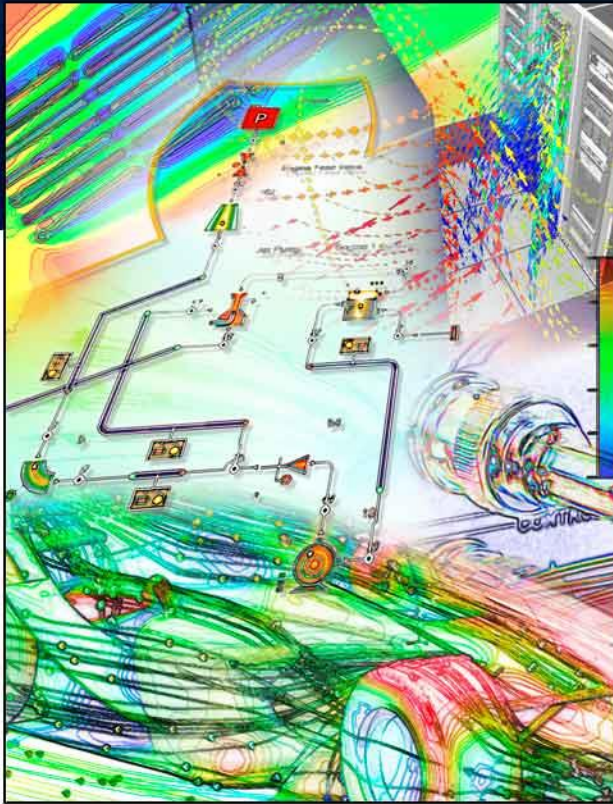


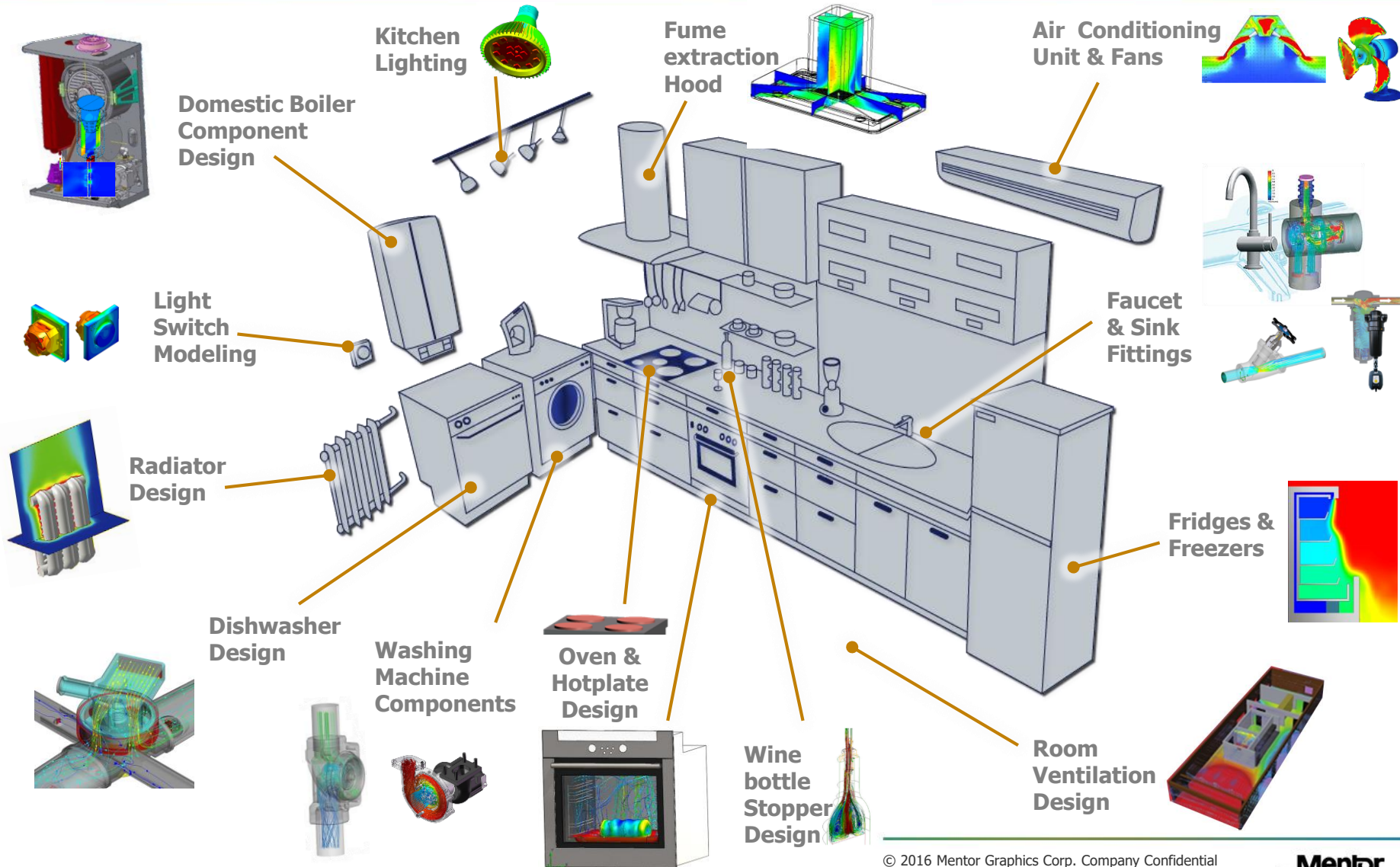
FloEFD Customer Success Stories: Consumer Products



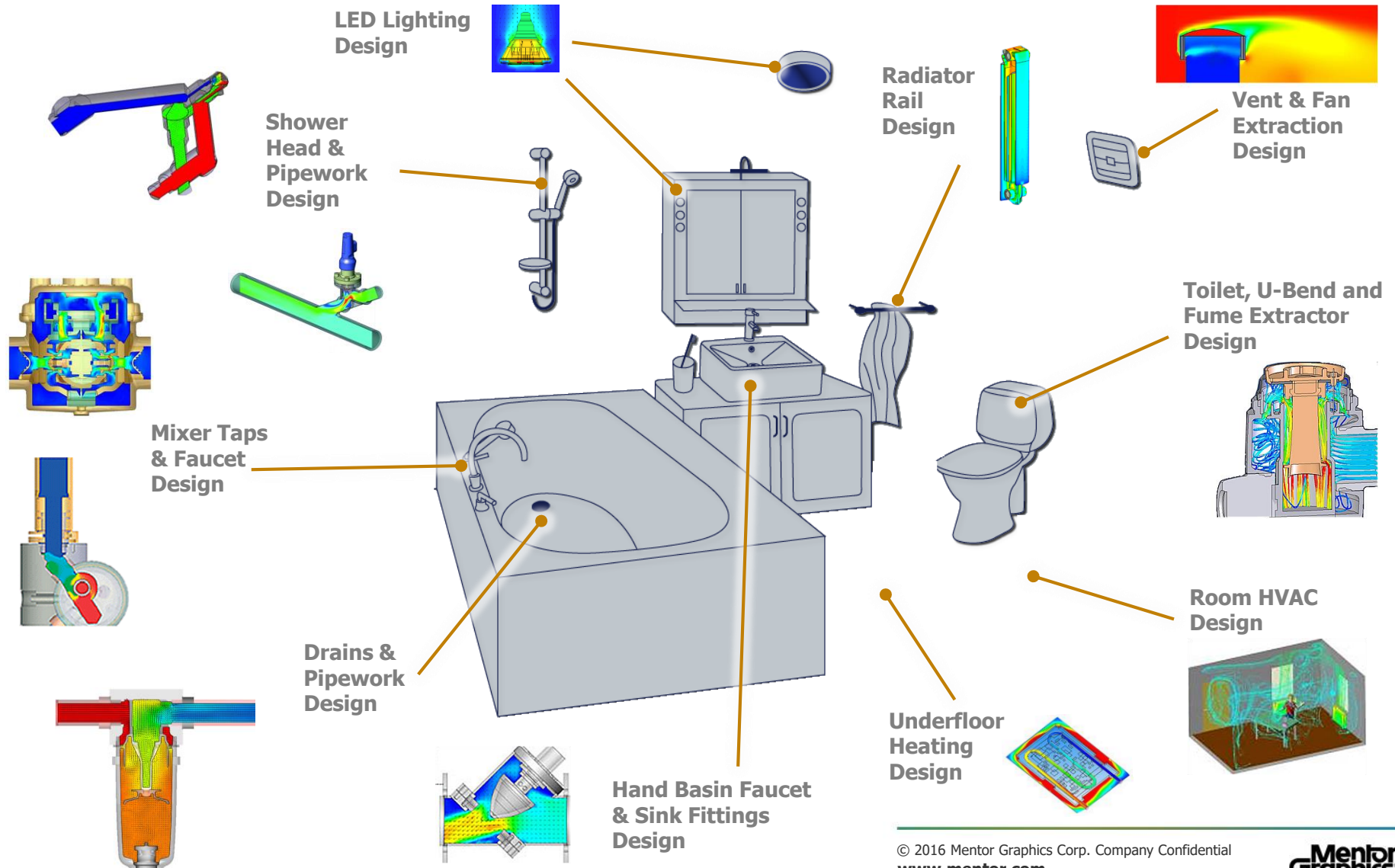
Mechanical Analysis Division

11th November 2016

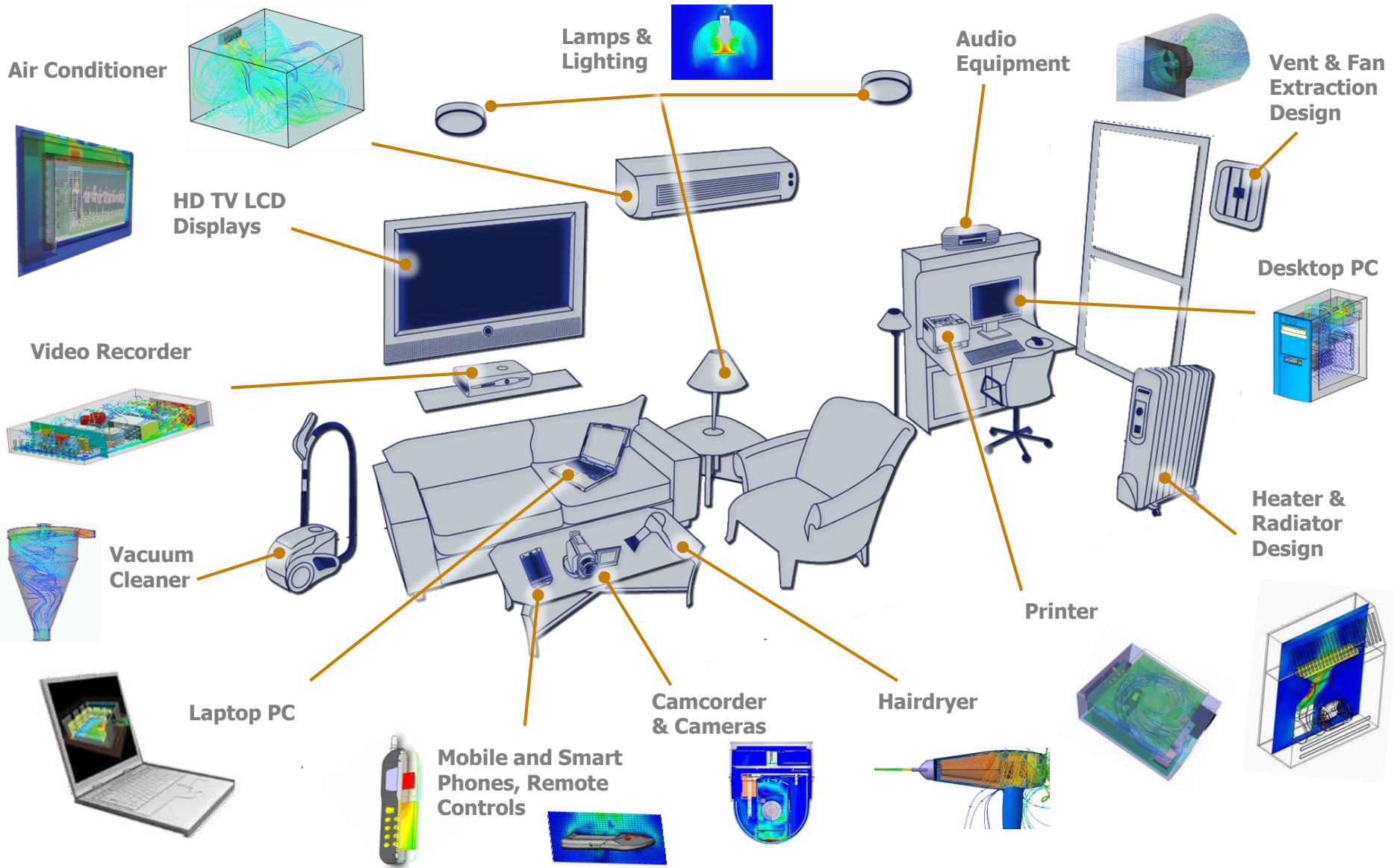
Mentor Graphics CFD applications for Kitchen Appliances



Mentor Graphics Frontloading CFD Solutions for Bathroom Appliances & Products

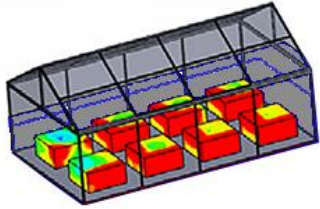


Mentor Graphics Frontloading CFD Solutions for Household Appliances & Products

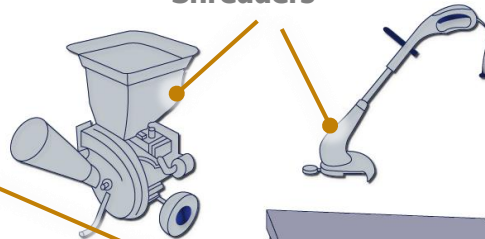


Mentor Graphics Frontloading CFD Solutions for Garden & Garage Appliances & Products

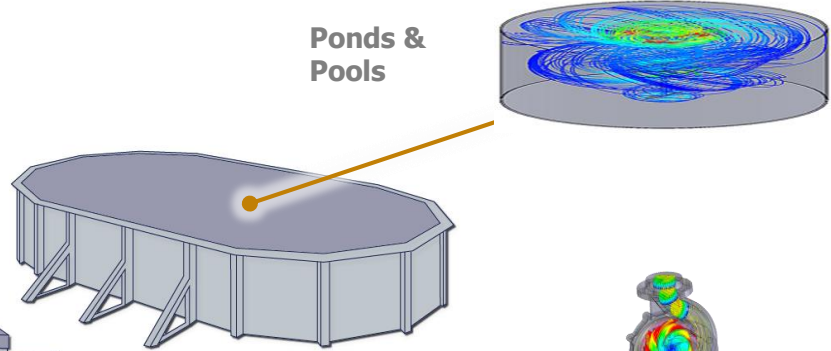
Greenhouses



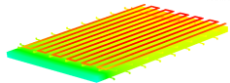
Strimmers & Shredders



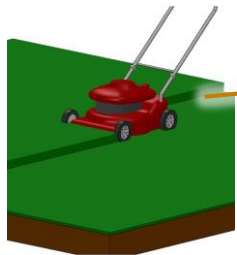
Ponds & Pools



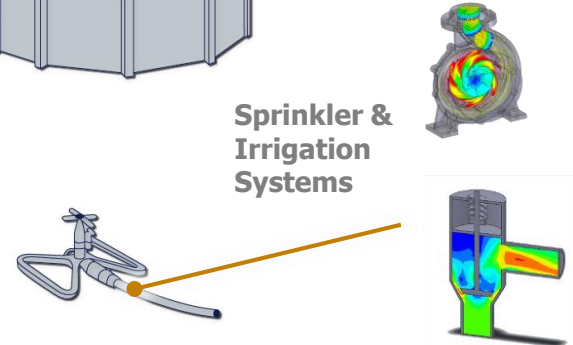
Barbecues & Grills



Lawnmowers



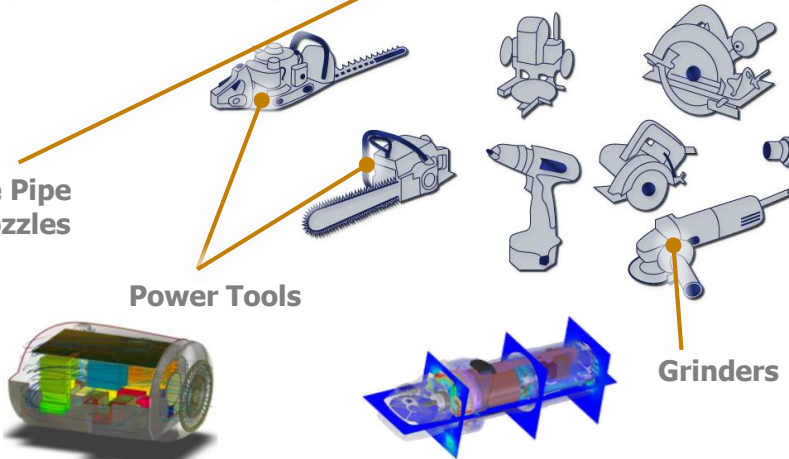
Sprinkler & Irrigation Systems



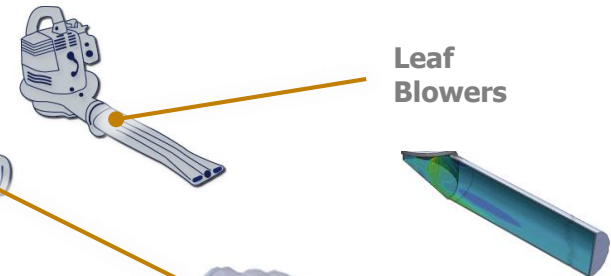
Hose Pipe & Nozzles



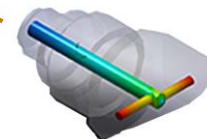
Power Tools



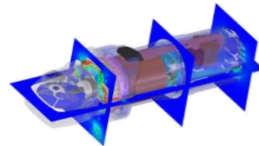
Leaf Blowers



Paint Guns



Grinders



FloEFD CFD Helps Develop Graco Spray Gun with 50% Larger Pattern in 1/3rd the Time

- Graco AG supplies systems, products and technology for a wide range of fluid handling applications including spray finishing and paint circulation, lubrication, sealants and adhesives, processing and power application equipment.

Challenge: Optimize the design of a new plural component spray gun.

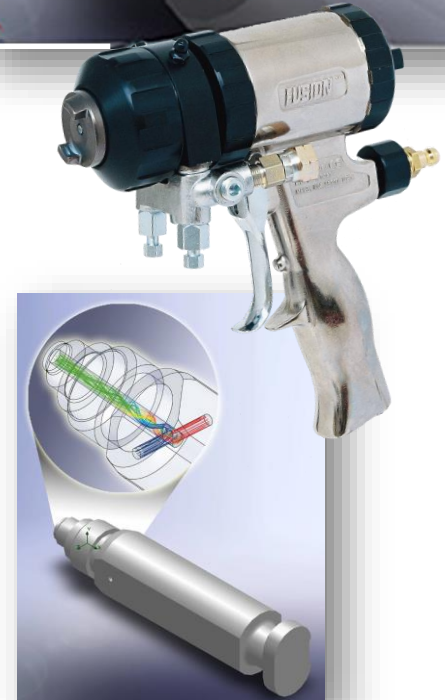
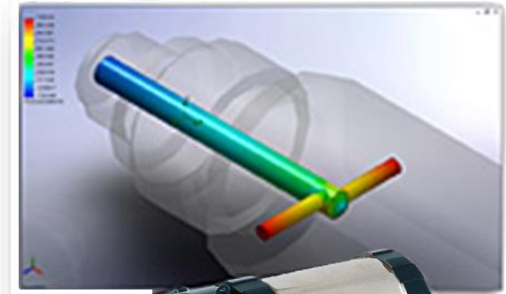
Solution: FloEFD

Benefits: - With CFD, Graco were able to do this in 1/3rd the time required to produce an acceptable but not optimized design using trial-and-error methods,
- Expansion of FloEFD usage into 3 more divisions.

"The use of software prototypes made it possible to explore a much wider design space than would have been possible with physical prototypes. It's important to note that I achieved these results despite the fact that I am a design engineer without any training in CFD."

Rick Anderson, Senior Project Engineer, Graco

Consumer Products



Voxdale Solve LED Lighting Overheating Problem in 1 Day with FloEFD in PTC Pro/E

- Voxdale, a Belgium based engineering consulting firm, were asked to solve a power light emitting diode (LED) thermal management problem.

Challenge: The initial prototype of the LED system overheated to the point that the amount of light delivered by the device and its lifetime were both substantially reduced.

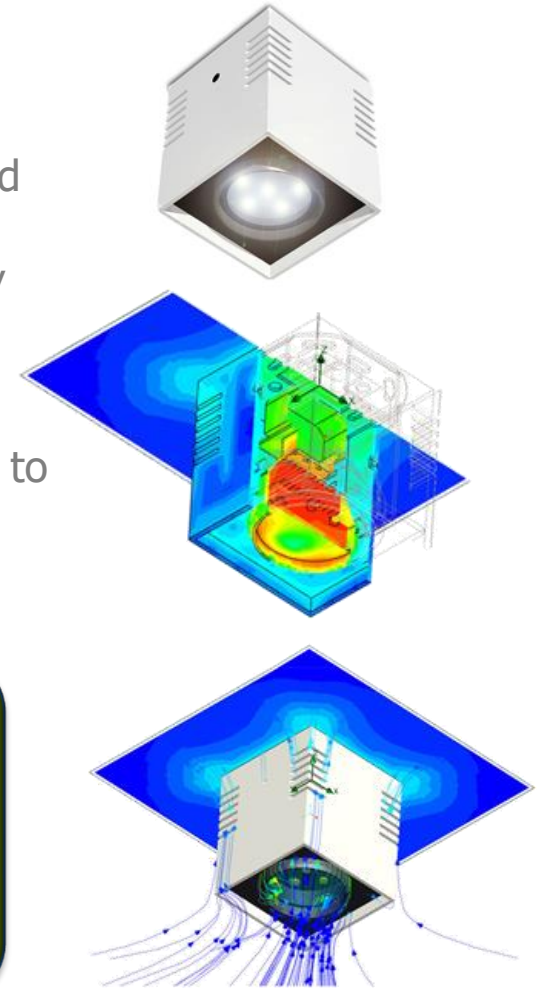
Solution: FloEFD for PTC Pro/E

Benefits: CFD predictions were used to redesign the housing to improve airflow, which eliminated overheating and increased the output and life of the light to the desired levels.

"In the past, CFD required the user to have a deep understanding of the computational aspects of fluid dynamics in order to be certain of obtaining accurate results. But in the last few years a new generation of CFD software has been introduced that eliminates the need for engineers to master the computational part of CFD and instead allows them to focus on the fluid dynamics of the product. "

Koen Beyers, President, Voxdale

Consumer Products



Johnson Design Creates Innovative Flush Valve without physical prototyping



- Johnson Design in the US have come up with the innovative "Denali Flushometer" lavatory flush valve concept.

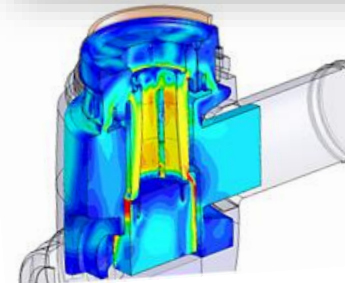
Challenges: Valve must deliver a fixed volume of water independent of the position of the restriction on a rolling diaphragm

Solution: FloEFD utilized in their design process

Benefits:

- Able to visualize flow inside the valve without having to disassemble it
- Prototyping costs were eliminated
- When built CFD predictions agreed with test measurements
- Virtual testing designs with CFD led to the best design being identified quickly without incurring excessive costs.

Consumer Products



Velocity distribution on cross-section through valve center

"The software considerably reduced the amount of time required to optimize the design by enabling us to evaluate design concepts in software without having to build a prototype."

Dustin Borg, Engineering Manager, Johnson Design

Sharp Laboratories Selects FloEFD for CATIA V5 for LCD Optimization Enterprise wide

- Sharp Laboratories Europe does all the company's Liquid Crystal research & development worldwide.

Challenge: Optimize LCD modules for various consumer applications.

Solution: FloEFD for CATIA V5

Benefits:

- Analysis results are easily generated,
- Technology improves communication between different groups globally with the same CAD software.

Consumer Products



"We selected FloEFD.V5 because it was the most accessible Computational Fluid Dynamics (CFD) software for engineers working with CATIA V5. Analysis results are easily generated and also improve communication between different groups within the company. FloEFD.V5 will be used by mechanical design engineers with varying levels of CFD experience – from novice to expert."

Scott Boham, Mechanical Design Engineer , Sharp

Marengo Reduces Extractor Hood Design Time in half with FloEFD

- Marengo AG manufactures kitchen extractor hoods for ovens and hobs.

Challenge: Design a new extractor hood that is more efficient and operates at a lower decibel-level. Identify best shape filter for removing smoke and fat particles from the air

Solution: FloEFD

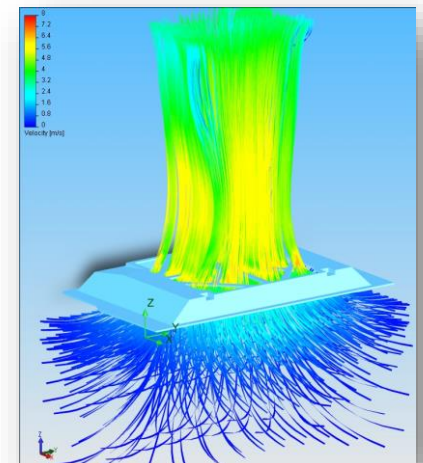
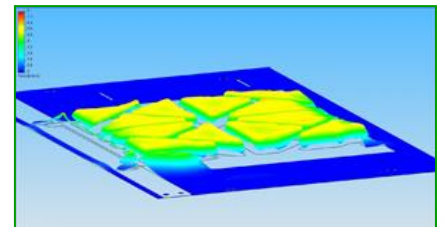
Benefits:

- Identify most impacted area and best geometry for effective filter
- Predict rate at which filters may clog and recommend cleaning interval to end-user
- Cut design and analysis in half compared to traditional methods

"With FloEFD, I can do what I need to do faster and better by locating the critical problem areas quickly. It can be very difficult to investigate problems on a physical prototype but with FloEFD you can put your finger right on the problem and fix it immediately."

Hans-Peter Keel, Mechanical Design Engineer, Marengo

Consumer Products



Grohe Creates Better Quality Kitchen and Bath Fittings Quicker with FloEFD

- Holding roughly 10% of the worldwide market, Grohe AG is the biggest European, and a leading global, manufacturer of quality stylish sanitary fittings (bath fittings and showers, kitchen mixers and thermostats).

Challenge: Test and increase the quality of a new generation of thermostats and faucets using CFD

Solution: Use of FloEFD to optimize existing designs

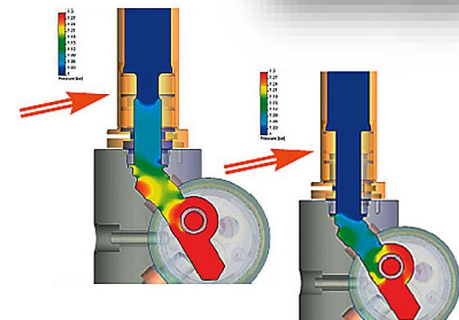
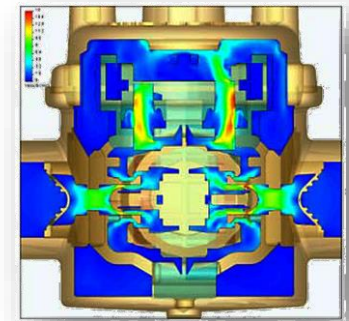
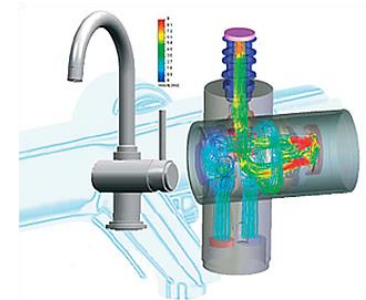
Benefits:

- In pre-development phase modified proposed designs led to reduced pressure drops based on CFD analysis & results matched experiment closely. Good noise reductions also experienced.
- Reduced the overall number of prototypes and overall product development costs

"The results are not just colorful images but are also very realistic so that decision makers who do not come from a technical field can be convinced. On this basis technicians and non-technicians can jointly discuss the advantages and also their doubts with respect to new product ideas with the aid of the CFD software. Software tools such as FloEFD are imperative for us so that we can still retain our high quality standards at reasonable prices."

Kai Huck, Engineer, Grohe

Consumer Products



Eclipse Combustion Optimizes Industrial Gas Burners with FloEFD

- Eclipse Combustion is an international manufacturer of industrial gas burners. Eclipse products are used in “low” temperature environments such as in dryers and industrial furnaces where performance, efficiency and reliability are essential.

Challenge: Build large air heater with low operating temperature and high combustion efficiency where the fuel is burned completely without excess emissions

Solution: FloEFD (Inventor files)

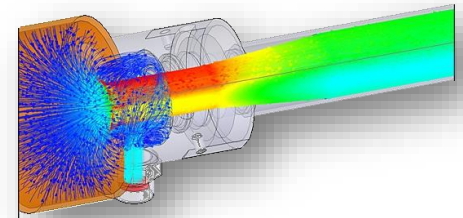
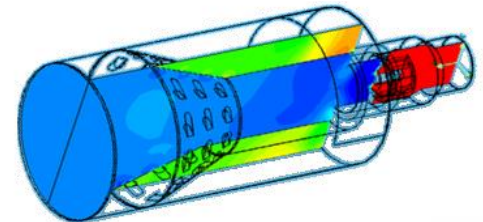
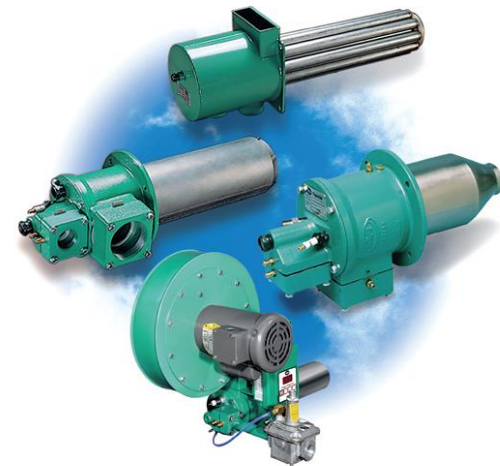
Benefits:

- Ease of use and complex geometry set-up in 1 day
- Develop an air heater product with a smaller than anticipated mixing chamber to customer requirements
- Created a customized consulting service for customers now.

"We initially invested in FloEFD flow simulation software to solve design problems. Now, we find and solve issues before they even become problems. FloEFD is simple enough for any engineer to use."

Ad Heijmans, Development Manager, Eclipse Combustion

Consumer Products



AEG Angle Grinder uses FloEFD to Yield Cool Power Tools Right First Time

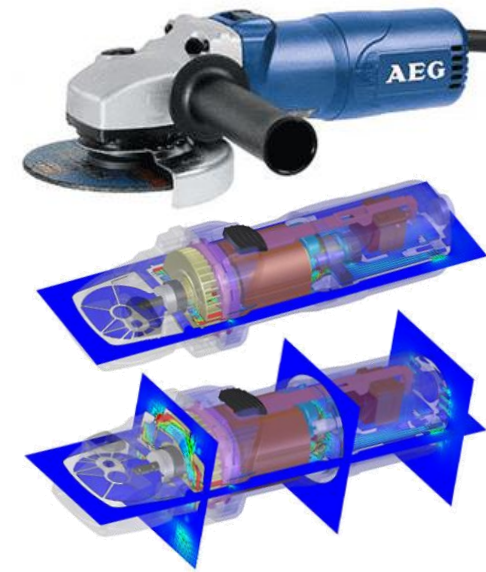
- AEG Electric Tools GmbH is an innovative market leading manufacturer of heavy duty portable electric power tools. Power tools are getting more compact, so investigation of motor cooling issues is needed to better understand the effectiveness of the tools.

Challenge: Correct cooling performance of Angle Grinder

Solution: FloEFD Pro

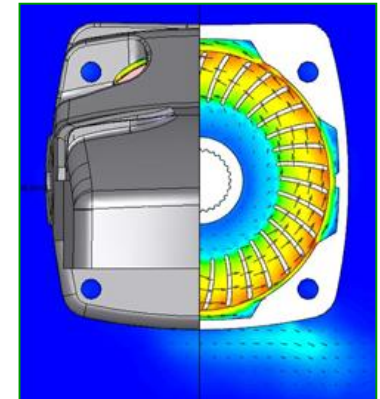
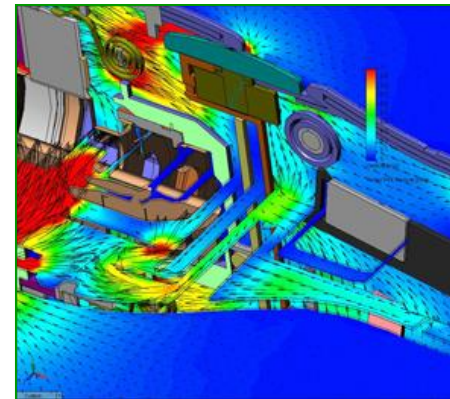
Benefits: - Ease of use and complex geometry set-up in 1 day
- Right-first-time 20% cooler power tool without dust accumulation risk

Consumer Products



"As power tools are getting more compact we investigate motor cooling issues to better understand the effectiveness of the cooling method used. We chose FloEFD because it is easy to use. Using FloEFD, we are able to fine-tune our designs to reach an optimized design much faster."

Markus Wörner, Design Engineer, AEG Electric Tools GmbH



Dialight PLC uses FloEFD for a wide range of LED Lighting designs

- Dialight is an industry leader in innovating and applying LED technology to the entire spectrum of visual applications.

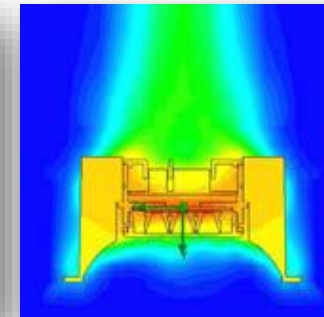
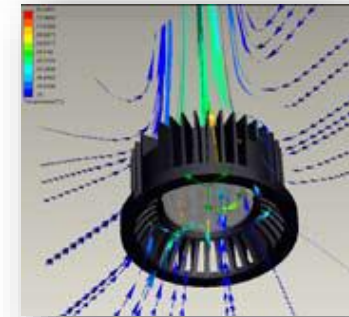
Consumer Products

Challenge: Ensure adequate thermal design of a wide range of commercial and domestic Liquid Emitting Diode systems

Solution: FloEFD for PTC Pro/E

Benefits:

- Fits into existing design process easily
- Allows new LED component designs to be produced quickly and efficiently
- Permits fast innovation of new components within fast timescales



"Although power LEDs are becoming more efficient, a significant amount of input power translates into heat. Cooling of the electronics and LED devices is critical to long-term reliability and so thermal analysis - including airflow analysis – is vital to help us meet our demanding development schedules...FloEFD is a recognized leader with good support and the software handles all the thermal transfer mechanisms we require."

Gordon Routledge, VP of illumination products, Dialight plc