



Virtual Ergonomics Solution

A powerful digital human modeling tool to create, validate and simulate human worker interaction for manufacturing

Competitive Advantage Through Innovation

- Introduces Ergonomics into the product lifecycle earlier
- Ensures conformance to relevant health and safety standards
- Accelerates time-to-market
- Improves employee satisfaction
- Optimizes workplaces and workcell design
- Increases productivity
- Reduces the cost of Human Factors analysis by reducing physical prototypes
- Evaluates entire target population during accommodation analysis
- Utilizes a comprehensive set of task analysis tools

DELMIA's Best-in-Class Virtual Ergonomics Solution

Manufacturing organizations around the world continue to design and develop machines, vehicles, and products that are capable of performing better, faster, and longer. An increasingly important design consideration is to ensure that these technological innovations are being designed from the perspective of the people who actually build, maintain, and operate them. From a factory worker to an aircraft pilot—today's manufacturers must consider these Human Factors (HF) early in the product lifecycle. DELMIA's Virtual Ergonomics suite of digital human modeling tools are fully integrated into the DELMIA Digital Process for Manufacture (DPM) solutions. It provides such organizations with a comprehensive array of human simulation and Ergonomics tools specifically designed for understanding and optimizing the relationship between humans and the products they manufacture, install, operate, and maintain.

Total Design Lifecycle Human Modeling

Creating and developing products based on the capabilities and limitations of people is not a new concept. Human Factors Engineering as well as ergonomists have proven that every stage of a product lifecycle has a common component—people. Digital human modeling technology can assist a designer in determining the performance of people in the context of a workplace, or their interaction with a product throughout its entire lifecycle, from conceptual planning through to final decommissioning before the product exists.





Easily Create and Validate Your Workforce

- **Manikin generation**
- **Gender specification**
- **Percentile specification**
- **Manikin manipulation technique**
- **Reach envelope and swept volume specification**
- **Advanced vision simulation**
- **Pick, place, and walk activity analysis**
- **Conform to civilian and military human factors standards**
- **Address maintainability issues early in the product lifecycle**
- **Create and manipulate advanced, user-defined digital human manikins**

Human Builder

Human Builder permits the intuitive creation and manipulation of accurate standard digital humans for initial worker/product interaction analysis. Human Builder offers a user-friendly interface and ensures that first level Human Factors studies can be undertaken by non-Human Factors specialists. Simple pull-down menus are used to create male and female standard manikins. (Name, Gender, 5th, 50th, 95th percentile.) The sophisticated manikin structure consists of 99 independent links, segments and ellipses. In addition, the manikin possesses fully articulated hand, spine, shoulder, and neck models to accurately reproduce natural movement, which includes seven default inverse kinematics for manikin motion.

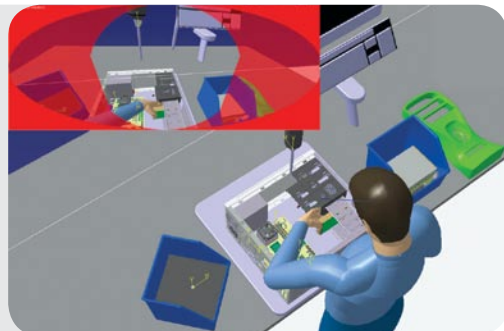
Human Task Simulation

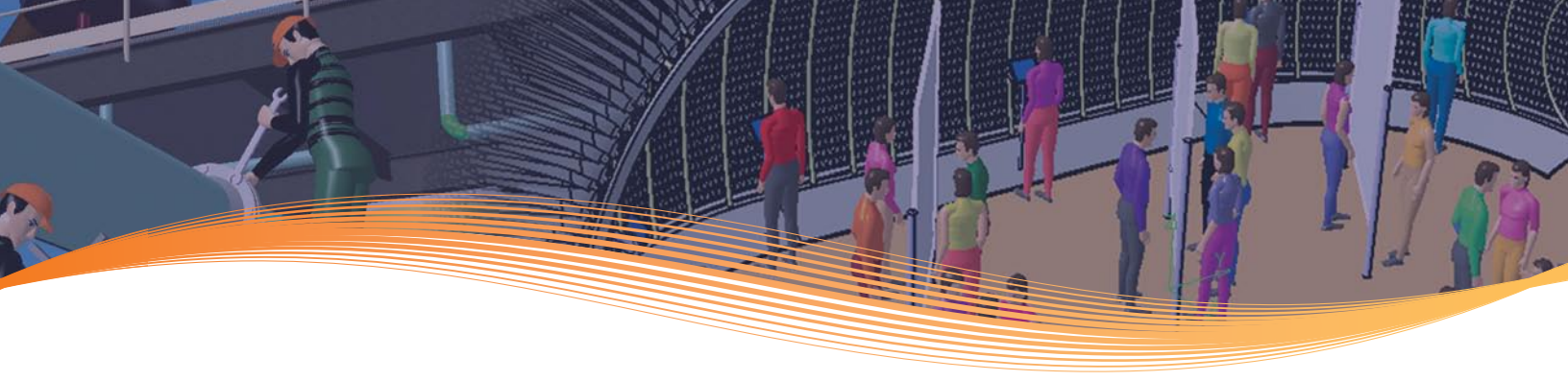
DELMIA Human Task Simulation is a powerful simulation tool used to create, validate, and simulate activities for “workers” using the DPM planning and simulation infrastructure. Workers perform these activities within the PPR environment where they may walk to a specific location, walk up and down stairs, ascend and descend ladders, move from one target posture to another, follow the trajectory of kinematics devices or path of an object, or automatically grasp and pick and place parts in the work area.

Users can also establish part relations to constrain specific segments of the worker to parts or tools in its environment. Position constraints are also stored from selected segments to selected 3D objects in the environment or standard V5 catalogs. Those constraints are subsequently solved to update the posture the next time the activity is modified.

DELMIA Virtual Ergonomics can be combined with DELMIA’s DPM Assembly to analyze the relationship between workers and other entities within the simulation. They can be simulated and validated using the powerful process simulation and capabilities within DPM, allowing the user to test and optimize multiple alternatives for the work humans must accomplish in a specific manufacturing, maintainability, and assembly environment.

Manikin vision assessment permits a designer to understand what an operator or maintenance specialist would “see” in a task environment





Human Posture Analysis allows users to create their own specific comfort, safety, and strength library for the needs of each individual application



Human Activity Analysis

Human Activity Analysis allows the user to maximize human comfort, safety, and performance through a wide range of advanced ergonomics analysis tools and standards that comprehensively evaluate all elements of a worker's interactions with a workcell. DELMIA's advanced human activity tools specifically analyze how a worker will interact with objects in the virtual environment. Users can accurately and efficiently predict human performance, ensuring conformance to factory standards and maximizing performance. DELMIA Human Activity Analysis includes a wide range of ergonomics tools for analyzing worker performance such as:

- 3D biomechanics analysis tools to calculate torques, loads, and shear
- Analyzes lifting, lowering, and carrying tasks using NIOSH 81 and 91 equations
- Evaluates push and pull tasks using the SNOOK and CIRIELLO equations
- RULA for arm position assessment, with the ability to customize RULA specifications

Human Posture Analysis

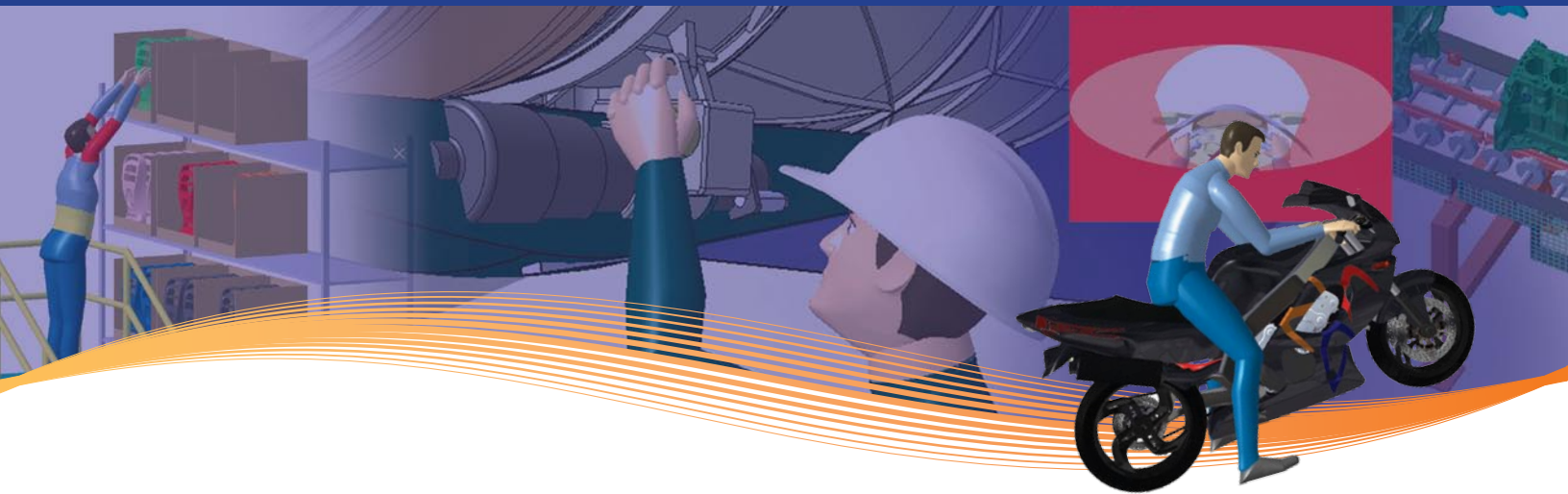
Human Posture Analysis permits the user to quantitatively and qualitatively analyze all aspects of a worker's posture. Whole body and localized postures can be examined, scored, and iterated to determine worker comfort, safety, strength, and performance when interacting with a product in accordance with published comfort databases.

User-friendly dialogue panels provide postural information for all segments of the manikin and color coding techniques ensure that problem areas can be quickly identified and iterated to optimize posture. Expert users can share their knowledge by saving ergonomics criteria, posture preferred angle, degree of freedom (DOF), and range of motion inside a user-defined catalog. This valuable information can be made available throughout the enterprise.

- Provides lock/unlock DOF
- Displays, defines, and manipulates joint limits in terms of comfort, strength, and safety
- Scores postures according to the preferred angles zones
- Finds best posture automatically
- Supports published comfort databases for postural analysis
- User-defined comfort and posture databases

Simulate your Global Workforce

- Users can customize all manikin anthropometric variables for user-specific human modeling
- 103 anthropometric variables (dimensions)
- Supports annotations on anthropometric variables
- Manages anthropometry database directly from a dedicated toolbar
- Creation of user-specific anthropometry databases
- Permits the creation of geography-specific anthropometry databases
- Target manikin anthropometric specifications can be saved in a catalog and then reused effortlessly within a different process

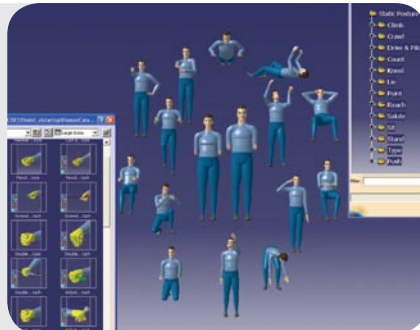


Human Measurements Editor

Human Measurements Editor allows the creation of advanced, user-defined manikins via a suite of advanced anthropometry tools. Manikins can then be used to assess the suitability of a product or process against its intended target audience.

Upon user input of appropriate critical design variables, a multi-normal statistical algorithm automatically adjusts all other anthropometry variables to create manikins that exist within a target publication. This unique “boundary” manikin technique ensures that designers accommodate their entire target population using a minimum number of manikins. The intuitive Graphical User Interface (GUI) permits designers to analyze the functional relationships between anthropometry variables. In addition, the user can define task-related critical values for detailed investigation while Human Measurements Editor determines the values’ remaining variables.

Define and create specified Human Catalogs or “libraries” for common workplace activities and related manikin characteristics or utilize the many predefined catalogs to reduce model setup



Improve productivity using predefined Human Catalogs

- **Static Postures such as Climbing, Crawling/Lying, Sitting/Standing, Kneeling, Reaching/Pointing, and Pushing**
- **Grasping Postures that are linked with the use of tools and equipment**
- **Preferred Angles postures that are related to the comfort, safety and strength or deployment of force**
- **Anthropometry models that are connected to the size of different populations or boundary manikins**
- **Human Task animation for common workplace movement to include Ingress/Egress car, Standing to crawling and Kneeling to standing**

About Dassault Systèmes:

As a world leader in 3D and Product Lifecycle Management (PLM) solutions, Dassault Systèmes brings value to more than 100,000 customers in 80 countries. A pioneer in the 3D software market since 1981, Dassault Systèmes develops and markets PLM application software and services that support industrial processes and provide a 3D vision of the entire lifecycle of products from conception to maintenance to recycling. The Dassault Systèmes portfolio consists of CATIA for designing the virtual product - SolidWorks for 3D mechanical design - DELMIA for virtual production - SIMULIA for virtual testing - ENOVIA for global collaborative lifecycle management, and 3DVIA for online 3D lifelike experiences. Dassault Systèmes is listed on the Nasdaq (DASTY) and Euronext Paris (#13065, DSY.PA) stock exchanges. For more information, visit <http://www.3ds.com>

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