





3DEXPERIENCE CATIA RELEASE HIGHLIGHTS-R2020x



THIS NEW DASSAULT SYSTÈMES' CATIA R2020X RELEASE DELIVERS MULTIPLE ENHANCEMENTS FOR DESIGNERS, ENGINEERS, SYSTEMS ENGINEERS AND CONSTRUCTION PROFESSIONALS.

- For **Everyone** New functionality for 3D Generative Innovator and 3DPlay.
- For **Designers** The new Human Experience Designer role expands the use of virtual humans beyond specialist studies. Powerful enhancements are delivered in CATIA Natural Sketch and ICEM Design Experience.
- For **Engineers**, The new Multi-Disciplines Automated Drafter role extends CATIA Drafting capabilities. Function Driven Generative Designer and Mechanisim Simulation Designer have benefit from increased performance, properties and function.
- For **Systems Engineers** R2020x introduces Systems Synthesis Analyst, which addresses all users in a program, who can now review and analyze traceability. This connects seamlessly to the new CATIA Magic portfolio.
- For **Construction Professionals** New advanced capabilities for steel structures, linear infrastructure design, facade design and IFC interoperability.

For Everyone

CREATIVITY EXPLORATION

3D Generative Innovator



The 3D Generative Innovator role delivers a browser-based on-the-cloud generative modeling environment that uniquely combines graphical visual scripting and interactive 3D-modeling, with the ability to use one or the other interchangeably at any time. This intuitive and smart approach allows creative people



in Architecture, Design/Styling and Engineering to quickly design, explore and validate variations of complex, repetitive and non-regular shapes and patterns. All created geometry is available to be used in the world of detailed design and manufacture through the rich portfolio of roles on the 3DEXPERIENCE Platform.

The Release 2020x expands the power of the solution by introducing seven new sophisticated and powerful operators allowing easier control of the data inside the graph. These give the designer more choice and flexibility in the choice of design methods, and increase creativity through multiple approaches to solving the design challenge.

The user experience has been further enhanced and optimized for mobile/touch devices. For example, casual users on any mobile device can interact with the model and easily vary parameters using sliders.

Users will now be able to model more quickly using the immersive search functionality within the graphical scripting interface. This will reduce time spent clicking on icons and switching between tabs, automatically connecting nodes on the fly.

For Advanced users, 3D Generative Innovator now includes the powerful Engineering Knowledge Language (EKL). EKL is a highly 3D-capable programming language which captures engineering knowledge. It simplifies the programmer's interaction with 3D objects, automating 3D geometry creation. Programmers can re-use logic, create highly efficient algorithms, and integrate them into 3D Generative Innovator, thereby extending the capabilities of the role.

Enhanced 3DPlay

All 3DEXPERIENCE Platform users can now visualize Product Manufacturing Information (PMI) using the enhanced 3DPlay app. This makes the 3D Master definition of the product, including functional tolerances and annotations, available to all users without needing a specialist CAD tool. The results of interference

simulations can also be visualized in 3DPlay, in addition to CATIA Composer assets.



For Designers

NEW ROLE: HUMAN EXPERIENCE DESIGNER





The new Human Experience Designer role expands the use of virtual humans beyond specialist studies. Nowany 3DEXPERIENCE user can access a variety of realistic virtual humans to better create, engineer, simulate and validate their products, environments and experiences.

These highly realistic virtual humans allow users to understand and optimize the consumer experience of a product design by animating the interaction of a human with the product, and to better explore that experience as a result. Complex human animations (eg. turning a steering wheel) can be created or imported and analysed. Each skeleton joint can be bounded in motion, and can connect and interact with dynamic objects to ensure realistic simulation. A variety of human manikins can be used to optimize proportion and ensure product usability for a range of human sizes. Animations can be replayed and studied, allowing full consideration of the human experience, including in virtual reality where the highly realistic human avatars enhance the experience. High quality renderings can be created.

For example, this allows architects to show people in the context of the building and to experience the interaction with building machinery such as an escalator, from the human point of view.

In R2019x we introduced the ability to sketch immersively in 3D Virtual Reality using CATIA Natural Sketch with HTC Vive HMD (Head Mounted Display). This way of 3D Sketching extends the ability to express and communicate creativity and to transform 2D ideas into a 3D reality.



In R2020x the immersive user experience has been enhanced to allow a more natural and intuitive experience, with

IMMERSIVE DESIGN EXPERIENCE WITH 3D NATURAL SKETCHING



refinements to the user interface to ensure effective interactivity with the VR controller. Discovery of the application is simplified and follows a gradual sequence of actions for a more consistent and efficient workflow. The user's commonly used colors are now stored and easily accessible under the wheel of the new color palette.



ENHANCED APP: CATIA ICEM DESIGN EXPERIENCE

ICEM Design Experience, introduced in R2019x, is a new generation of surface modeling App. for Computer Aided Styling (CAS) and Class-A surface modelers.

R2020x delivers new levels of productivity, innovation and collaboration.

Productivity: R2020x introduces productivity enhancements for selecting geometry, shape control, display and navigation.

Innovation: "OMNI" smart technology, which recognizes and predicts the designer's intent based upon his geometry selection, is extended with the new OMNIPlane and OMNICurve capabilities.

Collaboration: With ICEM Design Experience, Computer CAS and Class-A surface modellers can now seamlessly connect with the enterprise on the 3DEXPERIENCE platform, taking advantage of full digital continuity across

For Engineers

NEW ROLE: MULTI-DISCIPLINES AUTOMATED DRAFTER

INCREASED PRODUCTIVITY

R2020x introduces the Multi-Disciplines Automated Drafter role which extends CATIA drafting with functions and content for rule-based automatic generation of specialized drawings for heavy industries such as Marine & Offshore, Energy & Materials and Construction. Customers in these industries require the creation of 10,000's of specialized drawings and will benefit from a major increase in speed and accuracy with the smart automatic generation of industrystandard compliant drawings from (and synchronization with) the master 3D model.



In the shipbuilding industry, for example, engineers can easily create a range of multi-view Frame Drawings for consecutive frames, complete with symbols and annotations, based on templates and rules. Once the first multi view drawing has been defined, it can be applied to any other 3D frames or assemblies to automatically generate the corresponding drawings.

Customers will reduce certification document production costs and improve quality. This technology comes from the mid-2017 acquisition of AITAC, now available natively on the 3DEXPERIENCE Platform, demonstrating Dassault Systemes commitment and ability to consolidate capabilities on one platform.





EXPERIENCE THINKING IN MOTION

The Mechanism Simulation Designer role already delivers a customer and industry proven experience for Kinematics, fully integrated into the 3D product definition. R2020x extends this solution with new capabilities for rigid body dynamics and the introduction of humans in the context of mechanisms.

Rigid body dynamics benefits from enhanced performance and accuracy, including contact management with intermittent contact and the inclusion of friction properties.

Simulation benefits from the availability of more excitations and measures, allowing users to simulate more scenarios. For example, you can define a law and use it to apply a controlled variable force.

In addition, human manikins can be added to the design context to allow study of the human's interaction with the mechanism.



ENHANCED APP: FUNCTION DRIVEN GENERATIVE DESIGNER

EXTEND FUNCTION DRIVEN EXPLORATION

The "Function Driven Generative Designer" role, allows designers to automatically generate optimized conceptual parts and assemblies from functional specifications. The designer simply provides a set of requirements, including the 3D envelope, connections, the loading scenario, material, weight reduction targets for lightweight engineering, and the desired manufacturing process, either traditional, such as milling, casting or forging, or additive manufacturing. The push of a button runs a simulation process and generates the optimized concept assembly shapes. The geometry created by the optimization is class-leading in quality, consisting of real CATIA surface geometry, usable directly in all other CATIA roles.

In R2020x we introduce seamless integration between GDE and advanced SIMULIA roles for Stress Analysts. Advanced FEA users can use a SIMULIA role to refine or add specialized properties to the part or assembly (E.g., inertia matrix rather than a simple point mass). GDE will then take this setup into consideration during the optimization, or provide warnings in the case of incompatible simulation objects.

Now for a given family of parts, a stress analysis expert can set up a template, including loading and boundary conditions, meshing specifications, some of which may be regulatory. The designer can then apply that template to a new part design, ensuring rapid and accurate setup and a faster optimized part which is compliant with the expert template.

Virtual contacts can now be created, without the need to model the surrounding parts. Centrifugal forces can now be incorporated in the optimization process.

With Milling Assistant, which creates parts optimized for the milling process, productivity is enhanced through the ability to define symmetries, reducing setup time.



Symmetrized side

Masterside

Dimensioning is done on the master side.





For Systems Engineers

ENHANCED APP: ELECTRICAL AND ELECTRONICS ARCHITECT

The Electrical and Electronic Architect role allows webbased definition, development & management of embedded electronics and software across a complete vehicle and its variants. Following an initial focus on T&M, we have worked with major A&D companies to refine and extend the solution to address Integrated Modular Avionics (IMA) architectures.

This release has been enriched with an extended data model to better model hardware architectures and to support the structuring and positioning of electrical & electronic equipment in racks. It has also been extended to support Avionics Software Architecture definition based on the ARINC653 standard.



Architects can work and collaborate in the context of a shared complete vehicle architecture on the 3DEXPERIENCE Platform, removing design errors and misunderstandings.



which enables architects (system, electrical & electronic, software) to have a complete view of the project to ensure compliance at all levels (traceability), organise collaboration, and generate reports. R2020x introduces a complementary role, Systems Synthesis Analyst, which addresses all users in a program, who can now review and analyse traceability. This enables end-to-end traceability and collaboration on systems models. Both roles connect seamlessly to the new CATIA Magic portfolio, coming from the acquisition of "No Magic" in June 2018. Connection is through Magic Collaboration Studio, which enables collaboration on live data.

The CATIA Magic portfolio provides:

- The most standard-compliant solution on the market (DoDAF 2.0, MODAF, NAF 4, UAF and UPDM standards) for Systems of Systems engineering as well as the definition of Enterprise Architectures.
- A 100% SysML standard compliant solution for Systems Architecture. It enables running engineering analysis for design decisions evaluation and requirements verification, continuously checking model consistency and tracking design progress.
- A UML standard-compliant solution for defining software architectures.









All of these architectures can be simulated based on the fUML, SCXML, and other standards.

This "model-in-the-loop" simulation can be supplemented with the "requirements-in-the-loop simulation" delivered through the STIMULUS portfolio. This unique technology, from the acquisition of Argosim in January 2019, allows the early identification of inconsistencies between requirements. Systems architects can simulate requirements to detect incorrect, missing or conflicting requirements before design begins. Later in the design cycle the validation engineer can simulate requirements to check that the system actually complies with its specification

For Construction

ENHANCED APPS FOR CONSTRUCTION CITIES AND TERRITORIES

LARGE CLOUD OF POINTS

In R2020x massive point cloud files, containing millions of points, can be imported individually or in batch mode. Once imported, these large point clouds can be visualized, analysed, refined and edited. CATIA automatically recognizes 3D primitives in the point clouds, and the parameters of these primitives can be edited and controlled. Polyhedral surfaces (meshes) created from point clouds can be used in boolean operations with exact geometry such as NURBS surfaces, volumes or solids.

Using this approach, a large point cloud can be used to sculpt a complex terrain. This automation technology creates a parametric model enabling the quick and easy calculation of accurate volumes in many scenarios, specifically the calculation of excavations, and fillings for earthworks, determining excavation depth for a desired volume, or sub-dividing the terrain into precise quantities for machine planning.







ENHANCED APPS FOR CONSTRUCTION CITIES AND TERRITORIES



into connections and rapidly replicated around the building as PowerCopies.

Road and rail surface design benefits from an enhanced template-based approach which provides the ability to design a section-driven road or railway surface, while taking into account superelevation, transition lengths between sections and subgrade layers. The layers of materials composing the road or railway are defined within each section, and as a result of this process, the subgrade and earthworks computations can be completed within a single command.



R2020x further enriches the industry-focused 3DEXPERIENCE CATIA solution for Construction Cities and Territories, which addresses all participants in the end-to-end building process. This release delivers new advanced capabilities for steel structures, linear infrastructure design, facade design and IFC

For steel structures design, new highly productive detailing features enable the rapid creation of plates, stiffeners, coping and hole patterns to structural members in order to create steel connections. These steel detailing members are grouped

Façade Designers will benefit from the ability to

quickly pattern building facades. For instance, elevation planes can be used to control patterning and it is now possible to offset a façade from a surface to create multi-layered facades. Also, automation is increased by enabling the extraction of façade panels to be used as inputs for Engineering Templates, connecting designers with manufacturers to model highly detailed facades for fabrication.

interoperability.

This release also includes a new user experience and enhancements for importing Industry Foundation Classes (IFC) BIM models with options available according to the user's anticipated use of the data.



Our **3D**EXPERIENCE® platform powers our brand applications, serving 11 industries, and provides a rich portfolio of industry solution experiences.

Dassault Systèmes, the **3DEXPERIENCE**® Company, provides business and people with virtual universes to imagine sustainable innovations. Its world-leading solutions transform the way products are designed, produced, and supported. Dassault Systèmes' collaborative solutions foster social innovation, expanding possibilities for the virtual world to improve the real world. The group brings value to over 210,000 customers of all sizes in all industries in more than 140 countries. For more information, visit **www.3ds.com**.





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