Implementing a Global, Modular HIL Strategy for Automotive Electronics

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Executive Summary

1. PSA Overview 2015
2. PSA Challenges
3. Integration & Verification
4. PSA - IPG partnership
PSA Groupe - Overview 2015

At 31 December 2015

**EUROPEAN LEADER**

- in terms of CO₂ emissions: 104.4g of CO₂/km
- Largest car maker in Europe with 11.5% of the market

**EUROPE LEADER**

- in light commercial vehicles: 184,107 employees worldwide, 19.5% of the market

**REVENUE**

- 2,973,000 vehicles sold worldwide
- In Europe: 62.7%
- Outside Europe: 37.3%
- 2015: 54.7 Bn€

**EMPLOYEES**

At 31 December 2015 (including Française de Mécanique Sevel Nord)

- Number of Employees by Subsidiary Worldwide:
  - Total: 184,107
  - Faurecia: 85,218
  - Banco PSA Finance: 2,511
  - Other businesses: 330
  - Automotive: 96,048

- Number of Employees by Region:
  - France: 79,324
  - Rest of Europe: 59,676
  - Rest of the World: 45,105
PSA Challenges

Connected Services

Alternative Powertrain

Autonomous Car

ADAS KPIs:
• 100 functions / 2000 signals
• 60 ECUs in a EEA on several networks
• 300-350 components for diversity management
• Safety requirements: 100 Functional hazardous events with Gravity 4, of which 40 ASIL C&D
Integration & Verification Platform – Development Cycle

- **MIL** (Mock-up, Integration, Loop)
- **SIL** (Software-in-the-Loop)
- **HIL** (Hardware-in-the-Loop)
- **VIL** (Vehicle-in-the-Loop)

**Prototyping**

- Use Cases Database

**Use Cases**

- **Database**
- **Early System tests (1st ECU HW and SW samples)**
- **Systems integration tests (Serial HW and SW)**

**Integration Tests**

- **HIL-IVP**
- **Vehicle environment Simulation**

**System Tests**

- **HIL Unitary Tests**
- **Vehicle environment Simulation**

**Prototyping**

- **Virtual ECU Simulation**
- **Vehicle environment**

**Systems integration tests (Serial HW and SW)**
Integration & Verification - Platform (IVP)

**IVP V3:**
- Automated Test Engine
- Synchronized functions activations
- Error handling: DTC injection

**IVP V2:**
- ECU Model if ECU is missing
- Data Storage and analysis tool

**IVP V1:**
- HIL: ADAS functions coverage
- Interfaces with Unitary test Benches

**IVP V0**
- All ECUs present
- Modular construction
- HIL: Engine's environment simulation

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**MOTION**
- Engine

**CORE**
- Steering
- Brakes

**COCKPIT**
- Perception
- Screens
- HMI

**OPTIONS**
- Lightings
- Alarm

Complete HIL System
Open Software Platform

Software **Compliance** with National Instruments real time target

**PSA feed back experience** into Drive Line and Perception ECUs simulation
IPG : Expected

IPG : PSA supplier for new ECU HIL solution

IPG Skills :
- Agility
- Cheap
- Audacious (Solutions with high added value for the customer)

Partnership to reach an Autonomous vehicle in compliance with ISO 26262 norm.
Integration & Verification Platform – Business Impact

Car Prototypes reduction by ~30%

Tests Bench use time increase by 100%

Early HW and SW validation (1st samples)
- Early Bug fix
- Time-to-Market reduction

Reuse IVP structure for new vehicle project
Thank you for your attention

See you soon on our brands stands