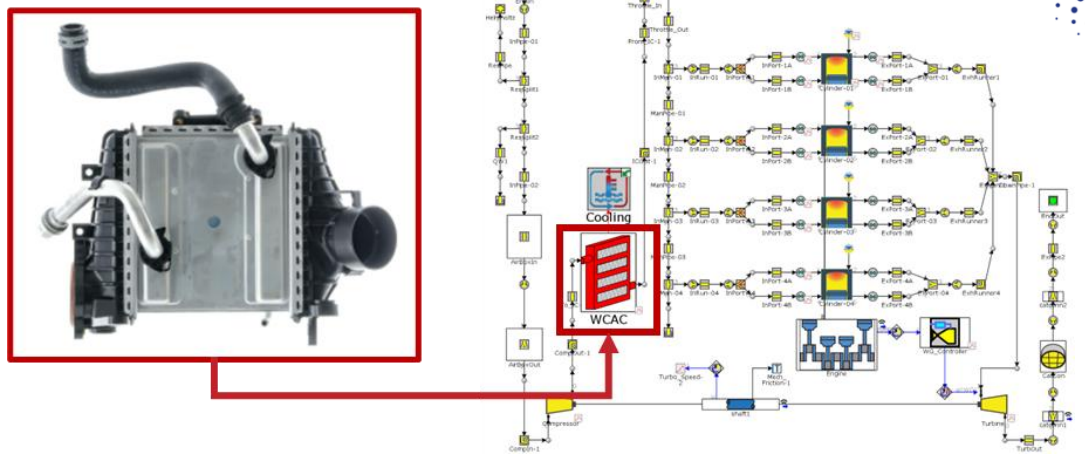
1D Simulation Analysis of Charge Air Water Condensation in Water-Cooled Intercoolers in GT-SUITE

- Supporting companies: **GammaTech Engineering** (GTE) | **STELLANTIS**

- Start date: March 2026
- Project duration: 6-8 months
- Site:
  - GTE's offices in Turin
  - Possible visits to STLA headquarters
- Compensations: Meals, travel expenses



- Motivations and Project Scope:
  - Automotive manufacturers have adopting 1D system simulation tools to support feasibility studies, cost reduction, and system-level optimization during early development stages.
  - Among the phenomena requiring deeper investigation is the condensation of water vapor contained in the charge air, which has been repeatedly observed in turbocharged engines equipped with water-cooled intercoolers (WCAC). Under specific operating conditions, charge air condensation may lead to potentially critical effects on engine operation, including misfire events, corrosion of ducts, sensors, and the heat exchanger itself, and, in severe cases, engine hydrolock.
  - Within this framework, the thesis activity will focus on a detailed 1D simulation analysis of condensation of water trapped in charge air using the GT-SUITE simulation environment. The developed model may be further coupled with a GT-POWER engine model, enabling system-level analyses for passenger vehicle applications.