

Automated GT-SUITE Methodology for Vehicle HVAC/Refrigerant System Engineering

■ Supporting companies: **GammaTech Engineering** | **Ford Motor Company**

- ❑ Start date: TBD
- ❑ Project duration: 6÷8 months
- ❑ Site:
 - GTE's offices in Turin
- ❑ The outcomes of this Master Thesis project may be suitable for presentation at a technical conference. Any decision regarding external dissemination of the results will and can be made solely by Ford at a later stage.
- ❑ The confidentiality level of the project deliverables will be defined by Ford. Depending on Ford's requirements and preferences, the thesis report and final presentation may be classified as confidential, with access restricted accordingly.
- ❑ Motivations and Project Scope:
 - Develop a methodology within GT-SUITE to **automatically address a defined vehicle HVAC/refrigerant-system engineering task** (e.g., component selection, control strategy definition, or model calibration). This class of engineering tasks currently relies on manual, iterative evaluation, which is time-consuming and does not systematically guarantee optimal performance and consistency across the full range of operating conditions. The specific application will be defined once the final thesis topic — among three candidate areas — is selected.
- ❑ Thesis proposal:
 - Build a structured model/parameter set for the selected system and **characterize the relevant properties** (e.g., component curves, control parameters, or calibration coefficients) for use within the GT-SUITE model.
 - **Develop a GT-Automation procedure** to run the model automatically across the library of candidates or across a representative set of operating conditions.
 - **Define quantitative metrics** to characterize system performance and stability (e.g., oscillation amplitude, settling time, tracking error) for each candidate configuration.
 - Implement a screening and **optimization/ranking algorithm** to identify the configuration providing the best trade-off between performance and stability across representative operating conditions.
 - **Validate the selected configuration** against experimental or reference data, and assess applicability of the method to other system architectures or programs.

