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## Internship Offer

### **The Delphi group:**

Delphi is a leading global supplier of electronics and technologies for automotive, commercial vehicle and other market segments. Operating major technical centers, manufacturing sites and customer support facilities in 32 countries, Delphi delivers real-world innovations that make products smarter and safer as well as more powerful and efficient. Connect to innovation at [www.delphi.com](http://www.delphi.com)

### **Project Description:**

The student project is to benchmark the CAE integration performance of AVL FIRE in combination with ESE Diesel meshing and the DOE package for the investigation of interaction between gas flow organisation, nozzle layout, spray targeting, and piston bowl geometry design. The final target is to develop a robust and automated workflow for engine combustion performance analysis and system optimisation.

### **Major Responsibilities:**

Evaluation of engine combustion and emission prediction capability using various level of model complexity in CFD

Establish an automatic workflow including geometry design, mesh generation, simulation, post-processing, and analysis and benchmark the performance of simulation automation

Application of the FIRE DOE package to investigation of the interaction between piston bowl geometry and nozzle layout and spray targeting.

After the internship period, a Master thesis project on related field can be offered.

### **Project Deliverables:**

Robust workflow for FIRE engine simulation based on high degree of CAE integration

Obtain fundamental understanding on how to optimize the combustion system under various engine specifications and operating conditions.

### **Desirable Qualifications:**

#### **Required:**

Strong background in thermodynamics and engine combustion

Have fun in CFD, meshing, and programming

Good skills in CAD software SolidWork , or Catia V5

Ability of team work, logic reasoning, self organisation, and self-driving working

Fluency in English

#### **Preferred:**

Experience with engine simulation or with commercial software, e.g. AVL FIRE, Converge, ANSYS CFD, ICEM-CFD

Experience in engine system analysis

### **Project Location:**

Bascharage / Luxembourg

**CONTACT :** *Dr.-Ing. Junmei Shi , Simulation Team Leader , AICC / [junmei.shi@delphi.com](mailto:junmei.shi@delphi.com)*

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## **Project Description:**

The student project is to perform a global response surface analysis on the influence of nozzle design parameters on the nozzle hydraulic performance. Tasks include CAD model generation, model parameterization, process automation including meshing, simulation set-up, and post-processing, and finally response surface analysis. An automated workflow is existing, but is expected to be improved within this work. The project can be divided into an internship phase and a Master thesis phase.

## **Major Responsibilities:**

Improve the existing workflow, carry out best-practice study for the numerical investigation  
Identify the key influencing parameters and establish corresponding response surfaces

## **Project Deliverables:**

A robust workflow for nozzle design parameter global sensitivity analysis  
Systematic understanding on the influences of nozzle design parameters

## **Desirable Qualifications:**

### **Required:**

Very strong skills in CAD software SolidWork or Catia V5  
Very good basis in Fluid Mechanics, CFD, Thermodynamics  
Strong interest and good skills in programming: e.g. C, Matlab,, Shell script, Python....  
Ability of team work, self organization, and strong analysis skills and results orientation  
Fluency in English

### **Preferred:**

Experience with ICEM / ANSYS Workbench mesh generation  
Experience with CFD code, e.g. ANSYS Fluent / CFX

## **Project Location:**

Bascharage / Luxembourg

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### **Project Description:**

The student project is to investigate the nozzle flow, spray, and mixing of pilot injection both under room temperature and hot engine conditions. A moving needle simulation approach for the nozzle flow (ANSYS Fluent / AVL FIRE) is available and a coupled approach for nozzle flow and spray are available for this investigation. The project can be divided into an internship phase and a Master thesis phase.

### **Major Responsibilities:**

Carry out best-practice study for the numerical investigation; Develop routines for simulation tool integration between Fluent and FIRE Measurement data analysis, simulation validation, and injection parameter study

### **Project Deliverables:**

A simulation approach including model coefficients suitable for capturing pilot spray and mixing  
Understanding on pilot injection, pilot spray and mixing under various conditions

### **Desirable Qualifications:**

#### **Required:**

Very good basis in Fluid Mechanics, CFD, Thermodynamics  
Strong interest and good skills in programming: e.g. Python, C, Matlab, ....  
Good skills in CAD software SolidWork, Catia V5  
Ability of team work, self organization, and strong analysis skills and results orientation  
Fluency in English

#### **Preferred:**

Experience with ICEM / ANSYS Workbench mesh generation or FIRE meshing  
Experience with CFD code, e.g. ANSYS Fluent / CFX / AVL FIRE  
Ideally can work on the development project for 10 months or above

### **Project Location:**

Bascharage / Luxembourg

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