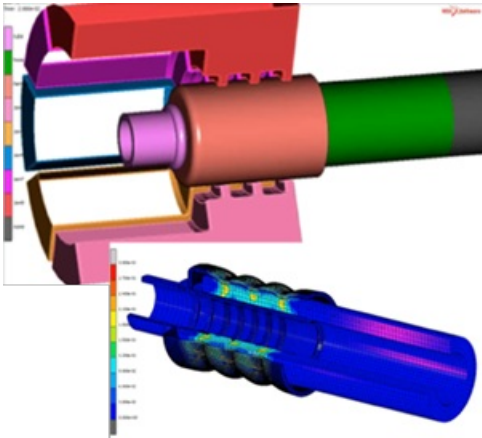


# OPTIMIZING VEHICLE FLUID HANDLING ARCHITECTURES WITH ADVANCED ANALYTICS AND VIRTUAL VALIDATION



Fluid handling systems are an integral part of all vehicles, providing the network to transport fluids throughout critical vehicle systems. Fluid handling technologies are used in all vehicle types, from the internal combustion engine (ICE) vehicles to battery electric vehicles (BEV) and plugin hybrid electric vehicles (PHEV). These systems are becoming increasingly complex as vehicles evolve into more highly advanced systems. The automotive industry is constantly pushing to fit more content into tighter spaces, while also attempting to reduce weight and cost. Cooper Standard's advanced analytics and modern digital tools are creating new opportunities to ensure our systems meet and exceed specific engineering requirements and performance standards, delivering exceptional value to our customers.

## **Design by Analysis**

Cooper Standard is a leading expert in computer-aided engineering (CAE) and digital simulation for advanced engineered solutions, and one of the first suppliers

to receive CAE certification with one of our major customers. When validating fluid transfer systems with Computer-Aided Engineering (CAE), engineers simulate various conditions within a system before creating any physical prototypes or running tests. These advanced analytics help to reduce costs by minimizing the need for "trial and error" and allow for more accurate models that represent real-world scenarios. Also, engineers can virtually test/ validate system performance and help identify issues early in the design process. This analysis equips our experts with the information they need to identify optimal solutions without having to wait for prototypes to be built or manufacturing to begin, increasing speed to market. CAE is increasing in demand as the push to virtually validate systems prior to production increases, providing a cost-effective way to evaluate if the systems are designed accurately and reliably.

## **Virtual Validation**

Virtual validation involves simulating product performance through digital models rather than actual parts and test equipment. Cooper Standard experts create detailed models of our products and test options which are then validated through simulation of many different environmental variables in a relatively short amount of time. This process provides a much faster turnaround time than traditional testing methods since data can be collected quickly without having to wait for results from the test lab or time-consuming field tests. Furthermore, simulations can be run multiple times with different variables such as temperatures, pressures, flow rates etc., allowing engineers to evaluate various options before settling on a design. This analysis helps ensure that each component will function as intended when placed under similar conditions.

Sustainability is becoming a focus area for manufacturers to consider how their operations and products impact the environment. Using design by analysis and virtual validation as part of the development and validation process for fluid handling systems helps reduce material waste and energy usage. Traditional processes for fluid handling systems validation typically involve extensive and costly physical testing before being approved for use in automotive applications.

For many reasons, OEMs and suppliers are looking towards the future, finding ways to integrate AI as part of everyday operations. Cooper Standard partners closely with customers to provide advanced analytics and digital tools to define the best overall solution and help our customers optimize their vehicles, while reducing costs, improving product quality, increasing speed to market, enhancing reliability and delivering improved sustainability. Continuing to build on virtual validation and making it better is how we plan to elevate our position in the automotive industry and how we plan to take technology to the next level. Our people are leading experts and passionate about helping customers make the transition to using virtual validation during the design process.

Learn more under the [Advanced Analytics and Digital Tools](#) on CooperStandard.com or [Contact Us](#) to learn more about virtual validation.