

# Machine & Tooling Designer (EMR-OC)

## Design and Build Virtual Machines in an intuitive 3D environment

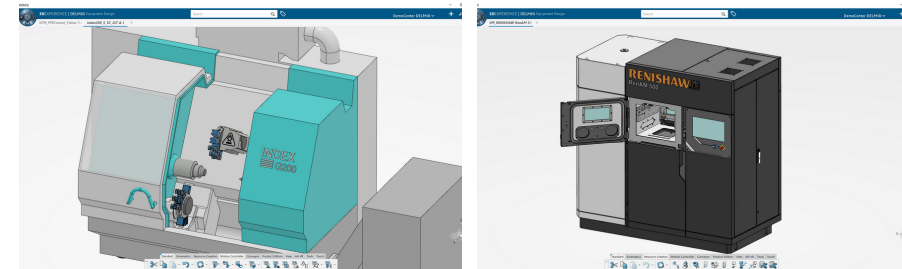
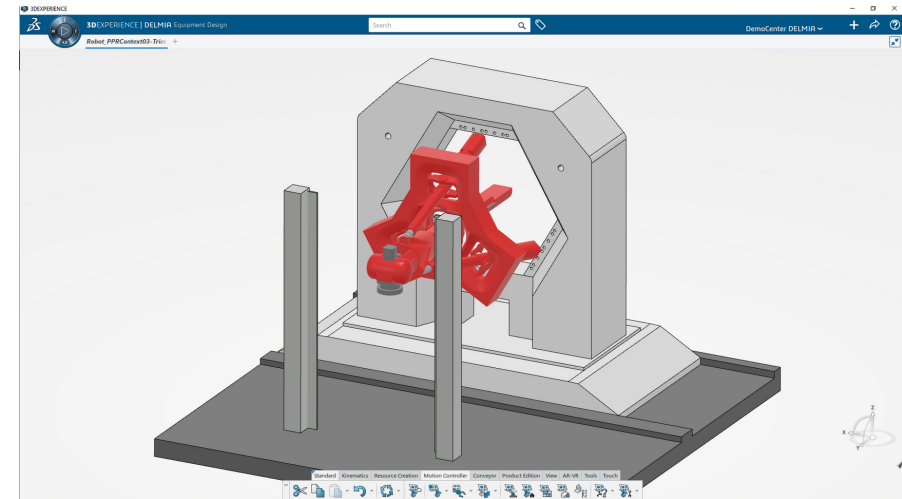
Machine & Tooling Designer (EMR) enables users to model and build virtual equipment—anything from tools and brackets to lift-assist equipment, in an intuitive environment equipped with essential tools. Users can develop and manage the complete machine and equipment design and definition, all while collaborating seamlessly in real time with designers, planners, programmers and simulation engineers on the 3DEXPERIENCE platform.

EMR provides a full suite of powerful tools for designing and validating machines and mechanisms to support production engineering at all levels of the enterprise. EMR's features include automated design tasks that speed up the design process as well as smart positioning of components, freeing up time for innovation. Users can optimize and validate all the mechanical devices used in a manufacturing setting, from simple clamps to NC machine tools, milling, turning and mill-turn machines and complex robotic devices. Users can define axis-motion parameters including travel limits, acceleration, home positions, and speeds. Once a model is validated and saved to a resource catalog, it can be used by planners, programmers, and simulation engineers in a virtual factory context.

## Benefits

### Capture and reuse of resource IP

Save equipment designs on the 3DEXPERIENCE platform or in a catalog for reuse by other stakeholders across the enterprise. Reduce time and effort leveraging corporate intellectual property.



### **Early discovery and resolution of resource-related issues**

Discover issues such as interferences, travel limits, and inadequate reachability during the equipment design cycle. Issues are resolved through seamless collaboration with other stakeholders. Users across the enterprise can collaborate seamlessly in real time on any project on the 3DEXPERIENCE platform. All stakeholders – from process planners to machine programmers and product designers all have access to the most current information. Early discovery and resolution of issues, along with real-time multi-discipline collaboration, saves time and costs throughout the enterprise.

### **Easily create complex machines**

Using the 3D interface, intuitive commands enable the rapid creation of a working kinematic device from an assembly of parts with a limited set of clicks. A combination of a Kinematics Wizard along with a template-based system for applying kinematics ensure easy operation. The device is validated through joint manipulation, simplifying the creation of NC machines, machine tools and custom robots for use by downstream stakeholders. Once validated, the device can be saved in a catalog for retrieval and re-used by other stakeholders. The device is validated through joint manipulation, simplifying the creation of NC machines, machine tools and custom robots for use by downstream stakeholders. Once validated, the device is saved in a catalog for retrieval and re-used by other stakeholders.

### **Collaborate seamlessly across the extended enterprise**

EMR provides complete collaboration and lifecycle management support. The 3DEXPERIENCE®platform enables stakeholders to share data seamlessly across the extended enterprise.

# Highlights

## **Create complex 3D Parts and Assemblies**

Contains the application Part Design Essentials, which provides features such as Boolean operations. Choose between single-part sketching and working in the assembly context, and integrate multiple product views and constraints. EMR allows users to quickly compose assemblies and position parts. Powerful tools pattern and symmetrize parts, and manage the assembly-level impact of functional features such as holes. Clear specification management tools let you make modifications and quickly assess their impact – ideal for multi-user environments and productive iterations.

## **Design and manage product structure**

Includes Product Structure Design; a set of capabilities that allows engineers to both design and manage the assembly structure. It supports change management and collaboration.

## **Capture and reuse templates**

Capture geometrical design and know-how through 3D Templates Capture, which allows engineers to share best practices and avoid duplication of effort. Engineering Templates Reuse capitalizes on existing knowhow to save time and let users focus on innovation.

## **Create and validate kinematic models of manufacturing devices**

Provides a collection of easy-to-use tools for the creation of both forward and inverse kinematic devices. Appropriate kinematic solvers are automatically assigned for revolute, prismatic, and other types of kinematic joints. Using a library of mathematical operators, users can easily create equations when modeling advanced devices. They can jog individual joints or move the device's Tool Center Point in 3D to validate the kinematic definition. Once the kinematics are defined, EMR has the unique ability to store the mapping of the kinematics in a template. This color-based mapping allows other users to apply the same kinematics to other mechanisms of the same type, with just a couple clicks. Machines are built either as a single controlled mechanical device, or as a group of devices being controlled as one to simulate the most complex machines.

### **Assign inverse kinematics to manufacturing devices**

The inverse kinematics functionality allows devices to be driven by commanding Tool Center Point positions instead of device joint positions. EMR provides support for automatic inverse kinematics solvers, generic and numeric, as well as device-specific solvers for industrial machines based on manufacturer specifications. EMR also supports user-defined solvers for custom-made robotic devices to allow users to define the inverse kinematic algorithm for special or experimental machines, and NC machines with fixed or moving beds, rotary axes on a bed or head, and interchangeable heads, as well as mill-turn machines with rotary and mill turrets.

### **Define home positions and joint travel limits**

Define joint values that correspond to states or home positions of the machine for use in manufacturing simulation. Joint travel limits and soft limits let users specify range of motion for validation during simulation. For programming advanced mechanisms, the range of motion can be defined as a formula based on other joint values of the device. Modeling NC machines supports multiple tool change positions, including the position's axis priorities. NC machine table and spindle positions can be defined by identifying the tool and workpiece mount parts & axis systems.

### **Define motion controllers and manage motion groups**

Define both motion controllers and motion groups. Motion controllers allow the end users to specify the grouping of different kinematic devices and the associated behavior. This enables the coordinated motion of resources. An example would be a robot, a mounted weld gun, and an external positioning table working in tandem in a spot-welding scenario. A new interface allows users to better create and manage motion groups in complex scenarios.

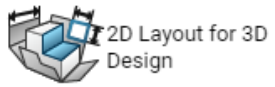
### **Customize controller attributes through profiles**

Define preset controller settings for tools, motion, and accuracy for manufacturing devices with inverse kinematics, such as industrial robots. These profiles allow the manufacturing resource to switch the device controller settings during simulation. It is also possible for users to define their own profile schemas. These profiles can be associated with instructions in the robot program that are downloaded with the program as part of the off-line programming translation.

### **On-the-Go (Offline Mode)**

Disconnect from the 3DEXPERIENCE® platform for up to 30 days. Once disconnected, the user can create geometry and assembly structure, and simulate devices. Home Positions, Tasks and Profiles as well as other features can be created and edited offline. Upon reconnecting, automatic data reconciliation will ensure that changes are preserved in the database.

# APPS



2D Layout for 3D Design



3D Annotation Experience



Design Review



Drafting



Product Structure Design



Quality Rules Reuse



3D Printing



3D Templates Capture



Drafting Template Essentials



Equipment Design



Simulation Finder



System Finder



Assembly Design



Bookmark Editor



Exchange Management



Generative Wireframe & Surface



Change Execution



Collaborative IP Management



Interference Check



Interference Finder



Collaborative Lifecycle



Component Family Definition



Manufacturing Finder



Material Definition



Converter for IGES



Converter for STEP



Mechanical Systems Design



Mfg Context Builder



Data Setup



Design IP Classification



Part Design Essentials



Product Finder