Development of a GT-SUITE Torsional Dynamic Model of a Hypercar Driveline

- Supporting companies: **GammaTech Engineering | Bugatti-Rimac**

- Start date: September 2026
- Project duration: 6÷8 months
- Site:
  - GTE's offices in Turin
- Compensations: Meals, travel expenses
- Motivations and Project Scope:
  - Modern hybrid hypercar drivelines experience **significant torsional excitation** from high engine or motor torque, rapid speed changes, gearshifts, clutch engagement, traction-control events, and wheel–road interactions.
  - These excitations can cause multiple **NVH, durability and drivability challenges**.
  - To address these problems, a complete system-level model is required because the engine, clutch or motor coupling, transmission, differential, driveshafts, wheels, tires, and vehicle inertia interact dynamically.
- Thesis Proposal:
  - Thesis objective is to develop and validate a reduced-order torsional dynamic model, used to identify critical resonances, quantify torsional vibration transfer paths, assess various transient load cases, and evaluate design modifications for improved NVH and durability performance.
  - Linear modal and frequency-response analyses will be used to identify natural frequencies, dominant modes, and excitation-order crossings. Non-linear time-domain simulations will subsequently simulate representative events such as acceleration, launch, gearshift, and traction changes.
  - Finally, simulation results will be correlated with available measurements, followed by sensitivity and optimization studies for parameters such as damper tuning, shaft stiffness, and torque-control strategy.
  - All the modeling activities **will be carried out using the latest AI tools** embedded in GT-SUITE.