How optimization is helping CFD consulting business become more competitive
We have helped over 80 R&D departments.

Annual investment in RS&DE to offer cutting-edge solutions.

We delivered more than 250 successful simulation and optimization projects.

10 qualified employees.

We master 10 high-end softwares.

80 R&D DEPT

100K$

250

10

10
Optimization & Design exploration

= 

- Instant expertise
- Performance
- Speed
Tools

Optimat

Hyperstudy

STAR-CCM+
Case 1 – HVAC, Wall-mounted faceplate
Case presentation

• GOAL: Change the look

• Original design: poor flow rate

• MANDATE: GIVE DESIGN DIRECTIVE
Traditional approach

Initial Design → CFD → New Design

Propose alternative
Revised approach

- Initial Design
- Design Exploration
- Final Design
- Discussion
OPtimization

Top spacing

TOP length

BOTTOM length

Bottom

ROTATION ANGLE
sensitivity

Graph showing the relationship between DP and length, Top spacing, Bottom spacing, and Rotation angle with respective effects (LBas → DP = 388.01704, SHaut → DP = 400.74586, SBas → DP = -603.58200, Rotation → DP = 84.034093).
BENEFITS

- Reduced time
- Reduced cost
- Engineering integrated with design
- Better performance
Case 2 – POOL equipment power optimization
Case presentation

• GOAL: optimize power for reduced flow/rpm

• Reduction of pump power per new regulations
Traditional approach

1. Fixed number of iteration
   - CFD with Best-guess initial design

2. Analyze and design next iteration
   - Iterate (3 - 4 times due to cost)

3. Prototype final design
   - Hope it works in all conditions
revised approach

1. DEFINE operation conditions
   - Choose design parameters
   - Explore and optimize

2. Analyze and design next educated iteration
   - Simulate new design
   - Iterate if necessary

3. Prototype final design
Optimization – initial model

- Optimate+
- Use of 3d-Cad parameters
- 50 simulations
OPTimization - parameters

3 parameters
- Blade length
- Blade curvature
- Number of blades

Objective
- Maximize torque
Optimization - results
Optimization – final design
benefits

- Faster turnaround
- Reduced cost
- Better understanding
- Better performance
Case 3 – shape optimization of a bike parts
Case presentation

• Goal: Increase aero performances
  • Fork
  • Downtube

• design exploration and optimization
## Traditional approach

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
</table>
| 1    | - initial design guess  
      | - CFD         |
| 2    | - Analyze and design next iteration  
      | - Iterate (3 - 4 times due to cost) |
| 3    | - prototype   |
| 4    | - Wind tunnel validation            |
revised approach

1. Evaluate primary shapes at different angles, speed …
2. CFD with initial design GUESS
3. Analyze and design next iteration
   - Iterate (3 - 4 times due to cost)
4. prototype
5. Wind tunnel validation
Example - downtube

4 parameters

2 constraints

Reduce drag at:
- 0 deg
- 15 deg
- Combination
results - downtube

Results downtube
• Circular constraint AT minimum
• Min thickness at trailing edge
• 0 deg - 35%
• 15 deg - 71%
• Objective - 56%

Results fork
• Less restrictions
• More complex conditions (wheel)
• Objective - 35%
0 - deg

before

after
15 - deg

before

after
BENEFITS

- Better first approximation
- Faster global iterative process
- Evaluation of areas where reducing drag makes a difference
- Increased performances on parts where no wind tunnel data is available
Optimization & Design exploration

=  
  • Instant expertise
  • Performance
  • Speed