

Development of a 1D CFD Models to Predict the Engine-Out Emissions in High-Performance Internal Combustion Engines



- **Supporting company:** Ferrari Spa - Know How Department
- **Start date:** March 2026
- **Project duration:** about 6-8 months
- **Site:** PoliTO (possible visits to Ferrari Plant in Maranello for Face-to-Face Meeting)

Motivations

- Given the increasingly stringent emission limits, the development process of new high-performance internal combustion engines must consider the emission minimization in addition to the performance enhancement. In this context, 1D CFD simulation tools play a key role since they represent an effective trade-off between physical fidelity and computational efficiency. As a result, this thesis activity aims at developing a GT-SUITE model capable of estimating engine-out emissions of a high performance turbocharged V8 engine.



Project Goals:

- **Literature Review** on available approaches to model emissions and post-oxidation phenomena 0D/1D environment.
- Analysis of the **experimental data** for the tested engine
- Critical analysis of the **predictive capabilities** of the base 1D CFD model of the tested engine
- **Calibration & Validation** of the emission and post oxidation models on the experimental data of a tested engine → main goal is to separate the contribution of combustion and post-oxidation phenomena

