STERN TECHNOLOGIES

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3D-CFD Simulations for your Industry

Energy & Infrastructure

Piping, pressure loss reduction, worst case scenario simulation, ATEX certification, pumps, incinerator, pressure storage, water/gas turbines, sewerage systems

HVAC

Thermal management, heat pumps, fresh air venitlation

Medical Industry

Laboratory equipment, blood vessels, hemodynamic variables

Production & others

Dryer, kilns, valves, stirrer, tank filling/ emptying/sloshing, wind turbines, vacuum cleaner, mowers, electronics

Aerospace

Drones (e.g. stability), turbines, thermal comfort in cabines

Building & Construction

Thermal comfort, moistness prevention, air/smoke distribution, fire breakout/extinguishing

Automotive

Aerodynamic optimization, radiator design, cooling of battery, engine, fuel cell, thermal comfort in cabine

Maritime

Propeller/ thruster optimization, cavitation prevention, hull shape

Evidence for certification processes

Technical reports for CE, ATEX, PED, IMO, IEC, MDR, *Eco-Design*, DIN EN 16798/ LEED

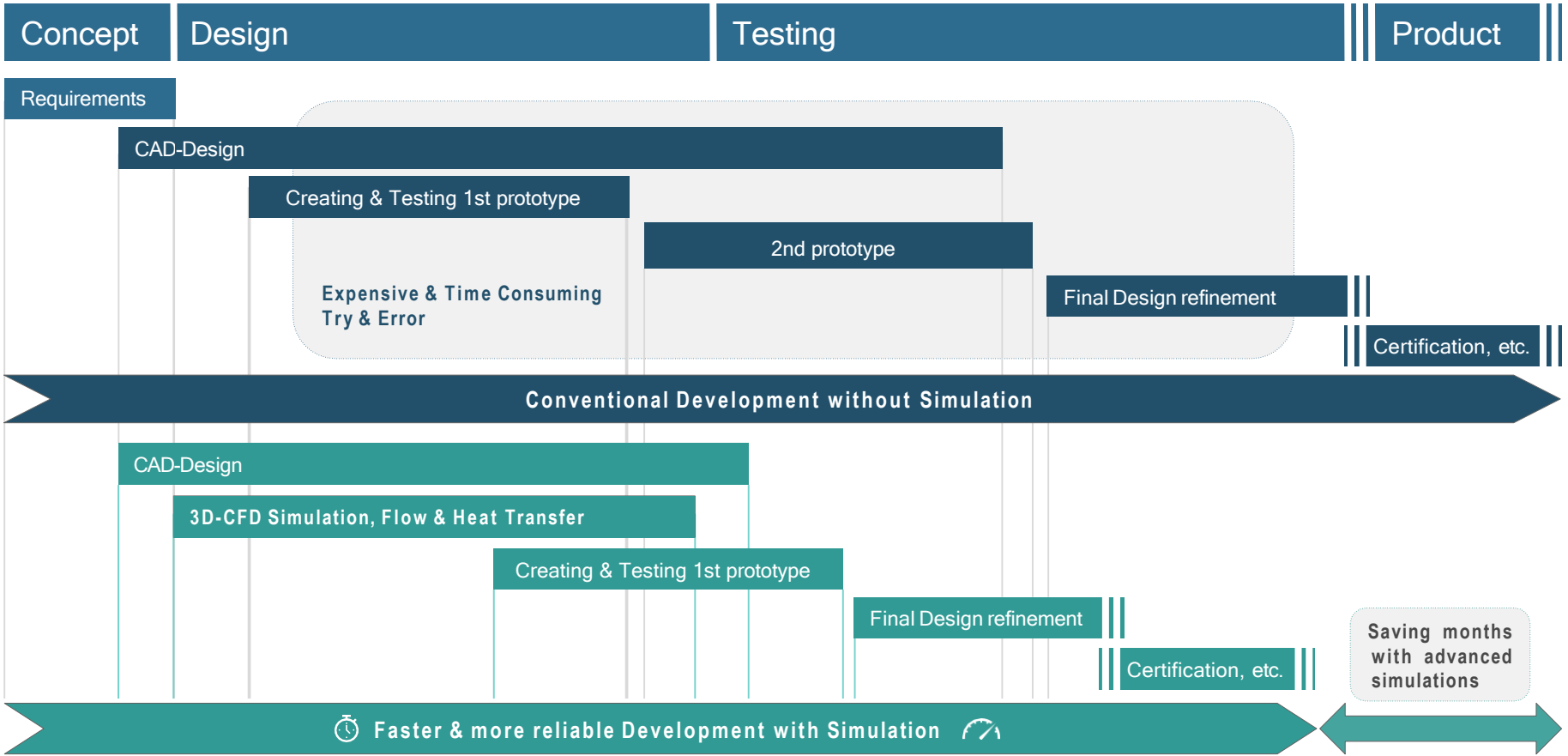
Cost reduction
Prototype testing is reduced, avoiding expensive revisions

Safety
Risks are identified and eliminated early through simulations

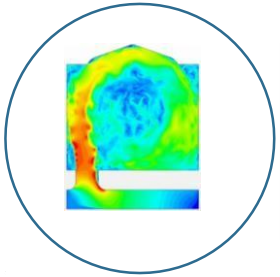
Efficiency
Designs are optimized to be energy-efficient and resource-conserving

Traceability
Clear & reliable data for certification bodies

Why simulation? Faster Development!

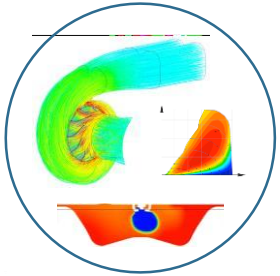


Our core Competencies



3D-CFD Simulation

>10 years experience in flow & heat simulations: mixing of fluids, pressure loss analysis, air-liquid-solid interaction, moving parts, combustion, cooling

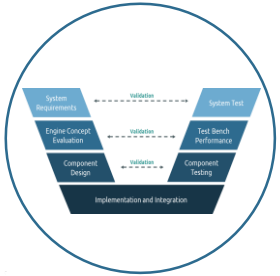


3D-CFD Simulation for complex applications

Turbines, compressors, pumps, incinerators, engines, drones, cavitation, fire/ smoke spreading

Rapid Prototyping

CAD-Design, Re-Engineering, 3D-printing, lightweight design, rendering



Systematic Innovation

Product improvements analysis & revealing, methods for innovative product design & compliance with regulations/ certifications

Internal Combustion Engine & Turbo Charger System

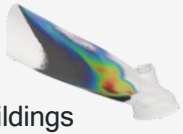
Conventional & renewable fuels, Hydrogen, Ammonia, Methanol

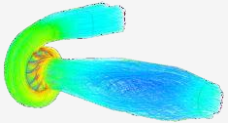
Predictive Models for Sales

Reduction of experiments & simulations, quick decision making tools for Sales

Detailled fields of expertise

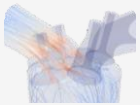
Computational Fluid Dynamics 3D-CFD





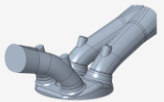

- ✓ **Mixing of Fluids:** Homogenization, stirrer, smoke distribution in buildings
- ✓ **Cooling/ Heat Transfer:** Drying, heat exchanger, hot spot detection, ventilation system in buildings
- ✓ **Combustion:** Exhaust gases distribution, emissions, pressure/ temperature rise
- ✓ **Aerodynamics:** Drones (flow stability), vehicles, wind turbines (IEC 61400 certification support)
- ✓ **Liquids & gases:** Cavitation at Marine propeller (IMO), aerosol distribution, condensation
- ✓ **Fluid-Solid Interaction:** Water turbines, stress simulation in Hydrogen valves
- ✓ **Lubrication:** Gear Box, dry sump lubrication
- ✓ **Internal Flow:** Valves, pumps, tanks (filling, emptying, sloshing), pressure storage (PED 2014/68/EU)
- ✓ **HVAC:** Heat pumps, fresh air ventilation analysis, *TGA-Planer* support
- ✓ **Certification support:** CE, ATEX, PED, *Eco-Design*, simulation worst-case/ shut-off scenario, technical documentation

Enabling you to do 3D-CFD inhouse

- ✓ Consultation on establishing your own simulation team
- ✓ Choosing the right software for your needs
- ✓ Consultation on pricing: software, hardware, CFD-engineers
- ✓ Workshops for your team
- ✓ We build CFD-simulation & workflows directly in your facility
- ✓ Best practices and support services by REVYVE

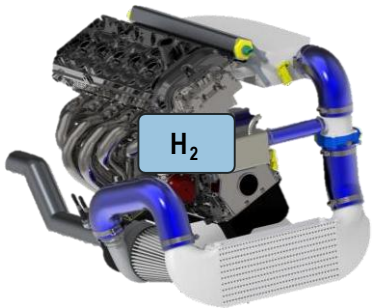
Design

- ✓ CAD-Modelling
- ✓ 3D-Scanning
- ✓ Re-engineering
- ✓ Rapid prototyping
- ✓ Weight saving design
- ✓ Rendering

Expanding automotive tools to other industries.

Example: Development of a prototype Hydrogen Engine

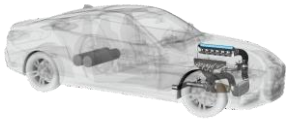


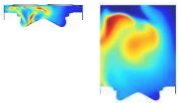
3D-Scan + Reengineering + Prototype Design

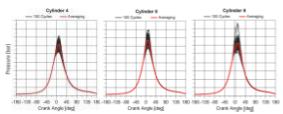
Design of Optimized Parts

3D-CFD Simulation

Testing



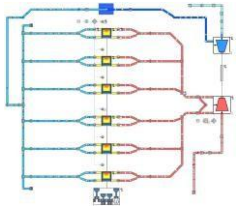


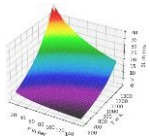


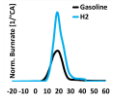
Thermo-fluid performance analysis

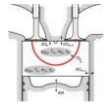
Combustion and chemistry simulation

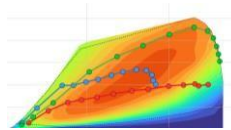
Controll strategy for Air Management





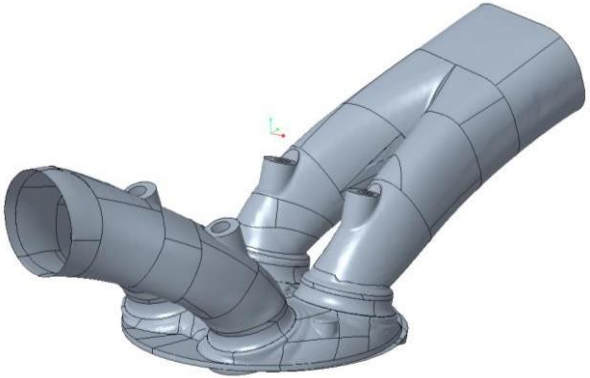




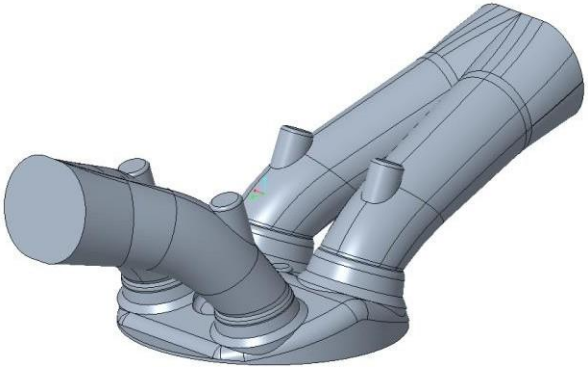


3D-Scan, Re-Engineering & Flow Optimization

Example project



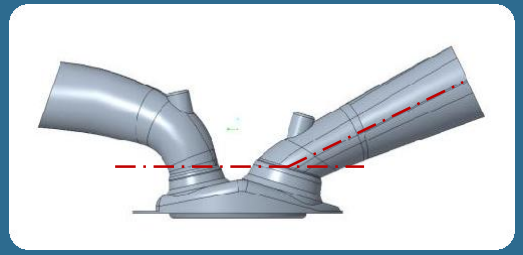
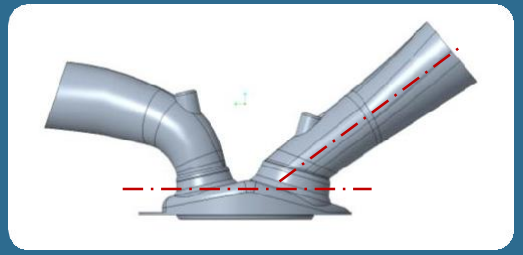
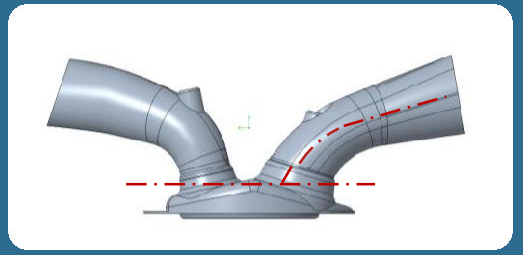
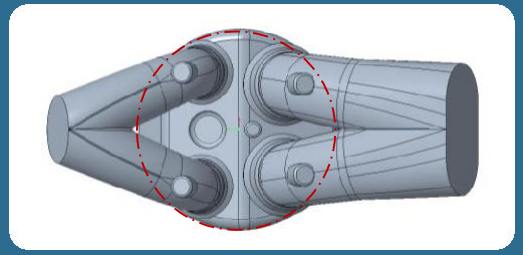
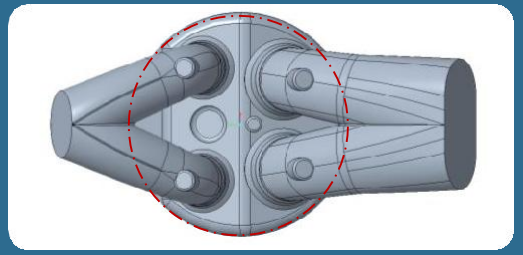
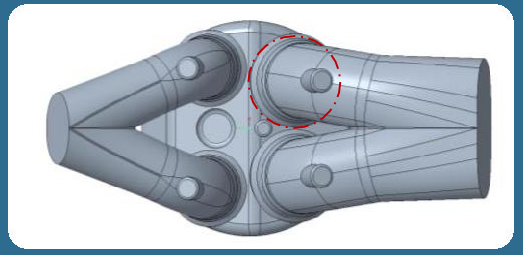
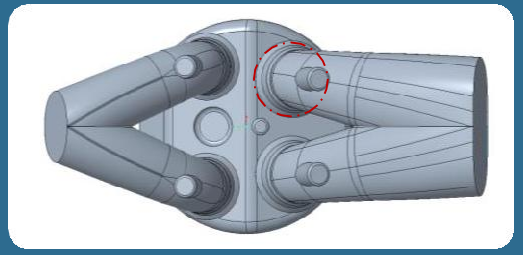
3D-scanned customer geometry



Re-Engineered and optimized geometry

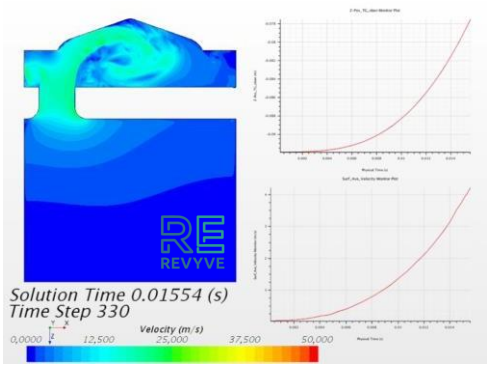
Parameterized CAD for Flow Optimizations

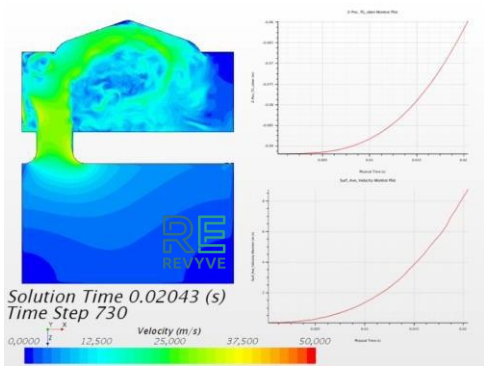
Example project

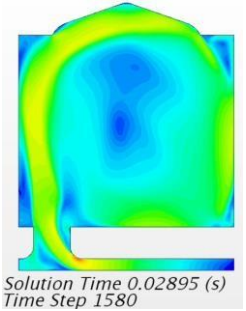
port geometry			
bore size			
valve size/angle			

Turbulence investigations in mixing chamber

Example project

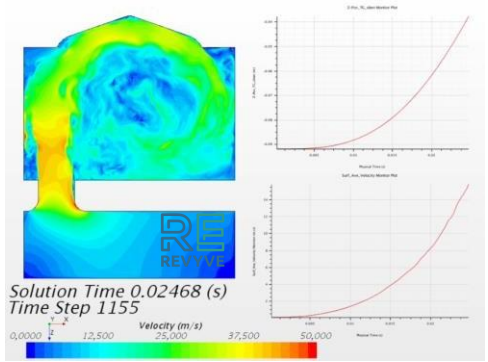


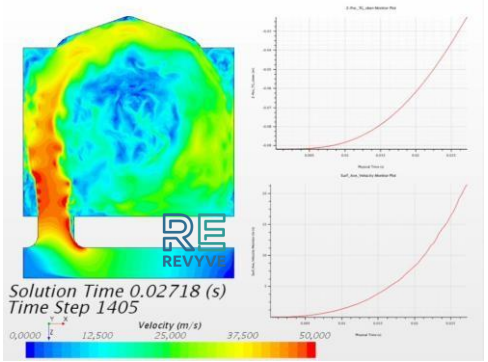


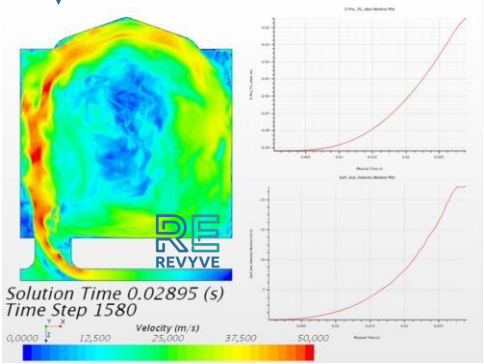


- Analysis of flow development over time
- Validation with experiments
- Detailled numerical investigation for reproducable results
- Foundation for further investigations

Comparison with other turbulence modells to find the best for each task





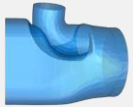


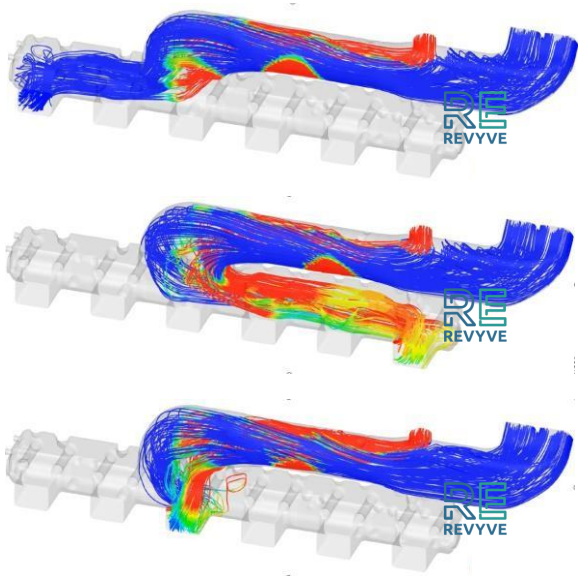
Equalizing the distribution of two pulsating flows

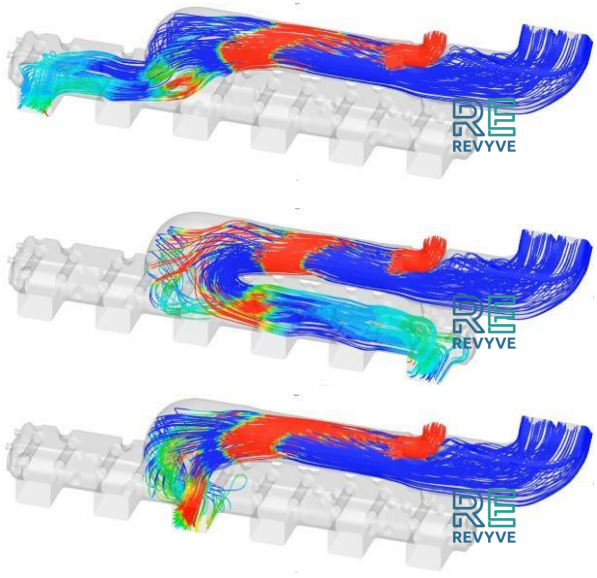
Example project

Reference Mixing Device

Optimized Mixing Device







- Optimzied mixing device lead to more centric addition of second flow (red)
- Improved equalizing of the two mixed flows achieved
- Process performance increased
- Easy integration in existing machines

THANK YOU

startup bw

KIT

UNTERSTÜTZT DURCH DEN IMPULS- UND VERNETZUNGSFONDS VON HELMHOLTZ

rotterdam partners

axel
Der Energie-Accelerator