

Virtual Manufacturing Technology Preseason training for Ford's 'industrial athletes'





Highlights

At Ford, virtual manufacturing experts are tasked with:

- Vehicle design feasibility and the safety of more than 50,000 production employees in Ford assembly plants
- Incorporating the latest technology to drive vehicle design and production decisions
- · Maintaining high-quality vehicles for Ford customers

By the Numbers

Through its virtual manufacturing program, Ford has:

- Reduced employee injury by **70 percent** through the latest ergonomics research, assembly improvements and lift-assist technologies
- Reduced ergonomic issues such as overextended movements, difficult hand clearance and hard-toinstall parts at new-vehicle launch by 90 percent
- Reduced the amount of employee days away from work due to injury by **75 percent**
- Worked on more than 100 new-vehicle launches around the world using virtual manufacturing tools – most recently the 2015 Ford Mustang, Ford F-150, Ford Edge and 2016 Ford Explorer

Core Virtual Manufacturing Technologies

On average, Ford ergonomists complete **more than 900** virtual assembly task assessments per new-vehicle launch, centered on three core technologies: full-body motion capture, 3D printing and immersive virtual reality. Each of these technologies provides critical data used to evaluate the overall safety of the assembly process for employees, while maintaining high vehicle quality and design feasibility.



Full-body motion capture provides data on how an employee uses his or her body to move and complete tasks. Through more than 52 motion-capture markers placed on an employee's arms, back, legs and torso, ergonomists can record more than 5,000 data points to evaluate muscle strength and weakness, joint strain and body imbalance.



3D printing

3D printing technology is used by an ergonomist to validate hand clearance in the vehicle assembly process in those instances in which virtual simulation gives unclear results. Employees with various hand sizes use the 3D-printed model to test how tight the space will be in vehicle assembly – which helps to drive better production decisions.



Immersive virtual reality

Immersive virtual reality uses a 23-camera motion capture system and head-mounted display to virtually immerse an employee in a future workstation. Then, the employee's movements are evaluated to determine task feasibility and proficiency.



"Our goal is to provide a healthy, safe and productive work environment at our Ford manufacturing facilities worldwide. The ergonomics and virtual manufacturing processes support our injury reduction strategy and enable early validation of production-technology changes."

> Michael Torolski, executive director, Vehicle Operations Manufacturing Engineering