1DayInR&D

An experience of FCA Research & Development activities and labs

Summary

A program of lessons and laboratories introducing the automotive research and development activities to university students.

The program is composed by two sessions. The first is dedicated to the presentation of the vehicle development and manufacturing processes and of the main objectives of the automotive research in the coming years. The second session consists of seven thematic workshops, focusing on: safety, aerodynamic, electromagnetic compatibility, engine and transmission, materials, cooperative and wearable robotics and additive manufacturing. Students can choose one of six proposals and deepen a phase of R&D process in close contact with the engineers and technicians of FCA and CRF.

Through the illustration of the automotive research topics and the experience of an industrial environment, 1DayInR&D aims to encourage an assessment of students' professional aspirations.

Program

- **Plenary session – Politecnico di Torino, Sala Consiglio di Facoltà**
    - Description of FCA product development process.

- **Experimental session – FCA & CRF Labs in Turin and Orbassano**
    - 1 lab selected by the student among the following proposals:
        - Crash FEM analysis;
        - Computational fluid dynamics;
        - Electromagnetic compatibility;
        - Powertrain development;
        - Smart materials;
        - Cooperative and wearable robotics;
        - Additive manufacturing.
    - The attendance is limited according to the facility.

Lab description

Crash FEM analysis	
Location	FCA Safety Center, Via F. Coppi, 2 – Orbassano (TO)
Duration	4 hours
Participants	12
Program	• Basic overview of current finite element (FE) solver and model for crash applications. • Pre-processing: example of FE model definition and set-up for full-vehicle simulation (from CAD to mesh, materials and properties, welding and connections, boundary conditions, barrier and impactors models). • Solving phase (analysis submitting on high performance computer server and monitoring). • Post-processing. • Physical test on high speed crash track. • Expected results and physical comparison.

Computational fluid dynamics	
Location	FCA Safety Center, Via F. Coppi, 2 – Orbassano (TO)
Duration	8 hours
Participants	15
Program	• Aerodynamic and climatic wind tunnel overview. • Climatic wind tunnel visit. • Aerodynamic wind tunnel visit. • Aerodynamic CFD simulation.

Electromagnetic compatibility

Location	CRF EMC Mirafiori Labs, C.so Agnelli, 220 (Gate 7) – Torino
Duration	4 hours
Participants	10
Program	⬩ Operating condition and susceptibility criteria. ⬩ Test bench setup. ⬩ Measurement execution. ⬩ Measurement data management. ⬩ Reporting.

Powertrain development

Location	CRF Powertrain facilities, Strada Torino, 50 – Orbassano (TO)
Duration	4 hours
Participants	30
Program	⬩ Introduction to powertrain technologies evolution. ⬩ Pollutants formation mechanism, control and laboratory measurement techniques. ⬩ Testing facilities experience (dynamic engine test bench, roller chassis dynamometer).

Smart materials

Location	CRF Smart Materials Labs, Corpo 1 - Corso Settembrini 40 – Torino
Duration	4 hours
Participants	10

Program	• Realization of conductive and piezo-resistive polymers through laser treatments.
	• Electrical measurements on conductive coupons.
	• Electromechanical test on functionalized polymers (test bench setup, measurement execution).

Cooperative and wearable robotics	
Location	CRF C&WR Labs, Strada Torino, 50 – Orbassano (TO)
Duration	4 hours
Participants	8
Program	• Definition of testing condition and evaluation criteria for human machine interaction. • Test configuration setup. • Measurement execution. • Measurement data management and analysis. • Work cell configuration and test case analysis of human robot collaboration. • Test configuration setup. • Test execution and observation analysis. • Discussion and evaluation of results.

Additive manufacturing	
Location	FCA Prototypes - Porta 33 - Via Biscaretti di Ruffia 90/A – Torino
Duration	4 hours
Participants	15
Program	• Introduction to Additive Manufacturing technologies and materials.

- Additive manufacturing process: from data preparation to production to post processing.
- Focus on metal Additive Manufacturing.
- Visit to Additive Manufacturing facilities.