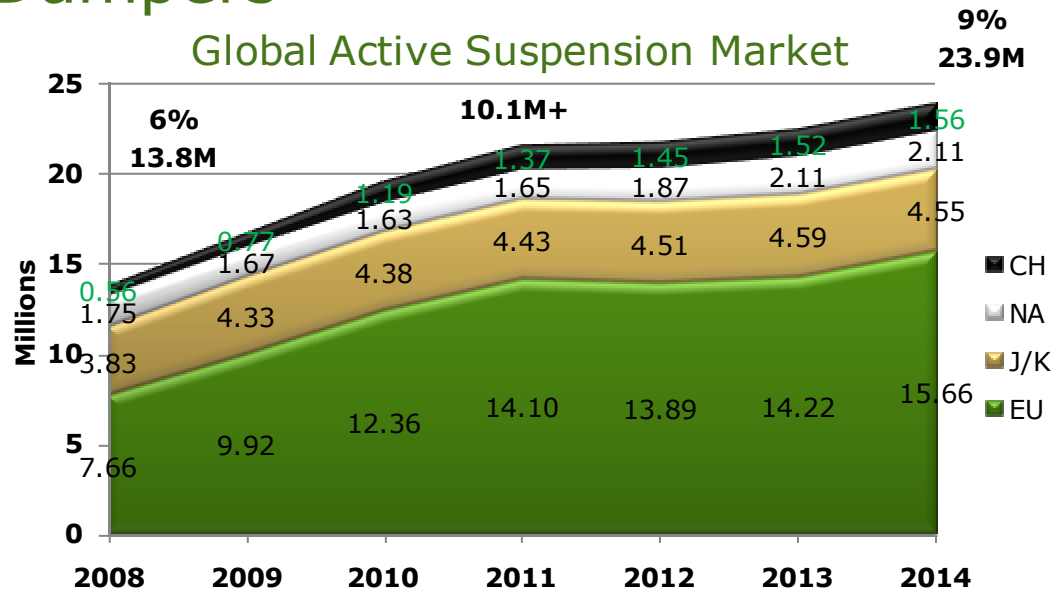


### Global EPS/EHPS Steering Gear Suppliers



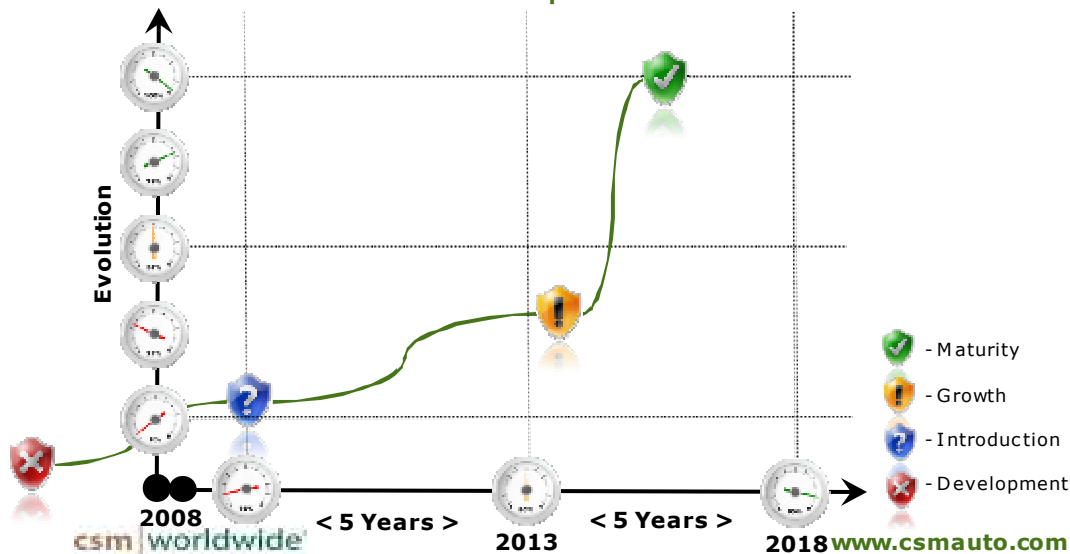


## Dampers

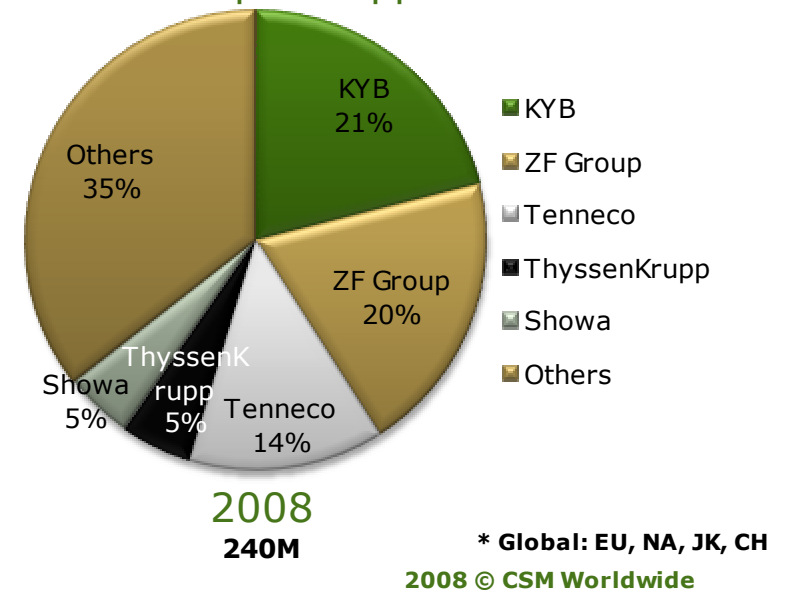


- Optional Market
- Price Limits Market Potential
- 50% Price Reduction
- Premium vs Commodity
- Braking, Steering and Suspension
- JVs, Partnerships and Acquisitions

### Active Suspension

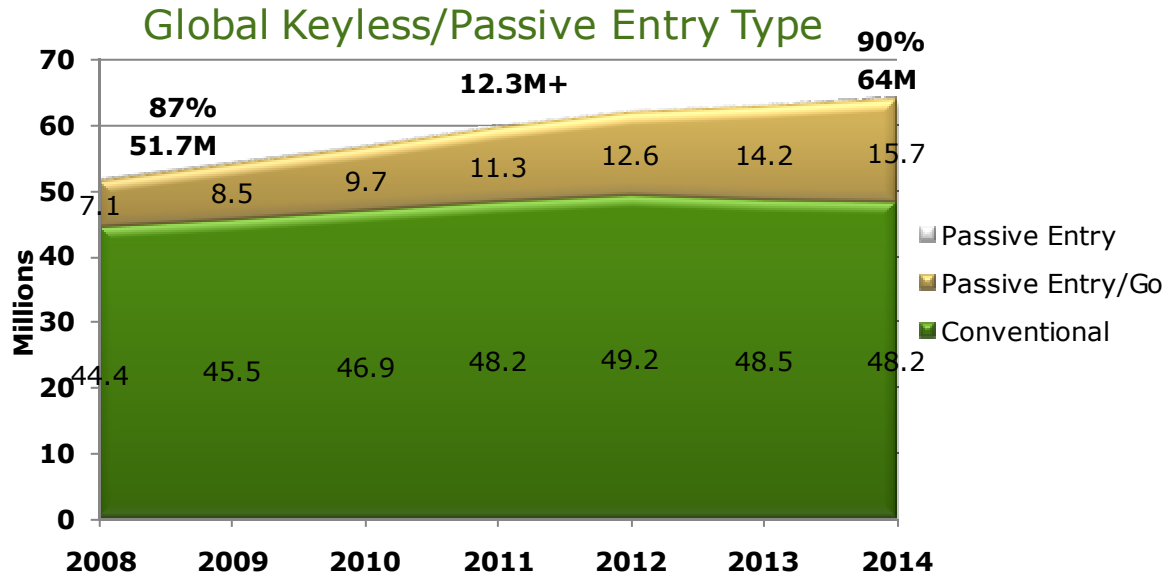


### Global Damper Suppliers





## Keyless/Passive Entry

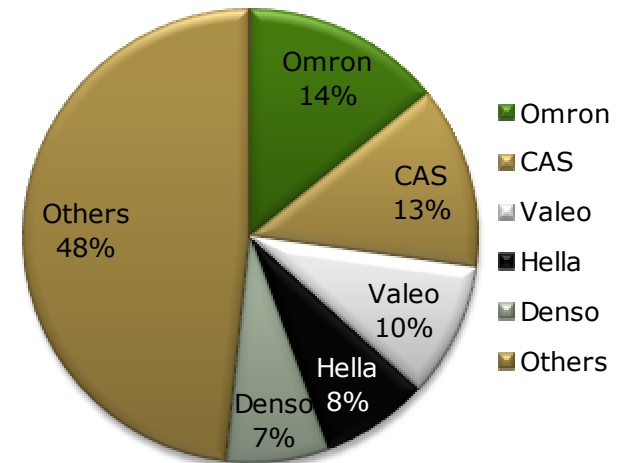


- Mature Technology
- Over-Complexed Functionality
- Platform Sharing
- Luxury Driven
- Personalization Upon Entry
- All-in-One Key with Functions & Info

### Keyless/Passive Entry



### Global Keyless/Passive Control Suppliers



2008

52M

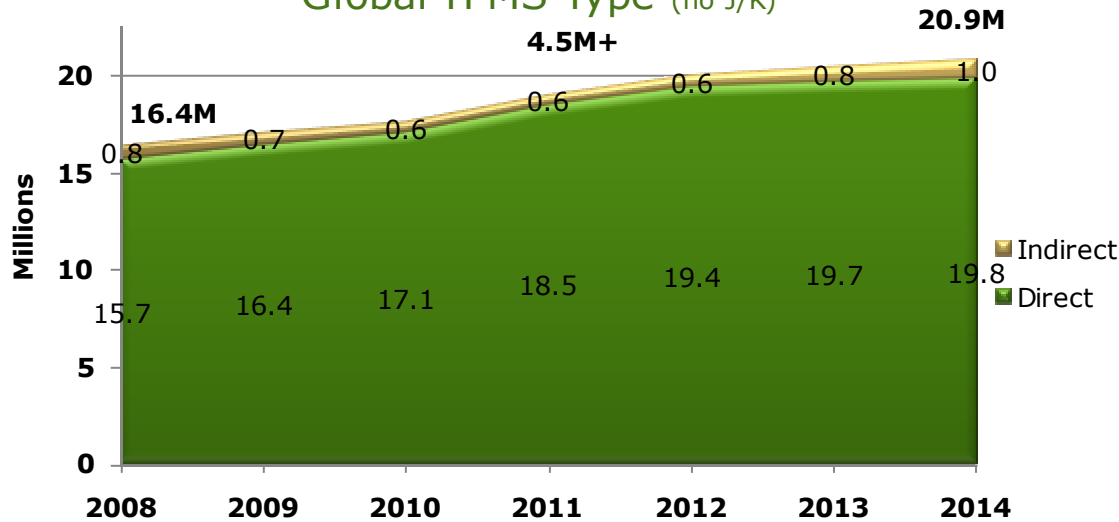
\* Global: EU, NA, JK, CH

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## Tire Pressure Monitoring

Global TPMS Type (no J/K)

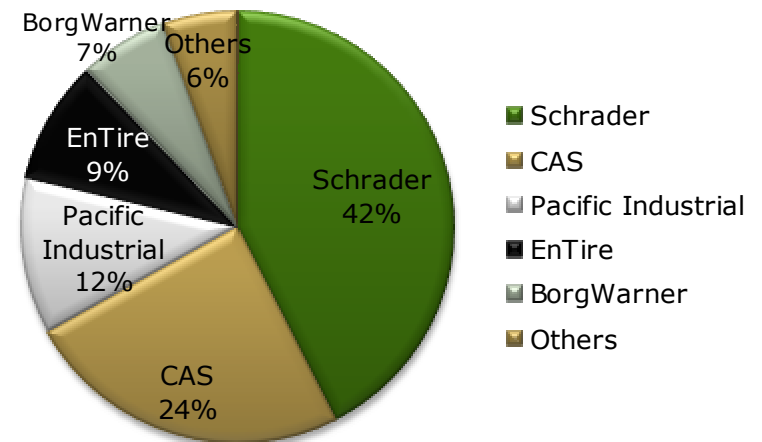


- Direct vs Indirect (or Hybrid)
- Standard for Vehicles Sold in NA
- Initially Safety-Driven Technology
- Now also Fuel Economy (Euro V)
- Extra Production Ready & Available
- Driver Information (Visual & Audio)

## Tire Pressure Monitoring



Global TPMS Suppliers (no J/K)



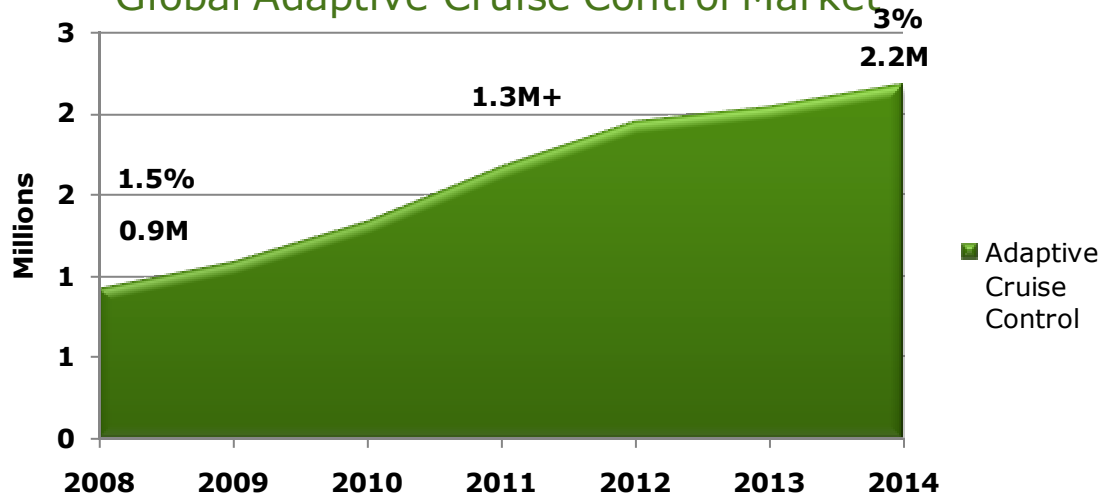
2008  
16.4M

\* Global: EU, NA, CH  
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## Adaptive Cruise Control

Global Adaptive Cruise Control Market

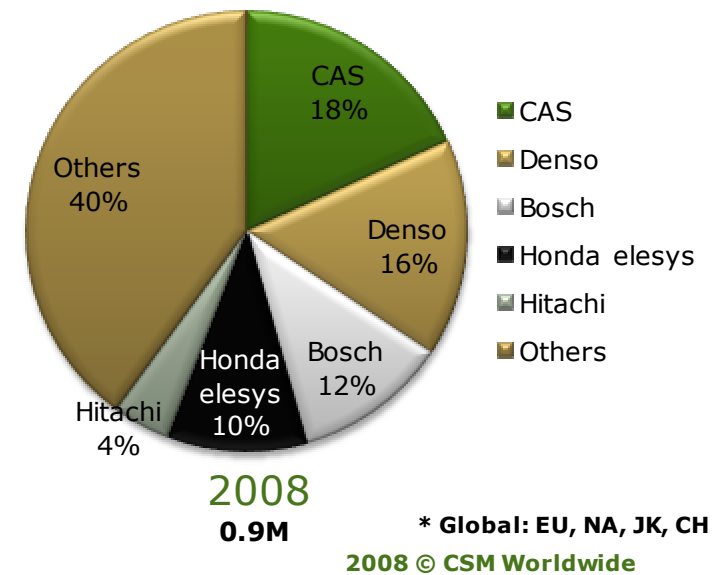


- Premium Technology
- Awareness = Forward vs Side
- Advanced Detection Systems
- Integration with other Systems
- Lighting, Powertrain, Brake, Chassis...
- Smart Car

## Smart Car



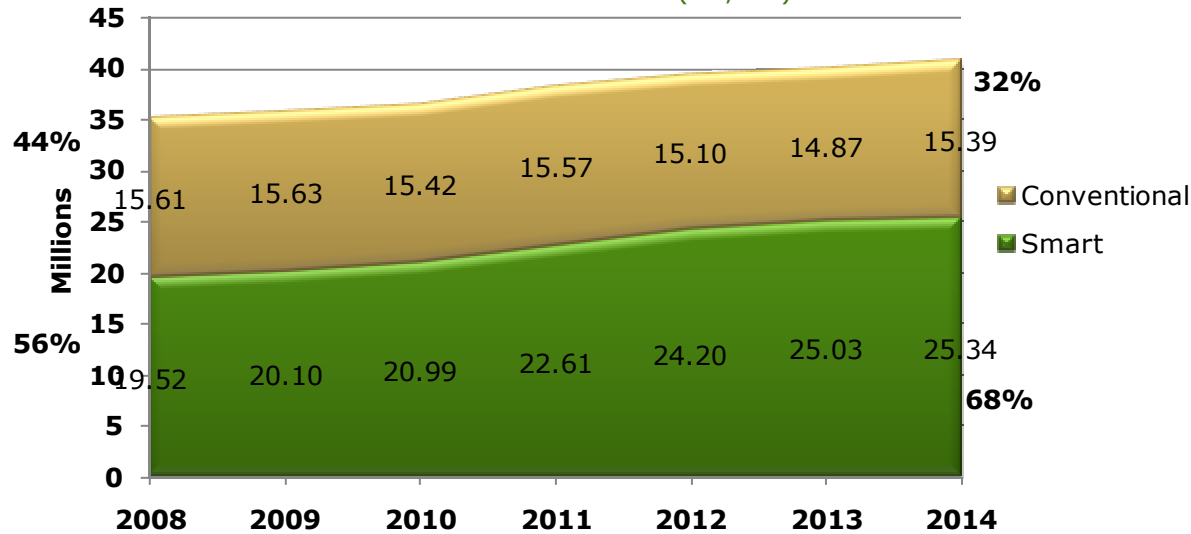
## Global Adaptive Cruise Control Suppliers





## Junction Boxes

Junction Box Market (NA, EU)

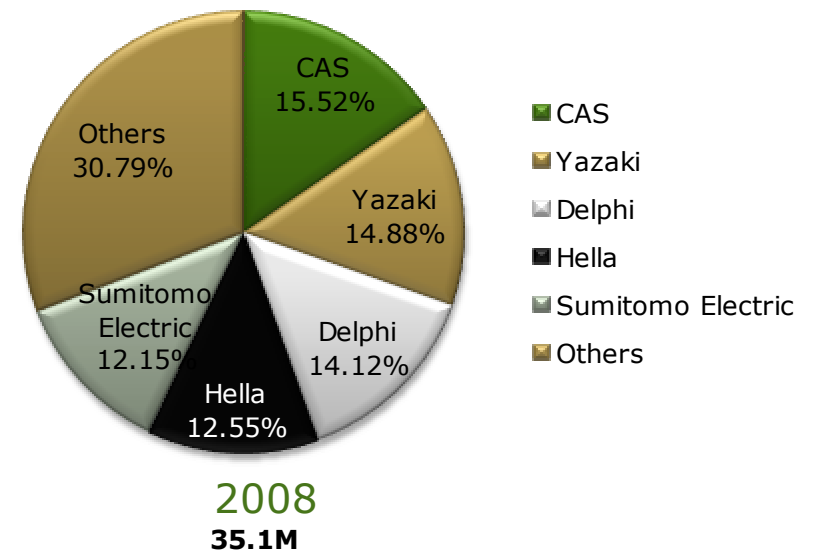


- Smart Junction Boxes
- Merges Controls & Functions
- Reduction of Controllers and Wiring
- Cost, Size, & Weight Savings
- Extra Wiring vs Local Control Units

Smart Junction Boxes



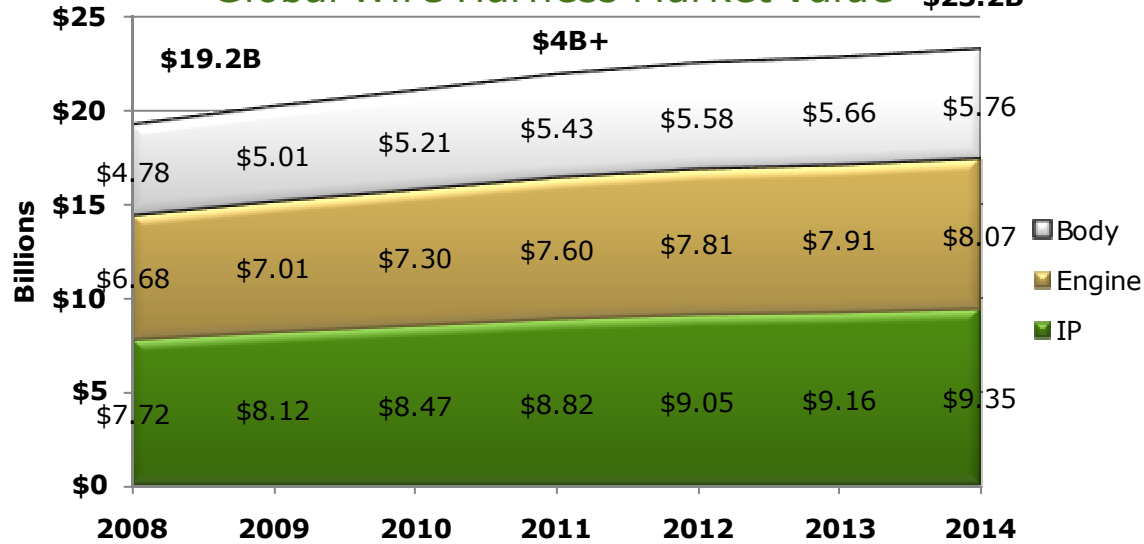
Junction Box Suppliers (NA, EU)





## Wire Harness

Global Wire Harness Market Value \$23.2B

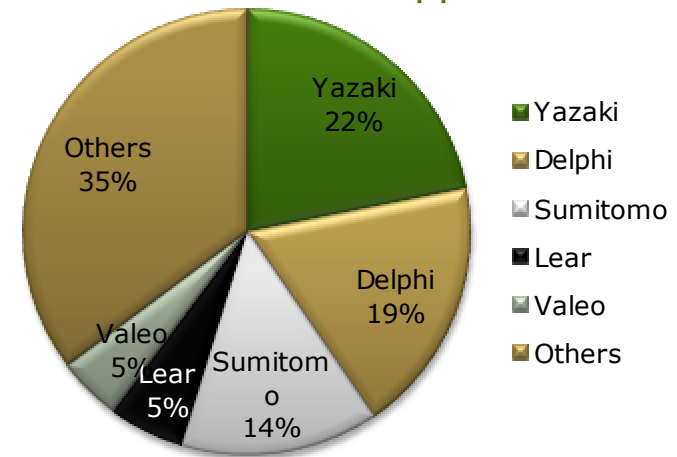


- Manufacturing not Automated
- Labour Intensive/Low-Cost Production
- Electrical Distribution Systems (EDS)
- Content Increase
- Extra Wiring vs Local Control Units
- Wireless & Fiber Optics
- Standards & Security

Wire Harness



Global Wire Harness Suppliers



2008  
194M

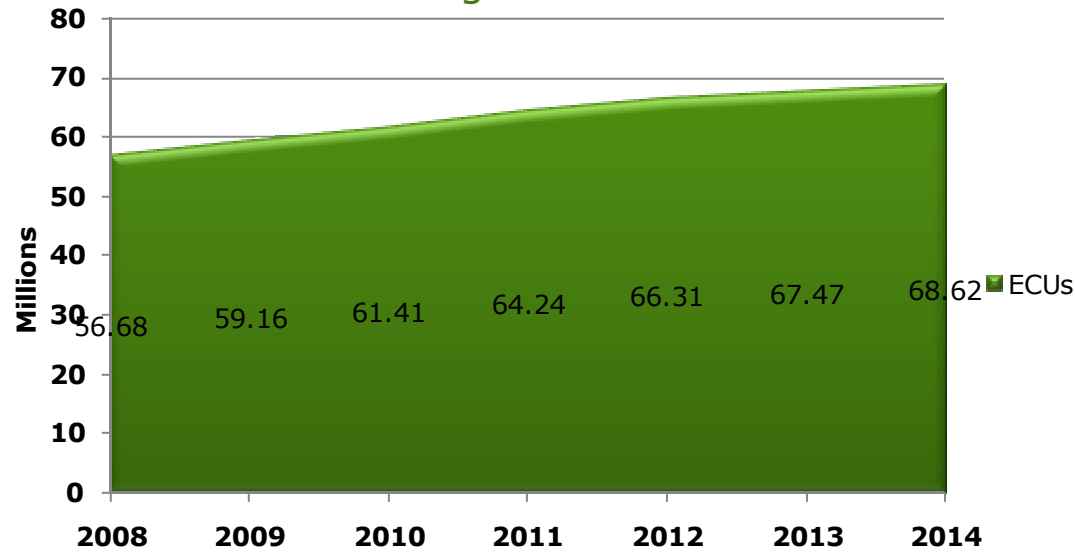
\* Global: EU, NA, JK, CH, S AM, S AS

2008 © CSM Worldwide



## Engine ECU

### Global Engine ECU Market

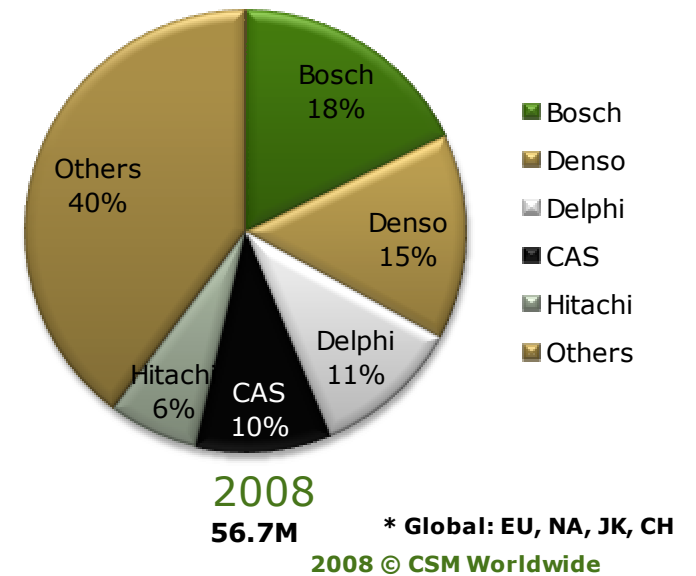


- 50+ ECUs Common
- 20% Transmission ECUs now Separate
- High Requirements vs Cost Effective
- Improved Testing & Simulation
- Extra Wiring vs Local Control Units
- Agreement of Standards
- Open standard for Hardware/Software

### ECUs



### Global Engine ECU Suppliers

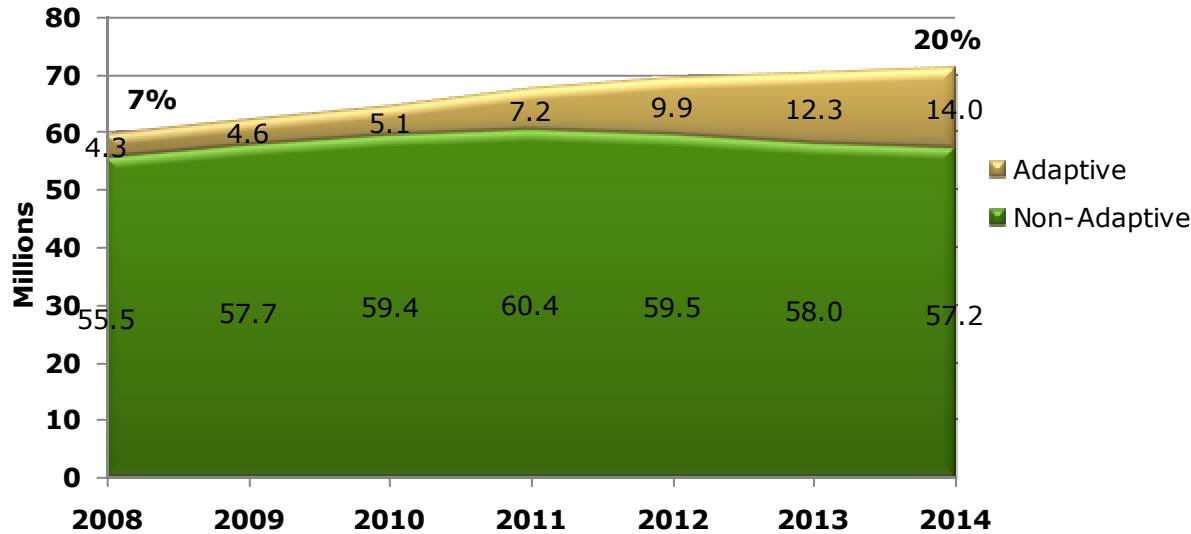






## Forward Lighting

### Forward Lighting Adaptive Type

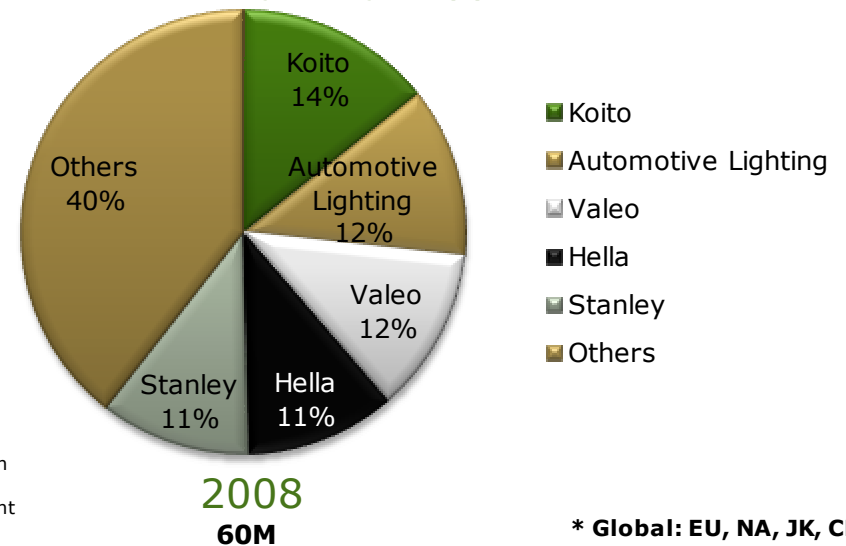


- Adaptive to Grow and Develop
- Automatic Daytime Lamps (DRL)
- Greater adoption of Xenon & LED Styling
- Legislations Impact Technologies
- Night Vision
- Integration with other Systems
- GPS

### Forward Lighting



### Global Forward Lighting Suppliers

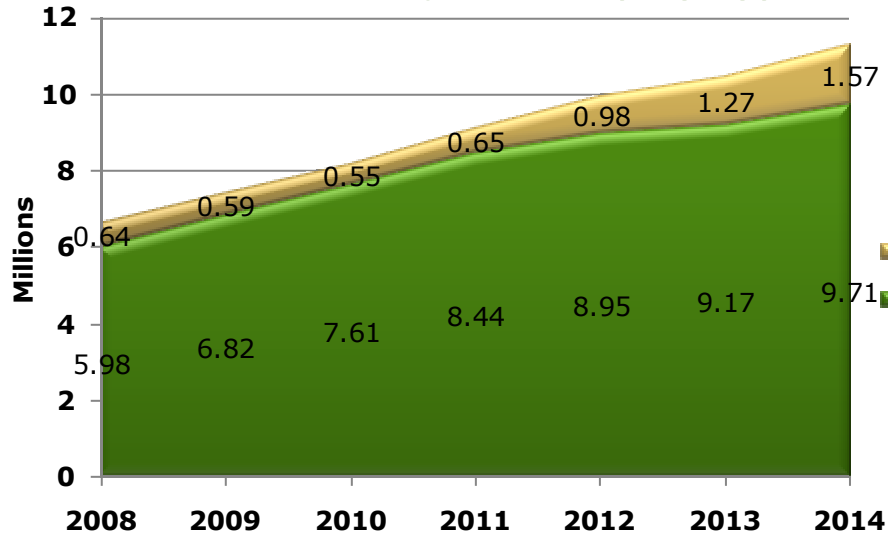


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2008 © CSM Worldwide

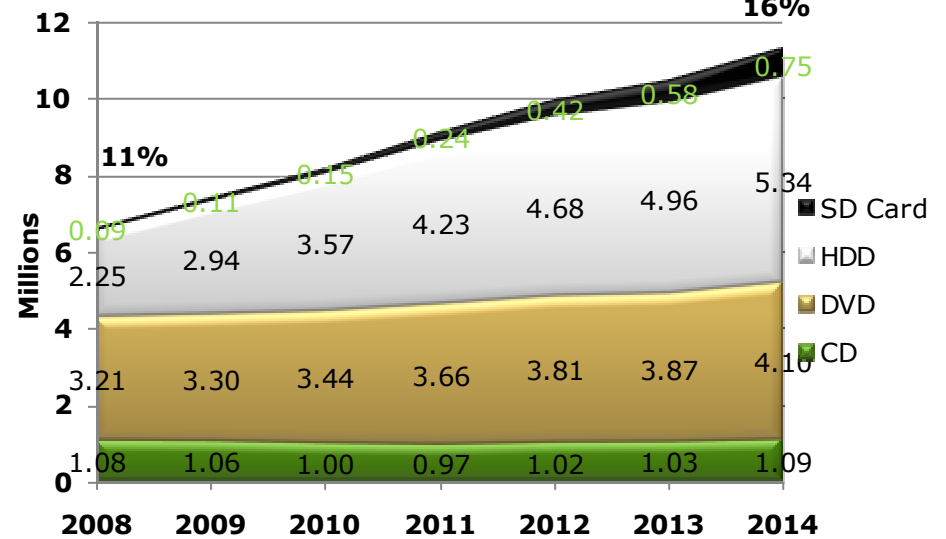


## Navigation

### Global OE Navigation Display Type



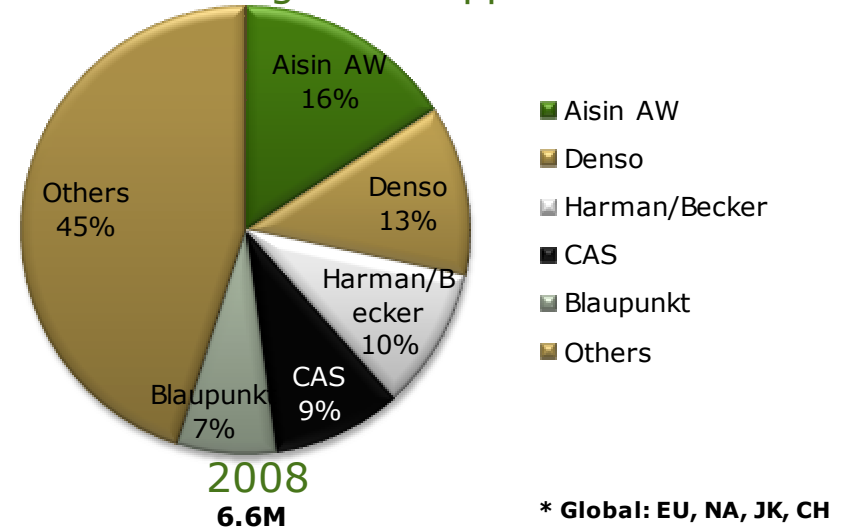
### Global OE Navigation Memory Type



## Telematics



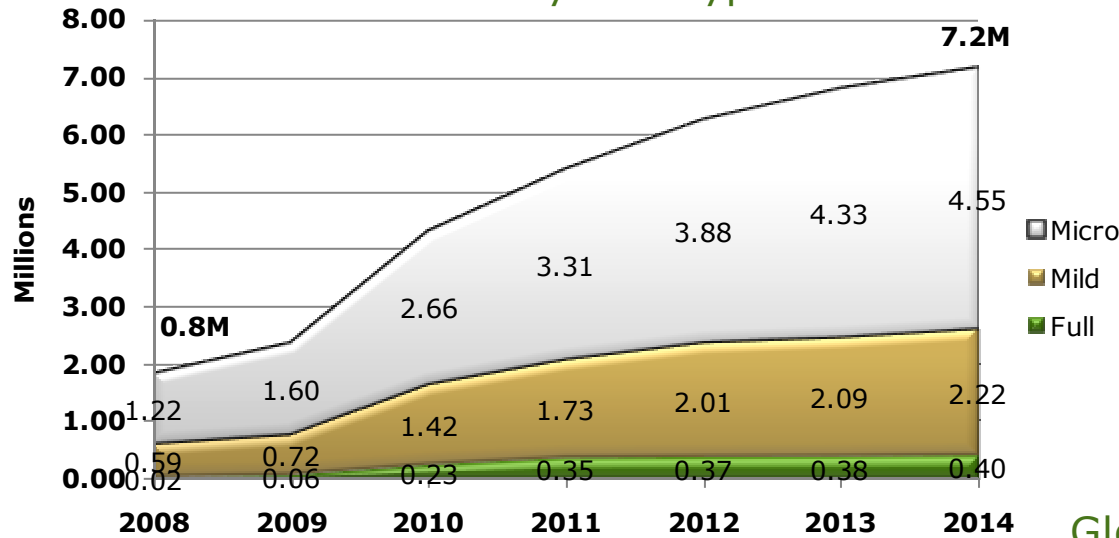
### Global OE Navigation Suppliers





## Hybrids

### Global Hybrids Type



- 120g CO2 per km in 2012
- Green Trend
- Limited Market & Benefits

- Alternative Propulsion
- Alternative Fuels
- Reductions & Efficiencies
- Cost Effectiveness

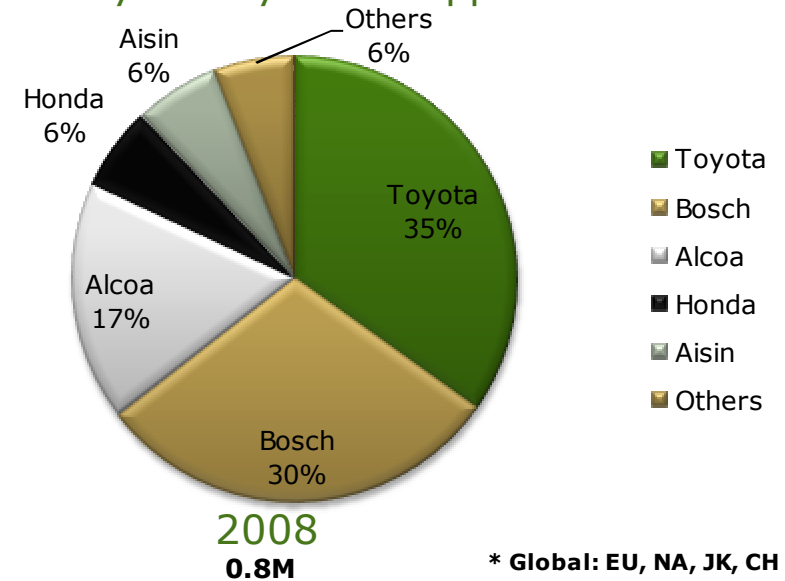
- Powertrain & Driveline
- 42V+

- Effect on other Systems

### Alternative Propulsion Systems



### Global Hybrid System Suppliers

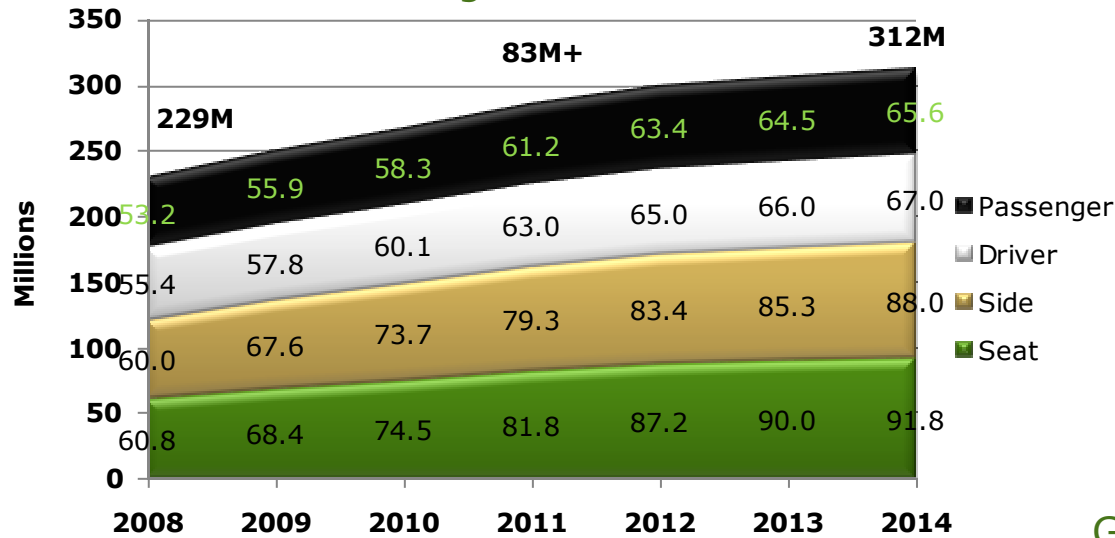


\* Global: EU, NA, JK, CH  
2008 © CSM Worldwide



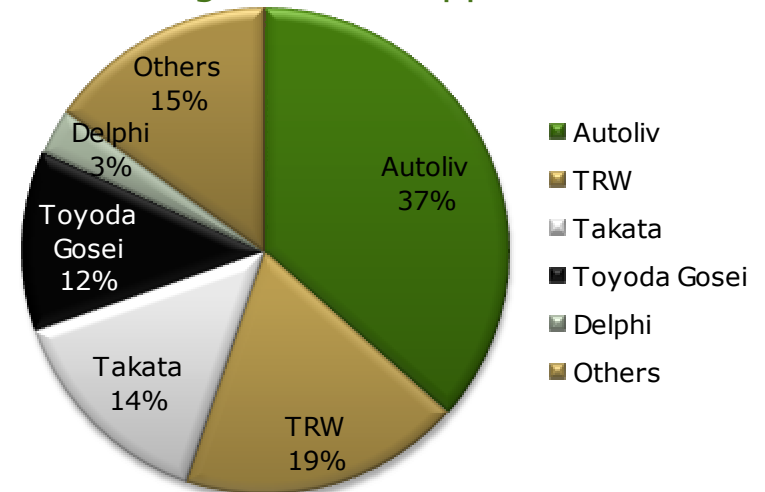
## Airbag Module

### Global Airbag Module Positions



- Passive Safety is a Mature Market
- Content Increase is now Limited
- System Improvement
- NA Legislation Driven
- EU/JK Consumer Driven
- Well Marketed Consumer Trend
- Commodity
- Pedestrian Safety

### Global Airbag Module Suppliers



2008  
236M

\* Global: EU, NA, JK, CH  
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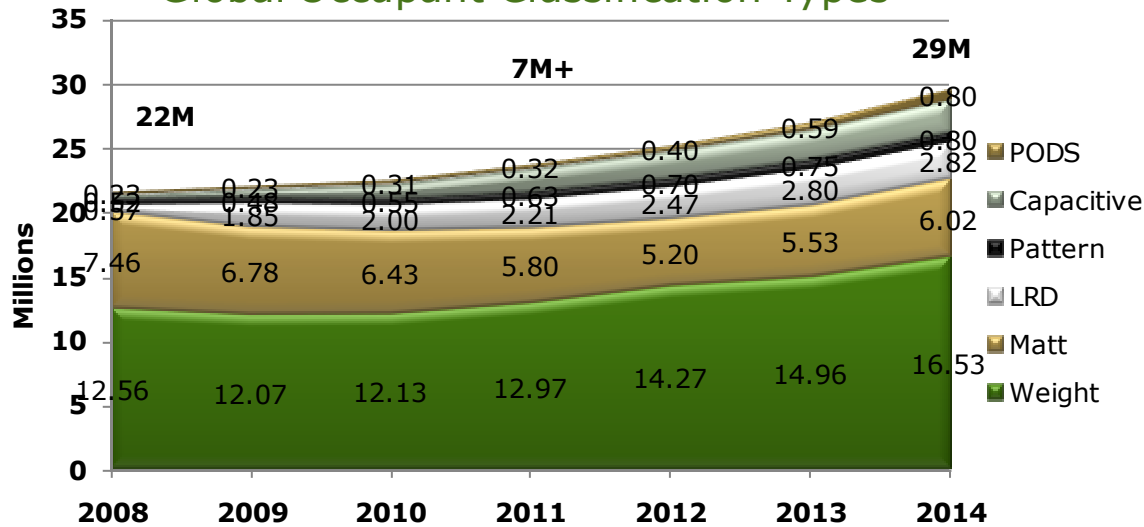
### Passive Safety





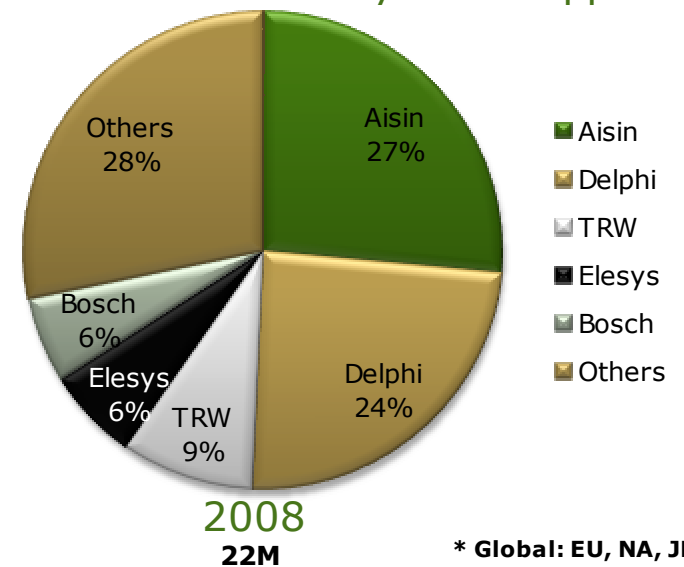
# Occupant Classification

Global Occupant Classification Types



- NA Mandatory
- Low Risk Deployment (cheaper)
- Added Content Value to Passive
- Future of OCS?

Global Occupant Classification System Suppliers



2008  
22M

\* Global: EU, NA, JK

2008 © CSM Worldwide

Passive Safety





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### Highlights

- Automotive industry has mechanical mindset
- Electronics dominated by suppliers in other industries
- Dedicated low-cost vehicle platforms rewrite the rule book
- Standards defined ASAP to continue content growth curve
- Hard to impact established technologies/markets, but not impossible
- Industry obstacles/fears/regulations create opportunities for outsiders
- Cost effective reliable safety systems will be a challenge
- Automotive suppliers have to embrace trends and fears
- Influence consumers/markets with more than just technology
- Maturity ends premium lifecycle and starts commodity lifecycle



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