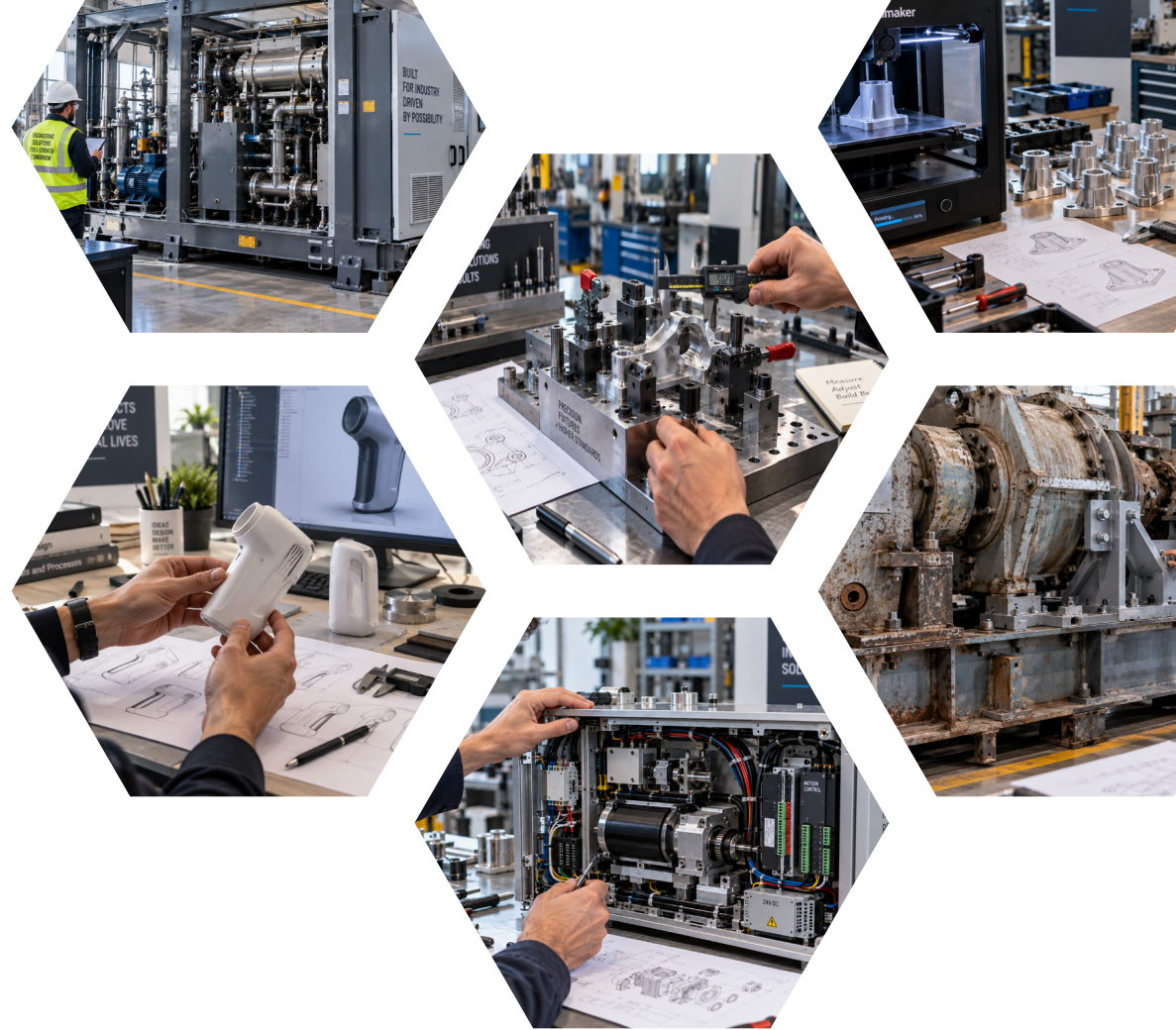


FAÇADE CREATIONS



Engineering Services

Computational Fluid Dynamics (CFD) Services

Computational Fluid Dynamics (CFD) Services

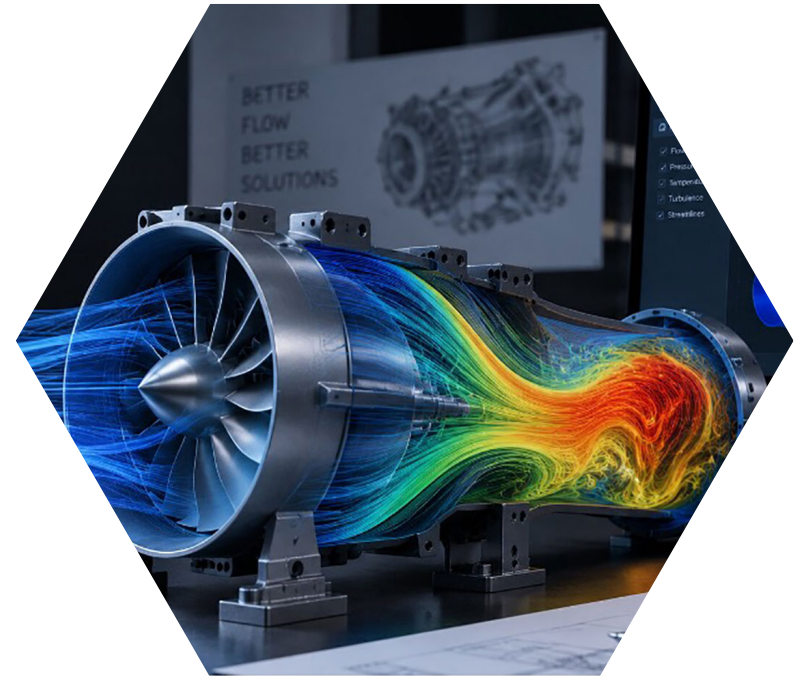
Introduction

Façade Creations' CFD practice deals with a part of engineering that is genuinely difficult to see directly: how fluids and gases move, how heat is transferred through a system, and how pressure and turbulence develop as a result. Where FEA answers questions about solid structures under load, CFD answers questions about flow, whether that is air moving around and through a piece of equipment, coolant circulating through a system, or heat being carried away from a component that generates it.

The value of CFD is that it turns something invisible into something you can actually design against. Instead of guessing at airflow patterns or building a physical prototype purely to find out where a hot spot forms, we simulate the system numerically and show you exactly what is happening, and why, so design changes can be made with confidence rather than trial and error.

Flow and thermal problems are often counter-intuitive. A cooling fan added in the wrong place can make thermal performance worse, not better. A duct redesign that looks sensible on paper can create a dead zone that starves part of a system of airflow entirely. CFD replaces intuition with an actual picture of the physics, which tends to save both engineering time and the cost of a redesign discovered too late.

We approach every CFD project the same way we approach FEA: start with a specific engineering question, build a model rigorous enough to answer it properly, and deliver a result that leads directly to a design decision, not just a report that sits on a shelf.



Industries We Serve



Thermal management of equipment and electronics

Enclosures, cooling systems, and heat sinks for products that generate heat in operation.



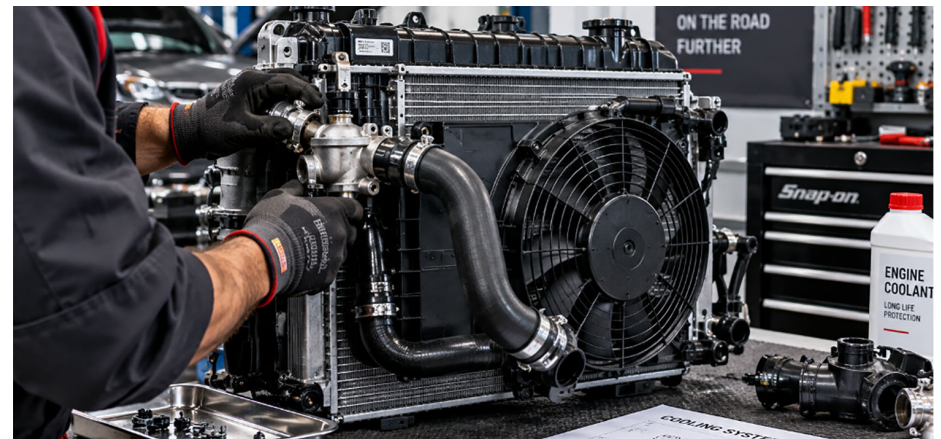
Industrial process equipment

Systems involving fluid flow, mixing, or heat exchange in manufacturing and processing environments.



HVAC and ventilation systems

Airflow performance and efficiency within mechanical and building service systems.



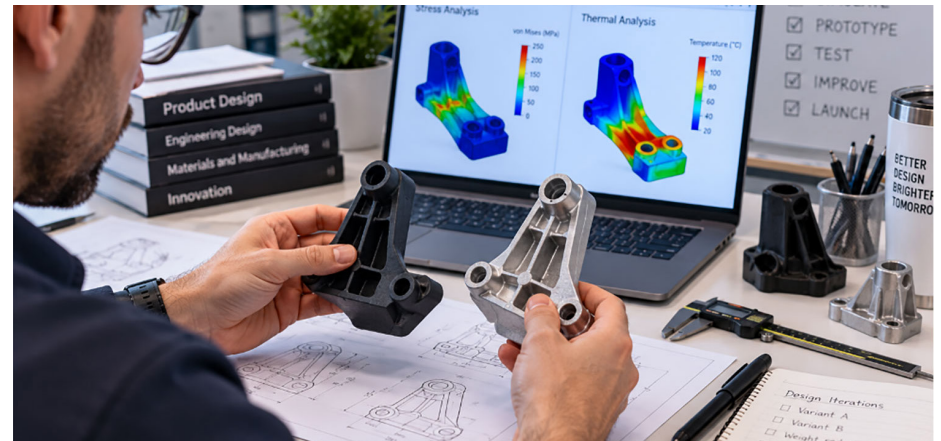
Automotive and mechanical components

Cooling circuits and aerodynamic performance for vehicles and mechanical systems.



Manufacturing and process optimisation

Flow-related inefficiencies in existing systems that are underperforming or behaving unpredictably.



Product development

Early-stage evaluation of design alternatives before physical testing begins.



Energy and power generation equipment

Thermal and flow performance of systems operating under demanding, continuous duty conditions.



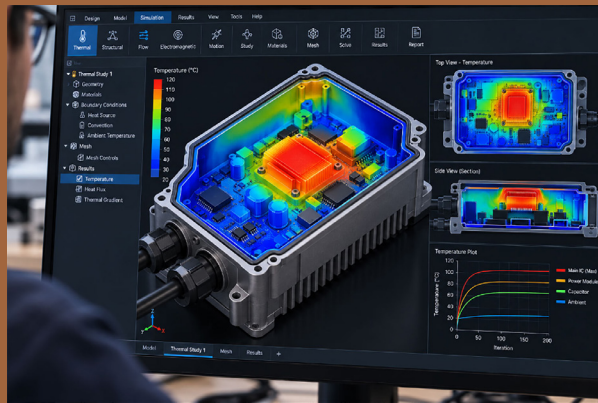
Data centre and electronics cooling

Airflow and thermal design for densely packed, heat-generating equipment.

Our CFD Services

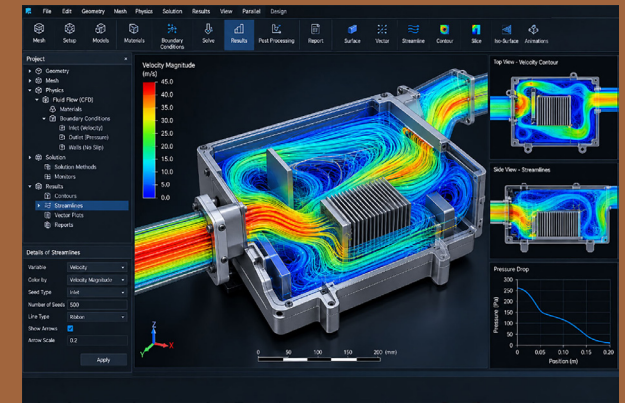
Thermal Management Simulation

We model how heat moves through and away from a system, identifying hot spots, evaluating cooling strategies, and confirming a design will stay within safe operating temperatures under real duty cycles. This is one of our most requested services, particularly for electronics and equipment enclosures where overheating directly threatens reliability.



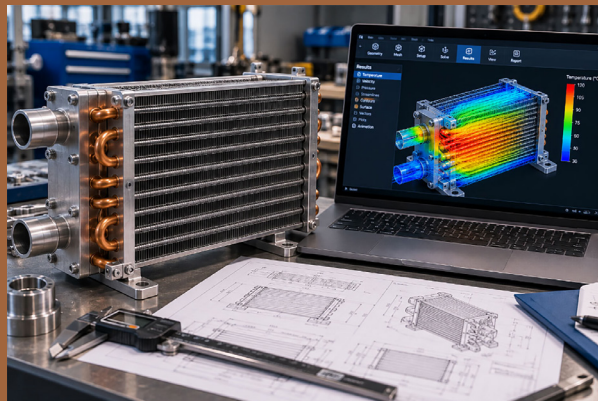
Internal and External Flow Analysis

Simulation of flow through ducts, pipework, and enclosures, or around external surfaces, to understand pressure drop, flow distribution, and areas of unwanted turbulence or recirculation. This helps identify where a system is wasting energy or underperforming due to poor flow geometry.



Heat Exchanger and Cooling System Evaluation

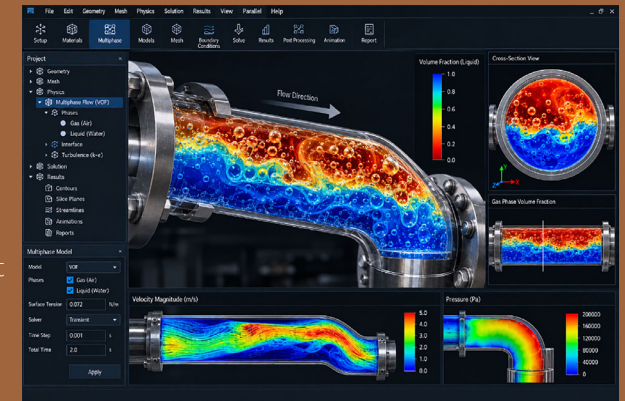
Detailed simulation of heat exchange components and cooling circuits, used to compare design options and improve thermal performance without relying purely on physical prototypes.



We can evaluate multiple configurations quickly, narrowing down to the strongest candidates before physical testing.

Multiphase and Complex Flow Modelling

Where a system involves more than one fluid phase, such as liquid and gas together, we model that interaction to predict system behaviour accurately, an area where simplified assumptions tend to give misleading answers.

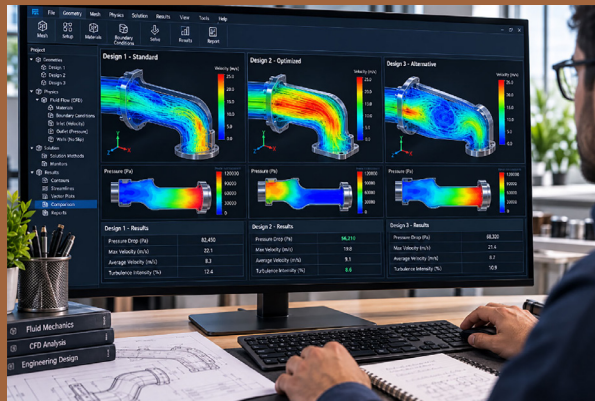


Our FEA Services

Design Comparison Studies

Running multiple design variants through simulation side by side, so decisions between design options are based on quantified performance data rather than intuition alone.

This is particularly valuable early in a project, when several design directions are still genuinely on the table.



Ventilation and Airflow Studies

Analysis of airflow through mechanical and building service systems, used to evaluate efficiency, identify dead zones, and confirm a system will perform as intended before installation, avoiding costly rework after equipment is already in place.



Troubleshooting Existing Systems

Where an installed system is underperforming, overheating, or behaving unpredictably, we use CFD to diagnose the underlying flow or thermal issue and recommend a practical fix, often resolving problems that have resisted straightforward physical troubleshooting.



Fan and Airflow System Sizing

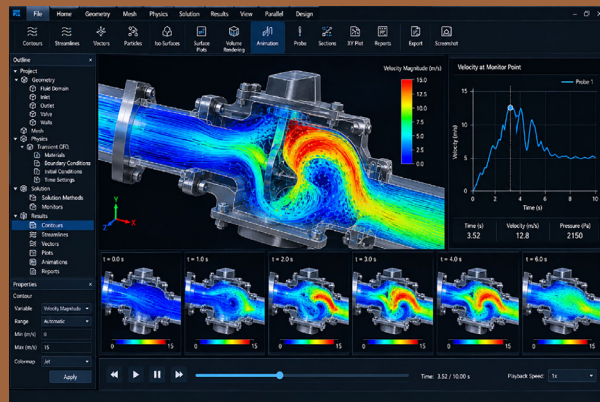
We evaluate fan and blower performance within a specific system, confirming that a chosen unit will actually deliver the airflow the system needs once real resistance and geometry are accounted for, rather than relying on nominal fan specifications alone.



Our FEA Services

Transient and Time-Dependent Simulation

For systems where conditions change over time, a start-up transient, a variable duty cycle, or a system responding to changing external conditions, we run time-dependent simulation to capture behaviour that a steady-state model would miss entirely.



Environmental and Enclosure Studies

Assessment of how equipment performs within its actual operating environment, including the effect of ambient temperature, enclosure placement, and surrounding equipment on overall thermal and flow performance.



Our Process

We begin every CFD project by clarifying the specific question that needs answering, since a well-defined question is the single biggest factor in getting a useful result efficiently.

We then build the computational model, including geometry preparation, mesh generation, and definition of boundary conditions such as flow rates, temperatures, and heat sources.

Once the simulation runs, we check results carefully for physical plausibility and convergence before presenting anything as a finding.

Every project concludes with a written report explaining the results in plain engineering terms, along with specific, actionable recommendations, and we remain available to run further design iterations as needed.



Frequently Asked Questions

What's the difference between CFD and physical airflow or thermal testing?

Physical testing tells you the end result at the points you happened to measure.

CFD shows you the full picture, flow and temperature at every point in the model, and lets you understand why a result is happening, which makes it far easier to actually fix a problem rather than just confirm it exists.

What information do you need to start a CFD study?

Geometry of the system (CAD model), the operating conditions involved (flow rates, temperatures, heat sources, pressures), and a clear statement of what question you need answered.

We can help define the boundary conditions if they are not yet fully known.

How accurate are CFD results compared to reality?

When set up correctly, with appropriate boundary conditions and a properly validated model, CFD results are reliably accurate enough to guide real engineering decisions.

We are transparent about the assumptions behind every model, and where it matters, we recommend a final physical check to confirm critical results.

Can CFD help with a problem we already have, not just a new design?

Yes, this is one of the most common reasons clients come to us.

An existing system is overheating, underperforming, or behaving in a way nobody expected, and CFD lets us find the actual cause rather than guessing and re-testing repeatedly.

Frequently Asked Questions

How long does a typical CFD project take?

A focused study on a single component or simple flow path can often be completed within one to two weeks.

More complex systems, involving multiphase flow, transient behaviour, or large assemblies, take longer.

We give a clear timeline once we understand the scope.

Can CFD help reduce the noise a system produces, not just its thermal or flow performance?

Flow-induced noise is closely related to turbulence and flow separation, both of which CFD can identify.

While acoustic simulation is a specialised extension of this work, our flow analysis often highlights the geometry changes that would meaningfully reduce noise as a secondary benefit.

Do you provide recommendations, or just the simulation results?

Always recommendations. Raw simulation output is not useful on its own.

Every project we deliver includes a clear engineering interpretation of the results and practical suggestions for what to change and why.

Is CFD only useful for large, complex systems, or can it help with small components too?

It is genuinely useful at both ends of the scale.

A small heat sink or a single duct section can benefit just as much from simulation as a full system, often with a much faster turnaround since the model is simpler.

Frequently Asked Questions

Can you simulate a system under conditions we can't easily test physically, like extreme temperatures or altitude?

Yes, this is one of the clearest advantages of simulation over physical testing. Extreme, hazardous, or simply impractical operating conditions can be modelled numerically without needing to recreate them in a lab.

How do CFD and FEA work together on a single project?

Many real problems involve both flow and structure, for example, wind or pressure loading on a component, or thermal stress caused by an uneven temperature field.

Where relevant, we combine our CFD and FEA capabilities so the thermal or pressure results from one feed directly and accurately into the other.

Do you need a powerful in-house computer to run these simulations, or is that on your end?

That is entirely on our end. You do not need any special hardware or software; you provide the geometry and operating conditions, and we handle everything from model setup through to the final report.

Every building presents
unique façade challenges.



Early conversation identifies risks and opportunities
before they become constraints.

Let's discuss how independent expertise can add value to your project.

Contact Façade Creations today.



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