GAMMA TECHNOLOGIES

GT-SUITE

Integrated Multi-Physics System Simulation

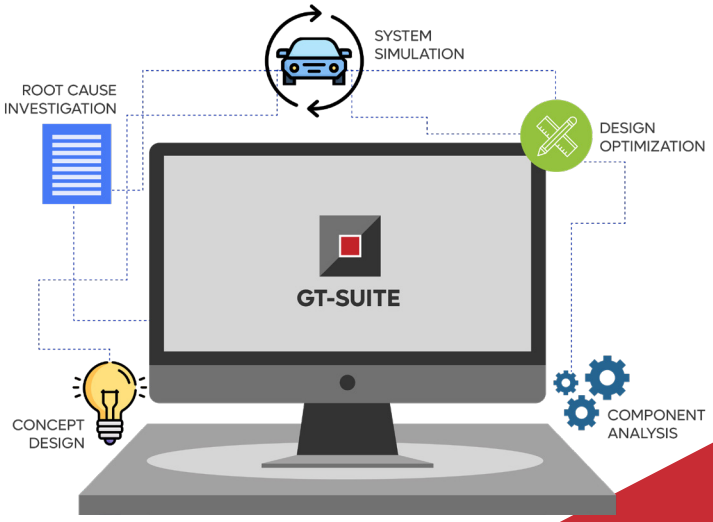
GT-SUITE Introduction

GT-SUITE is the market-leading CAE system-level simulation platform, designed for building models of physical systems, assembling them from rich libraries of available components.

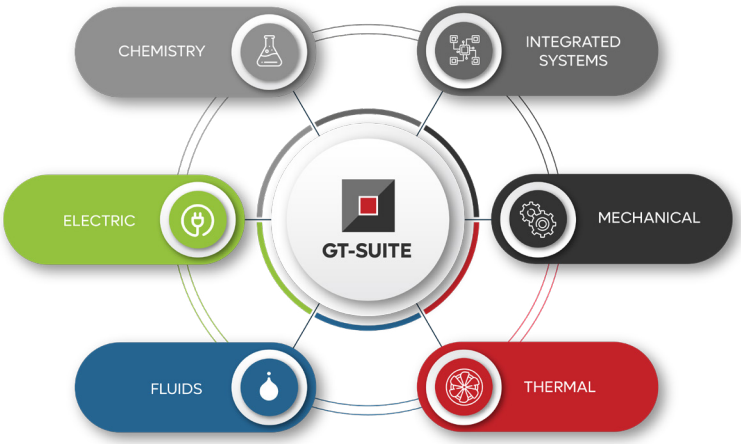
GT-SUITE has set the standard in system simulation through its:

- broad multi-physics capabilities
- deep modeling of physics for high level of predictivity and accuracy
- fusion of 1D system modeling with 3D detailed analysis
- data management for large scale models, shareable across the enterprise
- flexible productivity tools
- strength of the team backing the product

GT-SUITE (which contains GT-POWER) has its roots in decades of involvement with the automotive industry, where it is used by all leading OEMs and suppliers. Today it is broadly used also in off-highway vehicles, aerospace, marine and rail, power generation and industrial machinery industries.



All Physics Libraries with GT-SUITE:



The foundation of GT-SUITE is a versatile multi-physics platform for constructing models of general systems based on many underlying fundamental libraries:

- Flow library (any fluid, gas or liquid or mixture)
- Acoustics library (both non-linear and linear)
- Thermal library (all types of heat transfer)
- Mechanical library (kinematics, multi-body dynamics, frequency domain)
- Electric and Electromagnetic library (circuits, electromechanical devices)
- Chemistry library (chemical kinetics)
- Controls library (signal processing)
- Built-in 3D CFD and 3D FE (thermal and structural)

Advanced Features:

Fast solver makes simulations of large systems practical	Distributed computing	DOE and optimization
Fusion of 1D and 3D simulation in one tool	Imports solid models from CAD to create 1D and 3D models	Performs embedded 3D CFD and 3D FE thermal/structural modeling

Industries supported by GT-SUITE:

Automotive

Truck & Commercial Vehicles

Off Highway & Heavy

Aerospace

Marine & Rail

Industrial Machinery

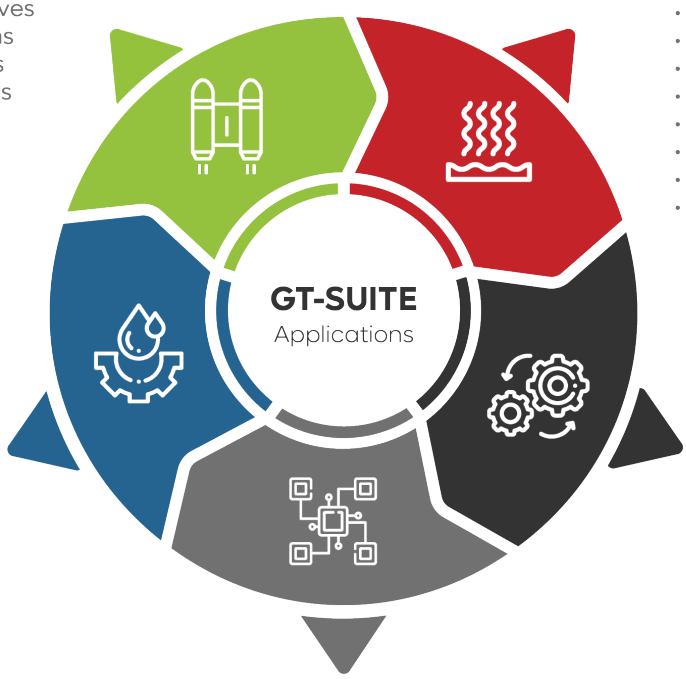
Power Generation

HVACR

GT-SUITE Applications:

Propulsion Systems

- Engine Modeling (GT-POWER)
- Electric Machines and Drives
- Combustion and Emissions
- Cylinder Pressure Analysis
- Intake & Exhaust Acoustics
- Exhaust Aftertreatment
- Real-Time Engine
- Battery Modeling
- Fuel Cell System



Thermal Management

- Vehicle Thermal Management
- Battery Thermal management
- Electric Machines & Drives
- Powertrain Cooling
- Air Conditioning & Heating
- Cabin Comfort
- Waste Heat Recovery
- Environmental Control Systems
- Water Heaters

Fluid Flow Systems

- Hydraulics & Fuel Injection
- Detailed Pumps & Compressors
- Lubrication
- Friction & Tribology
- Bearings, EHD
- EVAP & Carbon Canister Modeling

Multi-Body Mechanics

- 3D Vehicle Mechanics
- Transmissions
- Drivetrain
- Valvetrain
- Cranktrain
- Timing and Auxiliary Drives

Integrated Systems

- Lubrication
- Real Driving Scenarios with GT-RealDrive
- Vehicle Modeling Framework
- Performance, Fuel Economy and Emisions
- Hybrid and Electric Vehicles
- Energy management
- Control, MiL, SiL, and Hil
- Co-Simulation with xLINK

GT Products & Apps:

ELECTRICAL BATTERY
GT-AutoLion

THERMAL/FLUID /HVAC
GT-SUITE-RT
GT-TAITherm
GT-CONVERGE

ENGINE
ACT
GT-POWER-xRT

ROUTE/VEH DYNAMICS
GT-RealDrive
GT-Vehicle3D

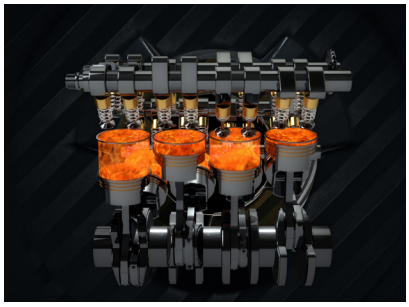
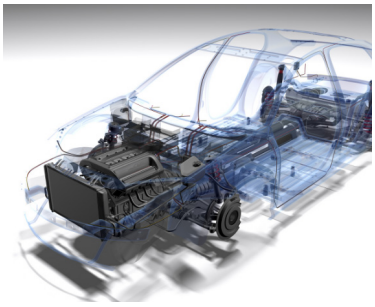
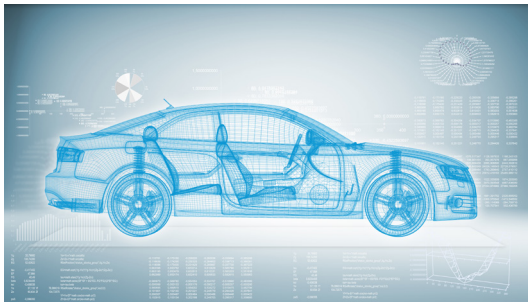
MECH/NVH
GT-3DMBD
GT-3DMBD Machinery
GT-3DMBD Advanced Tribology
GT-3DMBD Vehicle Dynamics

MODEL AUTOMATION
GT-Automation
GT-Play

Fusion of 3D into 1D:

The power to integrate 3D components into 0D/1D system simulation is a unique feature of GT-SUITE, enabling users to account for physics in 3 dimensions when required. To this end GT-SUITE utilizes built-in 3D modelers and solvers, such as:

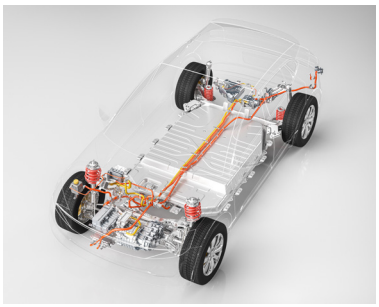
- 3D Thermal FEA for distribution of heat in complex 3D component geometries (with a built-in mesher)
- 3D Non-Linear Structural FEA for calculation of stresses and deformations in structures
- 3D Multi-Body Dynamics for modeling any types of mechanisms (rigid or FE flexible)
- 3D Flow for fluid flow with built in GT components or with Converge-Lite (from CSI)
- 3D Electro-Chemistry for 3D electro-chemical and thermal effects within battery cells

Whether the physics will be solved in 1D or 3D, powerful pre-processing tools are provided with GT-SUITE to directly build models from 3D CAD geometry, saving significant time and providing peace-of-mind that the resulting model is an accurate representation of the real geometry.

Electrification and Battery Simulation:





To model electrically powered machinery, there is a full library of basic electric components, motors, generators, batteries, power electronics, solenoids, and …….(add here) From these, one can build models of all types of electromechanical systems, including electrified vehicles, to study their performance and thermal management.

GT-SUITE also contains AutoLion, the industry-leading Lithium-ion battery simulation solution. AutoLion predicts performance and aging for any Lithium-ion chemistry under any operating condition. Designed for use by cell designers or OEMs, it is exceptionally fast, to make reliable predictive battery simulations a reality, from thermal runaway analysis to complete driving cycle simulations.

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