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Ergonomics in engineering
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ERGONOMICS IN ENGINEERING

DIGITAL HUMANS IN PRODUCT DESIGN & MANUFACTURING

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Why Ergonomics

- **Better design, assembly and maintenance**
- **Impact on cost, quality and safety**
- **Identify key challenges related to physical attributes and behavior of humans**
- **Account for different sizes and shape of people in engineering**
- **Training people**

Digital humans in product design

- **Positioning and comfort**
(helping designers to position controls for max driver comfort and safety)
- **Visibility**
- **Reachability**
- **Maintenance**
- **Assessment leading to injuries**

Application areas

- **Workcell layout**
- **Workflow**
- **Assembly**
- **Maintenance**
- **Tooling**
- **Adequate fixturing**
- **Lifting, pushing etc.**
- **Energy and fatigue analysis**

How do we achieve it

- **Build virtual environments**
- **Create a biomechanical virtual human**
- **Define human attributes**
- **Assign human tasks**
- **Analysis**
- **Model tools and fixtures**
- **Build realistic appearance**

What to consider

- **Human models should have joints, couplings, and D.O.F**
- **Respect the limits of real human body**
- **Shaded models rather than wireframe**
- **Categories of humans**
- **Creation and manipulation of postures**
- **Behavior parameters (turning neck, bending waist etc)**

What do we need

- **Tools to define motion**
- **Tools to interface VR**
- **Analysis tools**
- **Visualization techniques to communicate findings**
- **Measure force, torque etc., from human models**

Popular analysis

- **Spinal force analysis**
- **Strength and energy requirements**
- **Lifting analysis**
- **Fatigue analysis**
- **Limb analysis**
- **Handling limits**
- **Reachability limits**
- **Posture analysis**
- **Comfort assessment**

Scope of ergonomics in engineering

