THE WORLDS OF WORK IN TRANSITION ... FOR THE EUROPEAN AUTOMOBILE INDUSTRY

ETUI CONFERENCE

28 JUNE 2018
CONTEXT AND ISSUES... AT THE EUROPEAN LEVEL IN THE AUTOMOTIVE SECTOR

THE CONTEXT

A recovery of European auto markets and players

STRATEGIC TRENDS

- Strong investments in CAPEX (conception and production digitalization)...
- and in R&D (connected, autonomous and electrified vehicles)

Need of cash

New partnerships
- Be Stronger
- Be more profitable

Fear of being purchased by new powerful entrants from Software, high-tech, GAFA, energy sectors, Asian companies...

NEW ISSUES

Environmental regulations and new powertrain pathways

The Mobility Revolution

New Scheme of Production
THE MOBILITY REVOLUTION EFFECTS

New Scheme of Production

The Mobility Revolution

Environmental regulations and new powertrain pathways
POSSIBLE STABILISATION OF THE EUROPEAN MARKET: DEMOGRAPHIC AND CONSUMPTION EFFECTS

The passenger car market in Western Europe

Cycles do exist... but such a long period of decline (6 years) is rather novel. Moreover, no “return to normal” is expected... contrary to past experience. Demand has been structurally and durably affected.
PWC FORECASTS FOR EUROPE: GROWTH OF CARSHARING BY 2022 AND AUTONOMISATION BY 2025

PWC expects more than 10% of carsharing in 2025 in Europe, a little less than R. Berger (15%). Then 25% around 2030.

PWC anticipates the arrival of Level 4 autonomous vehicles starting in 2022, first on shared vehicles.

By 2030,

- only half of the vehicles would be conventional individual vehicles, according to PWC.
- Autonomous vehicles (L0 to L5) could represent 40% of the market.

## MOBILITY EMPLOYMENT IMPACTS ... PROGRESSIVE CHANGES

<table>
<thead>
<tr>
<th></th>
<th>Production</th>
<th>R&amp;D</th>
<th>Services</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Today</strong></td>
<td>Limited impacts</td>
<td>New services, new technological modules: ADAS, software and connected systems...</td>
<td>Digital tools of commercialization</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Digital &amp; Data engineering, IA, machine learning, Cybersecurity</td>
<td>Decrease of physical dealership networks</td>
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<td>Weight reduction and durability issues</td>
<td>New actors and solutions of mobility services, with limited job content</td>
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<td>Agile organisations</td>
<td>Externalisation of back office activities (call center)</td>
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<td><strong>2022 +</strong></td>
<td>Shared vehicles: new constraints of production</td>
<td></td>
<td>Sales more focused on service provision than on cars per se</td>
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<td></td>
<td>Less Volume</td>
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<td>More electronic components, produced on automated lines</td>
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- **Today**
- **2022 +**

- **Limited impacts**
- **New services, new technological modules**
  - ADAS, software and connected systems...
  - Digital & Data engineering, IA, machine learning, Cybersecurity
  - Weight reduction and durability issues
  - Agile organisations

- **Shared vehicles: new constraints of production**
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- **More electronic components, produced on automated lines**
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THE ELECTROMOBILITY REVOLUTION:

- Environmental regulations and new powertrain pathways
- New Scheme of Production
- The Mobility Revolution
ELECTRIFICATION... STRONG INCERTAINTY ON THE PATH & DIVERSIFICATION STRATEGIES

The differences in forecasts between analysts remain substantial... even for 2025!

For now, the main actors diversify their powertrain offers to be prepared to the market evolutions, and before a potential technological convergence in the mid term.

Variance of forecasts for 2025
FUNCTIONAL DEVELOPMENT: ELECTRIC VEHICLE

More added value:
- Electric charger
- Electrical distribution
- Controller
- Electronics
- Electrical wiring
- ECU
- Transmission
- Engine cooling

Less added value:
- Fuel Tank
- Gearbox
- Combustion engine
- Fuel system
- Turbo
- Exhaust system
- Emission control
- Air filter

New:
- Battery
- Electrical motor
- Converter
- Inverter
- PWT battery cooling
- Recharging interface

Disappeared:
### POWERTRAIN EMPLOYMENT IMPACTS: DIVERSE AND CONTRADICTORY DYNAMICS

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<tr>
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<th>Production</th>
<th>R&amp;D</th>
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<tbody>
<tr>
<td><strong>Today</strong></td>
<td>Implementation of EURO 6d-temp – new equipment;</td>
<td>A lot of work for powertrain teams (test + norms adaptations)</td>
</tr>
<tr>
<td></td>
<td>Limited hybrid impacts on assembly activities (but complexity, intensity of work)</td>
<td>Mobility (diesel/gasoline), diesel decline</td>
</tr>
<tr>
<td></td>
<td>Limited volumes of BEV, low productivity</td>
<td>Emergence of EV/FCEV teams + adaptation of all the vehicle functions to an electrical architecture</td>
</tr>
<tr>
<td></td>
<td>More Gasoline/Less Diesel Volumes</td>
<td>Diversified powertrain solutions (Full electric, Hybridized, Thermal)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>divestiture (volunteer departure; partnerships; externalisations...)</td>
</tr>
<tr>
<td><strong>After 2021</strong></td>
<td>More BEV volumes</td>
<td>Decline of ICE projects</td>
</tr>
<tr>
<td></td>
<td>Depends on the speed of electrification and the share of hydrids (MHEV, PHEV, FHEV)</td>
<td>More EV/FCEV projects</td>
</tr>
<tr>
<td></td>
<td>Depends on the battery production contribution</td>
<td>New R&amp;D domain (next generation of battery, quantum computing...)</td>
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<tr>
<td></td>
<td>New strategic suppliers (batteries), but shorter supply chain</td>
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DIGITALISATION OF THE PRODUCTION SYSTEM

The world(s) of work in transition in the European Automobile Industry – SYNDEX – 28 June 2018 – ETUI Conference, Brussels

DIGITALISATION OF THE PRODUCTION SYSTEM

#3

Environmental regulations and new powertrain pathways

New Scheme of Production

The Mobility Revolution
DIGITALISATION OF THE PRODUCTION SYSTEM: HIGH POTENTIAL FOR PRODUCTIVITY

Adapted from Etude Industrie 4.0, Les leviers de la transformation, Gimelec, septembre 2014

- Increased protection for production systems linked to the internet
- Long life cycles for products and technologies

Cloud Computing
- Customer loyalty
- Flexibility
- Personalization and productivity
- Production tailored to demand

Cybersecurity
- Increased protection for production systems linked to the internet
- Long life cycles for products and technologies

Big Data
- Dealing with complexity
- Creativity
- Collaborative production

Remote maintenance
- Cyber-physical system
- Numerical control (complete automation, interconnected systems, communication between machines)

Predictive maintenance
- Cyber-physical system
- Numerical control (complete automation, interconnected systems, communication between machines)

Plant
- Zero defects
- Reactivity
- Tracability
- Forecasting

Capteurs
- Zero defects
- Reactivity
- Tracability
- Forecasting

Advanced production systems
- Real time, autonomy, productivity
- Reporting transparency

Cobot/Exo
- Real time, autonomy, productivity
- Reporting transparency

Robot
- Real time, autonomy, productivity
- Reporting transparency

Automated forklifts
- Flow optimization
- Safety
- Costs

Internet of things
- Object marking
- Object-internet communication via low-frequency radio waves
- Real-time data collection
- Stock optimization
- Waste reduction

Future resources
- Green, renewable energy
- Energy storage
- Alternative raw materials

Suppliers
- Integrated supply chain
- Interconnected systems
- Total coordination

Connected logistics
- Integrated supply chain
- Interconnected systems
- Total coordination

3D printing
- Reduced losses
- Mass personalization
- Rapid production of prototypes

Nano-electronics
- Intelligent products
- Connectivity

Customer
- Connected
- Personalization
- Green, renewable energy

Future resources
- Energy storage
- Alternative raw materials
## STRONG PRODUCTIVITY IMPACTS TO COME... IN PRODUCTION AND R&D

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<th>Today</th>
<th>Production</th>
<th>R&amp;D</th>
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<tr>
<td></td>
<td>Robotization in production lines and logistic activities</td>
<td>Automatization of some Development activities (Ex. Numerical Test/ Physical)</td>
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<td></td>
<td>Evolution of production support team</td>
<td>New tools and ways of development (virtualization, PLM, built to print...)</td>
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<td>New organisations</td>
<td>New organisational setup (interdisciplinarity, more coordination between vehicle functions, data valuing)</td>
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<table>
<thead>
<tr>
<th>Not generalize yet</th>
<th>Production</th>
<th></th>
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<tbody>
<tr>
<td></td>
<td>Connected systems of production</td>
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<td></td>
<td>Predictive Maintenance</td>
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<td></td>
<td>Smart equipments</td>
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<td></td>
<td>More technicity to assist connected plants</td>
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</tbody>
</table>
CONCLUSION
## COMBINED EFFECTS: LESS AND DIFFERENT JOBS

<table>
<thead>
<tr>
<th>Volumes</th>
<th>Production</th>
<th>R&amp;D</th>
<th>Services</th>
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<tbody>
<tr>
<td>Stagnation and risks on export’s volume</td>
<td><img src="Image" alt="Decrease" /></td>
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<tr>
<th>Electrification</th>
<th>Production</th>
<th>R&amp;D</th>
<th>Services</th>
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<tr>
<td>Simplification of production</td>
<td><img src="Image" alt="Decrease" /> <img src="Image" alt="Recycle" /></td>
<td><img src="Image" alt="Increase" /> <img src="Image" alt="Recycle" /></td>
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<th>Mobility</th>
<th>Production</th>
<th>R&amp;D</th>
<th>Services</th>
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<tbody>
<tr>
<td>Fewer, but more autonomous and connected cars</td>
<td><img src="Image" alt="Decrease" /> <img src="Image" alt="Recycle" /> <img src="Image" alt="Increase" /> <img src="Image" alt="Recycle" /></td>
<td><img src="Image" alt="Increase" /> <img src="Image" alt="Recycle" /> <img src="Image" alt="Increase" /> <img src="Image" alt="Recycle" /></td>
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<th>Industry of the Future</th>
<th>Production</th>
<th>R&amp;D</th>
<th>Services</th>
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<td>Much improved productivity</td>
<td><img src="Image" alt="Decrease" /> <img src="Image" alt="Recycle" /> <img src="Image" alt="Increase" /> <img src="Image" alt="Recycle" /></td>
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BUILT THE MEANS TO « PIVOT » TO NEW FUTURE PATHS ... FOR COMPANIES AND FOR WORKERS

Anticipation

Diversification

Time to change

Concertation

Workers Capabilities and Potential

Reconversion out of Auto.

Technical Mobility

Transversal Skills

Polyvalence

Milestones of the transition

Which future path?
Some initiatives on jobs and skills management and planning

- **Skills and capability Observatory:**
  - A way to follow the adequation between needs and resources

- **Critical jobs identification & Construction of dynamic career paths:**
  - 3 years vision of the needs job by job
  - Comparison to the job resources
  - Identification of critical skills
  - Identification of a "vivier" of employees interested and able to muter to critical jobs
  - Construction of training path

- **Scenario Projections:**
  - What could be the future?
  - The products/services associated?
  - The skills needed
  - Built trainings

**For Syndex:**
- Complex environment => necessity to imply workers before changes
- Share prospective scenarios
- Training, necessary but not sufficient
- Simulate the new contexts of work

**Diversification & Concertation process through social dialogue:**
- A joint committee (with management and union reps)
- To identify potential of diversification with regard to the collective skills of the site
- To ensure the implementation of employee mobility to new projects
LINKS
MORE INVESTMENTS: GROWTH OF CAPEX AND R&D

Investment dynamic for the main European OEM (in M€)

R&D dynamic for the main European OEM (in M€)
## EXPLOSION OF PARTNERSHIPS

<table>
<thead>
<tr>
<th>Electrification</th>
<th>Battery</th>
<th>Autonomous v.</th>
<th>Connected v.</th>
<th>Cybersecurity</th>
<th>Autonomous ride hailing</th>
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<tr>
<td>Daimler/Renault on thermal engine and electrical motors (Smart)</td>
<td>Toyota/ Panasonic (JAP)</td>
<td>BMW+Intel/ Mobileye+Delphi</td>
<td>Microsoft, Ericsson, Huawei partnerships with OEM</td>
<td>Thales with several OEM</td>
<td>Uber/ Daimler-FCA-Volvo</td>
</tr>
<tr>
<td>Nissan/ E.ON on vehicle-to-grid services and renewable energy projects</td>
<td>GM/ Honda</td>
<td>Waymo(Google)/ JLR</td>
<td>Argus/ Ericsson</td>
<td>Uber/ Toyota</td>
<td></td>
</tr>
<tr>
<td>Suzuki/ Toyota on EVs for the Indian Market</td>
<td>BMW/ Solid Power (US)</td>
<td>Continental/ Nexteer</td>
<td>Honeywell/ Lear Corporation</td>
<td>Uber/ Waymo</td>
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<tr>
<td></td>
<td>CATL (CH)/ VW, Daimler, BMW or PSA...</td>
<td>Apple/ VW</td>
<td>Hyundai/ Cisco</td>
<td>Lyft/ Aptiv-BMW</td>
<td></td>
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<tr>
<td></td>
<td>VW/Google R&amp;D (US)</td>
<td>OEM/ startups</td>
<td>NTT/ Toyota</td>
<td>Lyft/ Magna</td>
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</tbody>
</table>

- In parallel:
  - acquisitions/ critical mass and/ or securing new competences (e.g., PSA-Opel or Magna-Getrag...)
  - Outsourcing/ disengagement: classic vehicle functionalities
## COMBINED EFFECTS

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<td><img src="image6" alt="Icons" /></td>
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<tr>
<td>Productivity</td>
<td><img src="image7" alt="Icons" /></td>
<td><img src="image8" alt="Icons" /></td>
<td><img src="image9" alt="Icons" /></td>
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