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GM Global Ergonomic Manufacturing Engineering Process - Applying Consistent Strategies and Methodologies for Success

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Abstract: General Motors (GM) ergonomics activity began over 30 years ago as a decentralized, activity. In the mid-80's GM and The United Automobile Workers (UAW) Union participated in an ergonomics pilot project with the University of Michigan (resulting in several published articles). In 1990 UAW-GM- Occupational Safety & Health Administration (OSHA) entered into an agreement on Ergonomics, which was the catalyst for Ergonomics Program in General Motors. By the mid-2000's GM recognized how critical it was to shift more attention to "designing in" ergonomic principles and guidelines early in the vehicle and powertrain development process. Today, our Global Manufacturing Engineering Ergonomics team (Program Ergonomists) consist of individuals around the globe that execute our ergonomics process across several functional groups, as a single voice to ensure:

1. Vehicle and Powertrain Product Engineering (PE) teams implement ergonomic principles in the products we make, and
2. Manufacturing Engineering (ME) teams implement ergonomic principles when launching new programs in the manufacturing plants.

Our primary focus is to design out systemic product and manufacturing issues and prevent future ergonomics issues before the product goes into production.
GM's ergonomics process is based on proactive assessments using internal and external ergonomic tools, research, and guidelines.

The three ergonomic analysis phases are:

1. Virtual Analysis, where we have collaborated with universities and OEMs to create digital models with both improved realism of the models and postures when analyzing reach, access, clearance, and operator's line of sight or field of vision analysis. We also evaluate operator strength capabilities (relative to the force required for installing parts) 2-3 years before production; due to the advancements in model's algorithms to better predict how a body reacts to an applied force in a specific direction.

2. Pre-Production Analysis focuses on the measurement/evaluation of installation forces that cannot be evaluated virtually. The acceptable force for any component is evaluated against internal GM specifications, guidelines, and requirements.

3. Program Launch activities validate the agreed upon resolutions demonstrated during pre-production were implemented (e.g. clip change to reduce force). Multiple vehicle or powertrain components are measured and signed off before an issue is considered closed.

At GM, Ergonomics is a key enabler to all successful program launches by all levels of leadership. Ergonomics is an accepted core requirement to design and build vehicles and powertrains around the world.

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