REALIS

Accelerating high efficiency engine development for the future

Simulation software for fast, repeatable, predictive design results

Saving time and reducing expensive hardware testing

WAVE | WAVE RT | VECTIS | IGNITE | ENGDYN | VALDYN

FEARCE | FEARCE | PISDYN | RINGPAK | SABR | FAST

/ Fluid Dynamics
/ Structural Mechanics
/ Systems Engineering
/ Application Engineering

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Accelerating Possibilities

WAVE: High fidelity 1D CFD engine modelling

Predicts engine performance, gas dynamics, combustion, emissions, acoustics and thermal behaviour

- Reduces development time with rapid construction, tuning and simulation of accurate 1D engine models
- Supports engine performance, combustion, emissions, acoustics and thermal analysis using validated physical models
- Enables automated meshing, calibration, post-processing, scripting and 1D/3D CFD co-simulation workflows

Applications

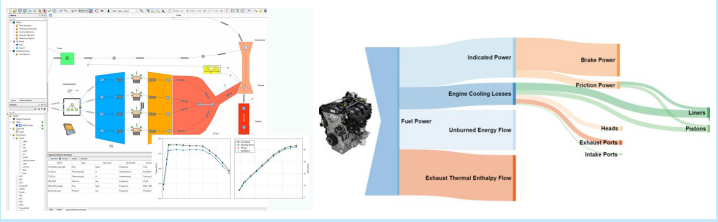
Engine performance and gas dynamics simulation

Combustion, emissions and aftertreatment analysis

Intake, exhaust and acoustic optimisation

Thermal analysis and cooling system inputs

1D/3D CFD co-simulation with VECTIS



WAVE-RT: Real-time 1D CFD engine modelling

Delivers faster-than-real-time engine models for virtual calibration, controls and system simulation

- Reduces calibration time by generating real-time engine plant models from calibrated WAVE simulations
- Supports MiL, SiL and HiL workflows for controls development, validation and ECU integration
- Enables system-level simulation of drivability, diagnostics, OBD and digital monitoring applications

Applications

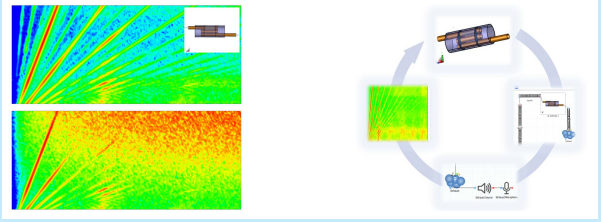
Virtual calibration and controls development

MiL, SiL and HiL engine simulation

ECU strategy validation and integration

Drivability, diagnostics and OBD development

Real-time engine models for vehicle system simulation



VECTIS: 3D CFD engine design and thermal analysis

Predicts in-cylinder combustion, fluid flow and thermal behaviour to optimise ICE design and heat management

- Reduces CFD model build time with automated meshing for complex geometries and moving boundaries
- Supports combustion, spray, emissions and thermal analysis using advanced solvers and physics models
- Enables efficient workflows with automated set-up, parametric analysis, post-processing and 1D/3D integration

Applications

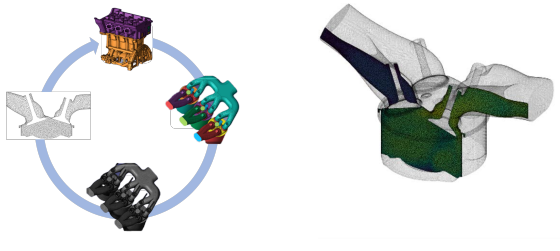
In-cylinder spray and combustion simulation

Intake, exhaust and fluid system optimisation

Engine and vehicle thermal management

Conjugate heat transfer and transient thermal analysis

CFD results export for FE thermal analysis



IGNITE: Complete vehicle system modelling

Models complete vehicle systems faster than real time, optimising performance, economy and emissions

- Reduces development time through rapid simulation of conventional, hybrid, electric and novel vehicle architectures
- Systems-level modelling of engine, transmission, driveline, electrical, controls, thermal and aftertreatment systems
- Supports drive-cycle, mission-profile and energy-flow analysis with Modelica libraries and integrated post-processing

Applications

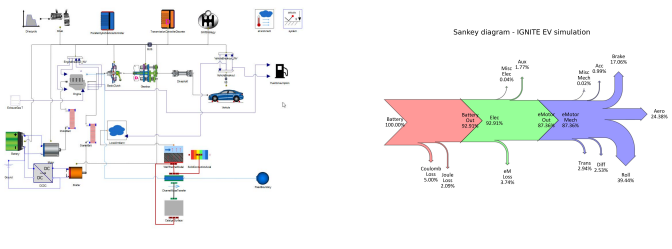
Complete vehicle system modelling

Drive-cycle simulation and virtual calibration

Performance, fuel economy and emissions prediction

Emissions aftertreatment systems modelling

Mission profile and energy flow analysis



ENGDYN: 3D cranktrain dynamics analysis

Predicts cranktrain loads, displacements, dynamic behaviour, for bearing, durability and NVH design

- Reduces development time by simulating crankshaft, block, bearing and connecting rod dynamics
- Calculates cranktrain loads and displacements for downstream FE structural durability analysis with FEARCE
- Supports bearing, crankshaft, block, connecting rod and NVH studies using 3D engine system analysis

Applications

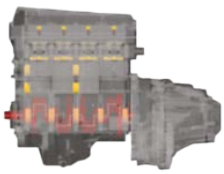
Crankshaft stress, fatigue and durability analysis

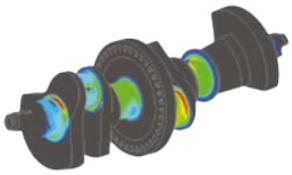
Bearing load, lubrication and durability studies

Cylinder block and powertrain structural loading

Connecting rod static and dynamic analysis

Engine structure-borne and radiated noise prediction





VALDYN: Multi-body system dynamics analysis

Predicts mechanism loads, displacements, dynamic behaviour for valvetrain, drive, engine-system design

- Reduces model build and simulation time using engine-focused building blocks and fast solvers
- Calculates cranktrain loads and displacements for downstream FE structural durability analysis with FEARCE
- Supports valvetrain, chain, belt, gear and engine-system studies with flexible FE components

Applications

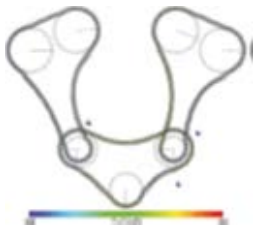
Valvetrain kinematic and dynamic analysis

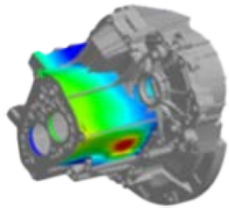
Chain and belt drive dynamics

Gear system dynamics and refinement studies

Complete engine-system modelling

Flexible FE component displacement and stress recovery





FEARCE: FE modelling for vehicles and powertrains

Automates FE model assembly, loading, solution and post-processing for structural, thermal, durability, NVH

- Reduces pre- and post-processing time by automating assembly, connectivity, load application and results evaluation
- Improves repeatability and traceability of complex FE workflows across design iterations and variants
- Supports structural, thermal, durability and NVH studies with links to major third-party FE solvers

Applications

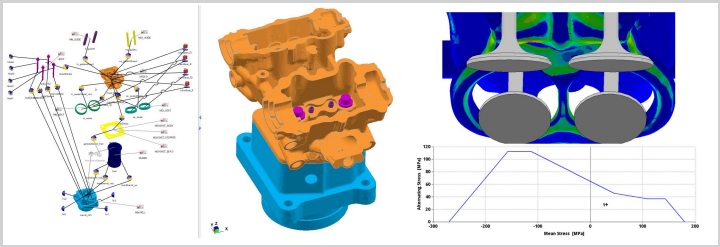
FE model assembly and load application

Thermal boundary condition mapping and analysis

Solution set-up and post-processing

Durability and fatigue analysis

NVH vibration and acoustic prediction



FEARCE-Vulcan: Thermal analysis for IC Engines

Predicts IC engine thermal loading, component temperatures for durability, efficiency, emissions

- Reduces time and testing costs by predicting power cylinder temperatures before hardware is available
- Uses iterative FE thermal analysis to calculate heat paths, boundary conditions and thermal deformation
- Supports rapid assessment of design variants across multiple conditions without requiring full CFD analysis

Applications

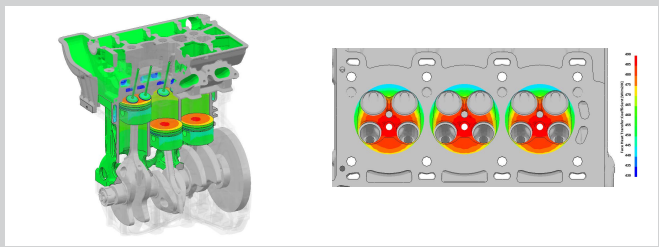
Power cylinder thermal analysis

Prediction of piston, liner, head and valve temperatures

Thermal boundary condition generation for FE models

Boundary conditions for thermal deformation, durability

Thermal modelling for efficient, lower emission engines



PISDYN: Advanced dynamic piston simulation

Predicts piston liner dynamics, lubrication, mechanical interactions to optimise engine-cycle performance

- Reduces development cost and time by replacing extensive physical testing with predictive simulation
- Minimises friction, wear and scuffing risk to improve engine efficiency and durability
- Enables optimisation of piston design for NVH and performance across real operating conditions

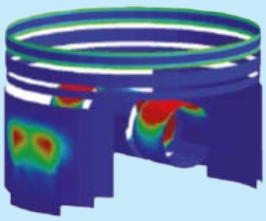
Applications

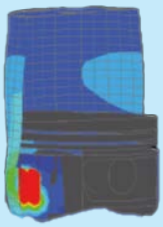
Optimisation of piston geometry

Investigation of lubrication behaviour and oil supply conditions

Analysis of piston slap, vibration, and secondary motion

Study of wear, scuffing and durability under varying engine loads and speeds





RINGPAK: Advanced dynamic ring pack simulation

Predicts ring pack behaviour, lubrication and gas flow to optimise sealing performance and oil consumption

- Reduces costly engine testing by accurately predicting oil consumption and blow-by
- Predicts trade-offs between friction, oil consumption and sealing performance
- Identifies root causes of performance issues and evaluates design changes with multi-case simulations

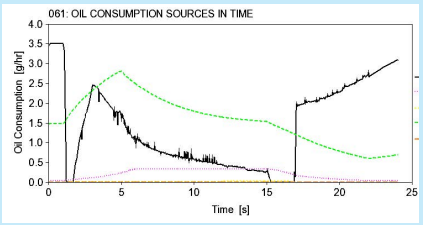
Applications

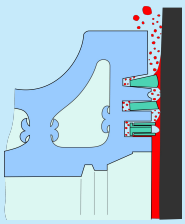
Optimisation of ring pack design and configuration

Oil consumption and oil transport analysis

Blow-by and sealing performance studies

Transient engine operation and duty cycle simulations





SABR: Shaft, gear and bearing concept design

Provides a fast, easy-to-use concept tool for transmission design and optimisation

- Enables detailed analysis of bearing, shaft and gear systems to support design refinement
- Reduces expensive physical durability testing by simulating all or part of the transmission system
- Supports manual, DCT, automatic, EDU and hybrid transmission architectures with rapid multi-case analysis

Applications

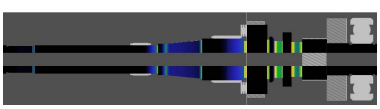
Shaft system design and fatigue analysis

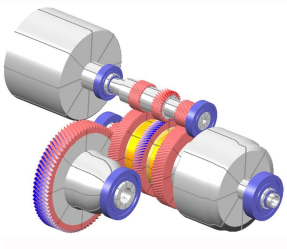
Bearing selection, rating and misalignment studies

Gear micro-geometry and Tooth Contact Analysis (TCA)

Integrated TCA to minimise transmission error

Transmission efficiency and power loss mapping





FAST: Rapid engine friction prediction

Predicts complete engine friction, supporting early performance, efficiency, calibration decisions

- Reduces development time by predicting whole-engine mechanical friction from limited design and operating data
- Identifies friction contributors across rings, skirt, bearings, valvetrain, drives, auxiliaries, windage and pumping losses
- Generates friction maps and FMEP inputs for performance simulation, virtual calibration and architecture comparison

Applications

Complete engine friction and FMEP prediction

Engine architecture comparison at concept stage

Friction target setting for engine development

Interpretation of motored teardown test results

Friction maps for performance analysis and virtual calibration