

INTRODUCING ICEM DESIGN EXPERIENCE

The new generation of surface modeling for CAS and Class A

INDUSTRY CHALLENGES

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EXECUTIVE SUMMARY

In the surface modeling world, detail is everything. The flowing lines and careful interplay of light and shade across the body of a sports car; the super sleek curvature of a luxury jet, or even the precisely rounded corners of a smart high-tech consumer product - they're some of the most scrutinized surfaces in existence. That is because the overall look, feel and perceived quality of a product in the eyes of the consumer will most likely determine its market appeal.

Traditionally, styling and engineering complex 3D forms has been a multifaceted and convoluted process. Computer aided styling (CAS) designers, tasked with conceptualizing visually exciting products, must balance style, form and function. Class A modelers must then transform these styling concepts into manufacturing quality data, taking into account preliminary feasibility and budget constraints. Different tasks using different software applications demands the constant exchange and exporting of data back and forth between them.



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But as product development cycles shorten and the race to market intensifies, designers and engineers need a new approach. They need technology that enables them to work collaboratively and concurrently. They need tools that allow them to combine aesthetic and functional requirements from day one. They need to ensure manufacturing feasibility early in the development lifecycle. And they need to be able to rapidly iterate design concepts to launch the very best products.

The industry is calling for a new surface modeling tool that satisfies the complex needs of both CAS concept modeling and Class A surface modeling, bringing them together in a single environment. And we have the answer.

ICEM Design Experience is the new generation modeling application on the **3DEXPERIENCE®** platform. It gives CAS designers the ability to bring innovative concepts to life quickly, then pass this same concept model to Class A teams to finish the design, while preserving the

artistic intent and incorporating engineering and manufacturing requirements. Concepts are translated into usable data easily. Designers benefit from fully integrated and unified workflows that allow them to mix and match different mathematical approaches and design methodologies. Accurate visualization tools show every subtle shadow and reflection as the lights hit each part of the object's surface, exactly as it would be seen in the real world.

Until now, CAS designers and Class A modelers have had to rely on multiple applications to take advantage of best-in-class functionality. They had to choose between creativity, productivity and collaboration.

ICEM Design Experience delivers the best of all worlds – a creative user interface, simple but robust associativity and strong collaboration.

A new level of creative modeling productivity, collaboration and innovation is here.

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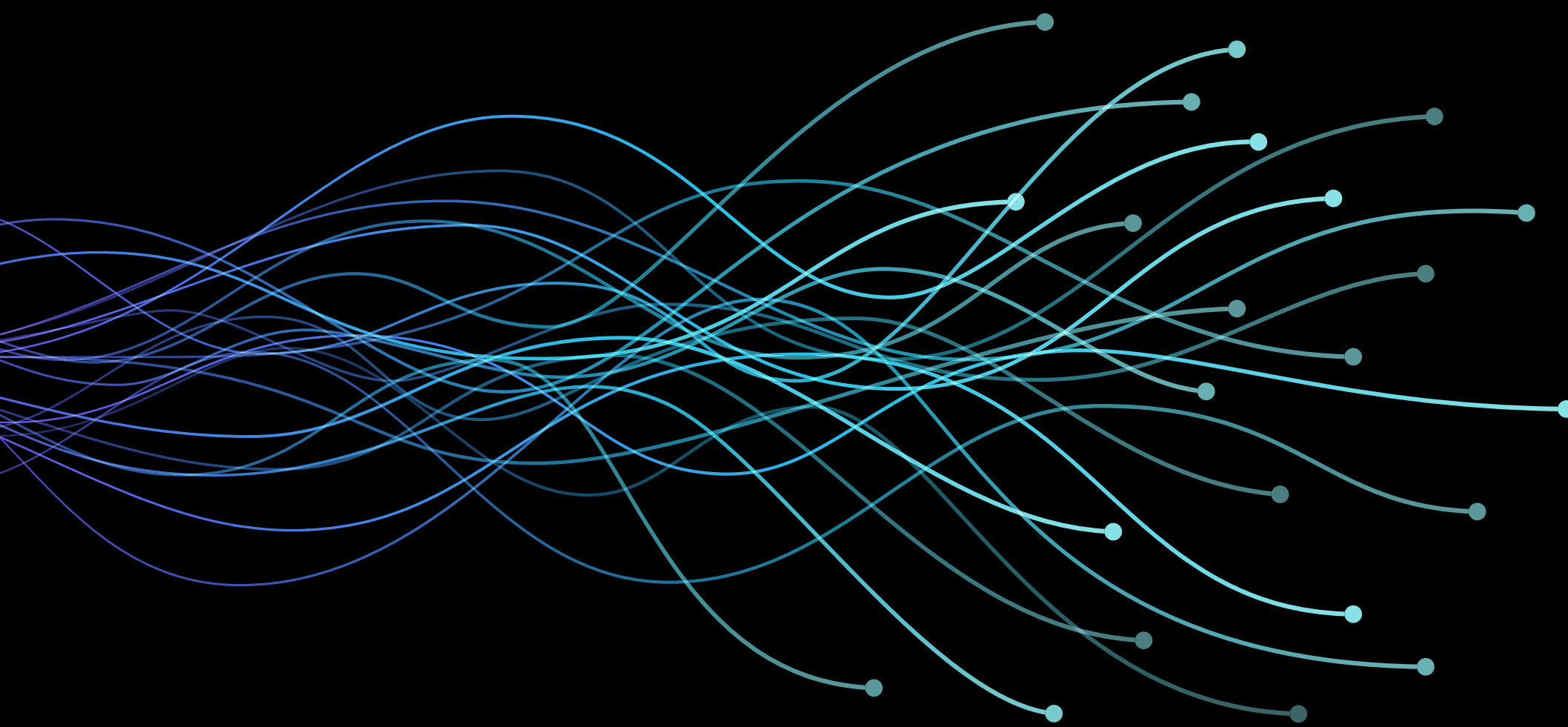
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Faster Product Development

The trend is being driven by greater consumer demand for choice. Businesses across all consumer-facing industries are under pressure to develop appealing, innovative products that cater to diverse needs and preferences while keeping costs and delivery times on track. This invariably leads to shorter design cycles, higher product variability and a faster pace of technological innovation that requires even greater flexibility and agility throughout the product development process.

It's not making the jobs of designers and engineers any easier. As manufacturers race to keep up with the technological desires of consumers, so too must design and engineering teams come up with new production-ready concepts faster – concepts distinguished by their style, aesthetics and quality.



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More constraints and regulations

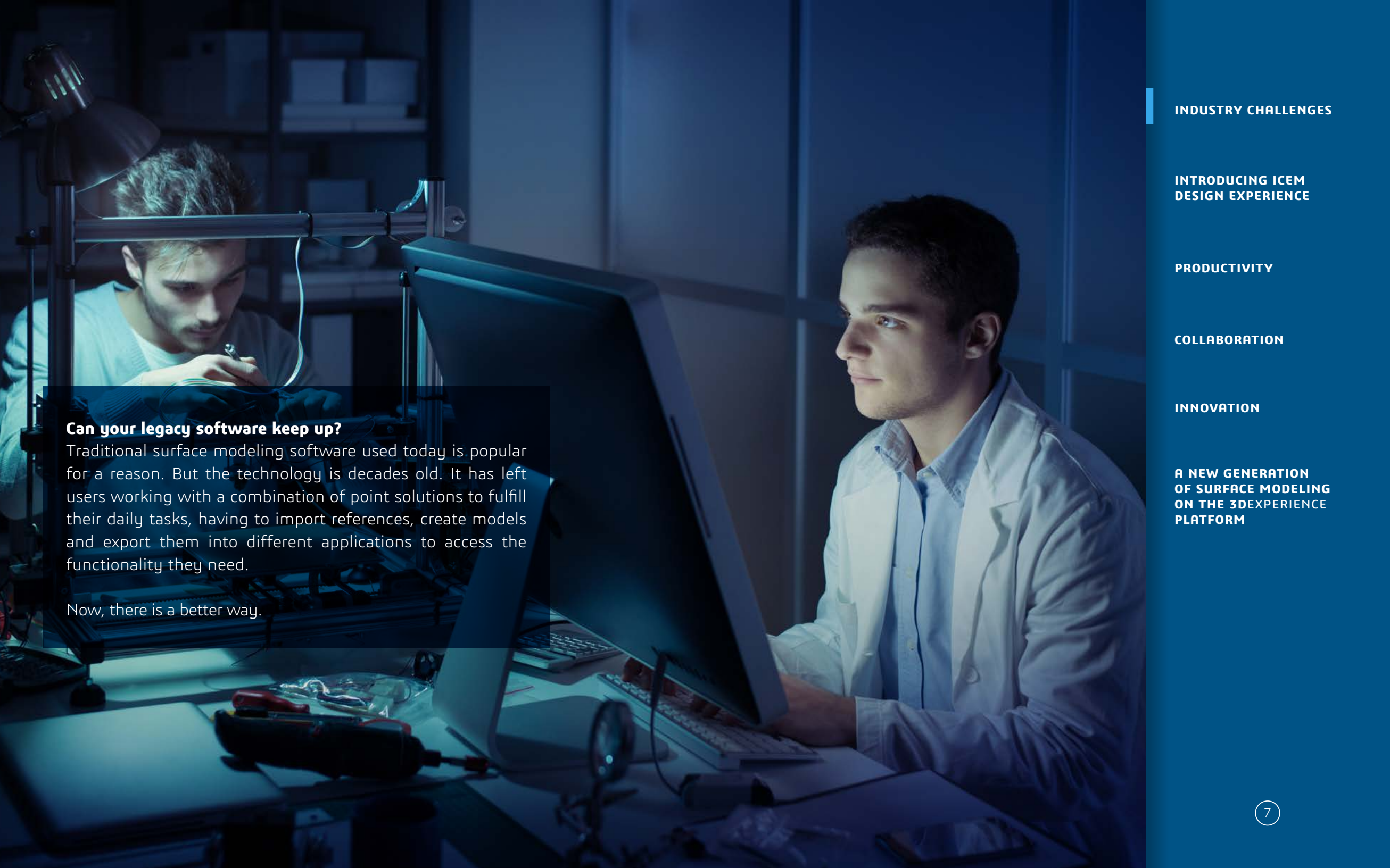
With new technology brings ever-growing constraints and regulations. This equates to huge complexity, all to be handled in ever shortening timeframes.

Now, even at the sketching stage, designers do not have a completely free hand. In the automotive sector, for example, they must comply with predefined vehicle requirements as well as technical conditions such as the wheelbase, trunk volume and safety features. Their role is further complicated by ever-growing industry rules and regulations, often varying between different markets and regions, which must be considered from the very beginning.

Greater product complexity

Product complexity is increasing too, leading to more integrated 3D modeling between software interfaces and hardware design. Across all industries, we're seeing the progressive elimination of physical controls – handles, buttons, knobs and switches – as new screens and interfaces continue to multiply. All these technological innovations need to be integrated into surfaces in such a way that users perceive them as functional, sensible and visually appealing.

And as these new technologies are constantly introduced and improved upon, they throw up constant changes and design iterations throughout the product development process. It's creating an even greater need for speed and flexibility.



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Can your legacy software keep up?

Traditional surface modeling software used today is popular for a reason. But the technology is decades old. It has left users working with a combination of point solutions to fulfill their daily tasks, having to import references, create models and export them into different applications to access the functionality they need.

Now, there is a better way.



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ICEM Design Experience (IDX) is a new specialized modeling application on the **3DEXPERIENCE** platform for CAS and Class A surfacing specialists. It delivers a comprehensive and completely integrated set of tools for industrial design, providing a high level of design freedom, an efficient and intuitive user interface, and precise, industry-leading surface results.

Built on industry-leading technology

ICEM Design Experience has all the hallmarks of an industry-leading explicit geometry modeling tool for defining, analyzing, and visualizing complex free-form surface models to the highest quality. What separates ICEM Design Experience from other tools on the market is that it introduces a new robust soft parametric technology that gives users flexible rapid modification abilities. It builds on the best-in-class capabilities from ICEM Surf and CATIA ICEM Shape Design and combines explicit and soft

associative modeling styles for a flexible design workflow. Users are empowered to explore new design opportunities and enjoy even more productive creativity.

Targeted for use in product design processes throughout the automotive, aerospace and consumer goods industries, ICEM Design Experience supports all modelling disciplines. This includes SubD surface modeling, CAS, Class A and reverse engineering, perfectly integrated through the **3DEXPERIENCE** platform with all other available apps and roles, such as immersive virtual reality reviews, interactive presentation experiences, and sophisticated simulation modeling.

The end-to-end design application enables designers to create high precision surfaces, detect subtle surface problems and check for compliance with regulations, while simultaneously performing and experiencing real-time 3D visualization.

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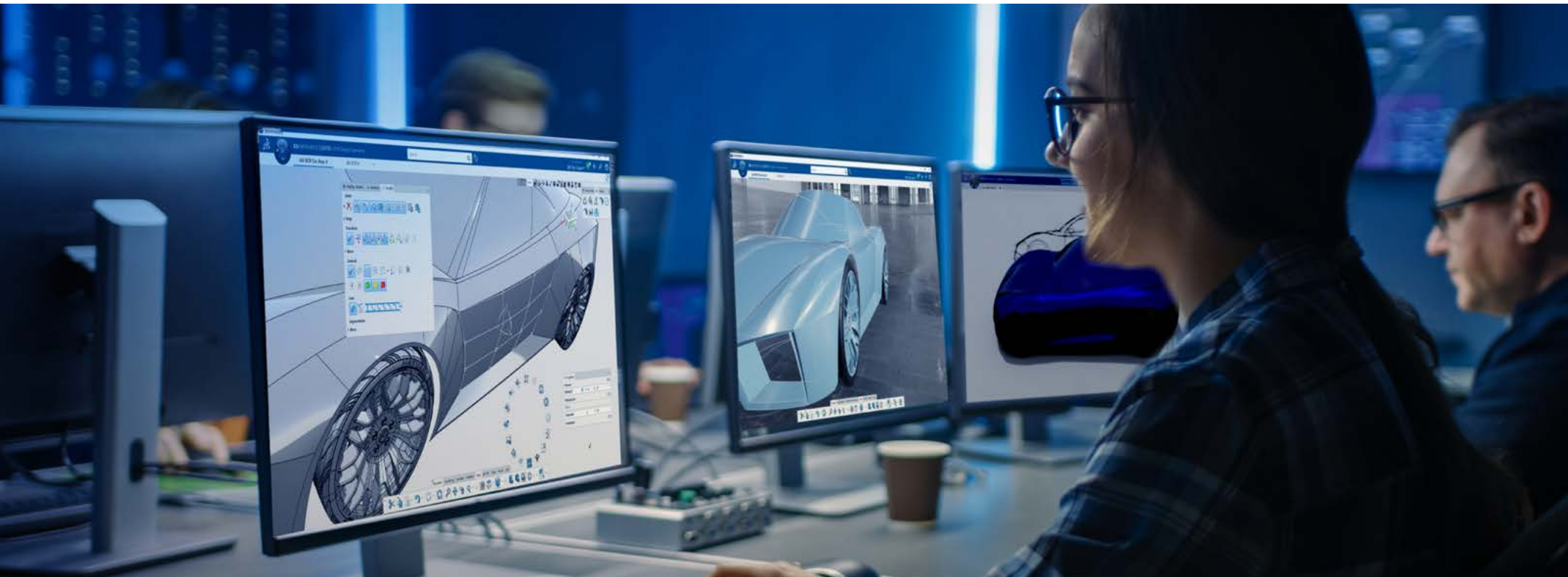
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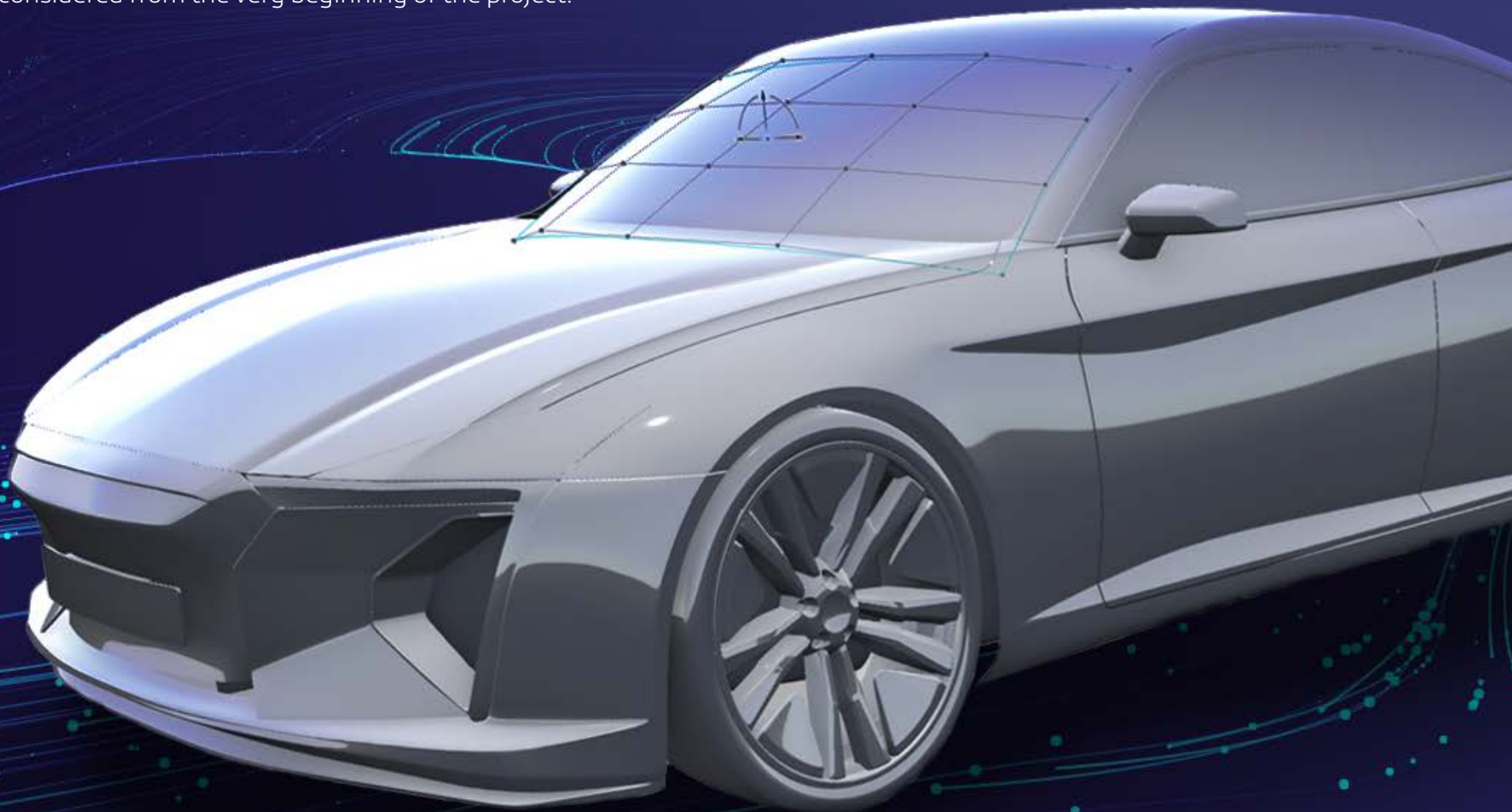


Everything about ICEM Design Experience is new:

- A completely redesigned user experience, introducing new navigation concepts and tools and enhanced visualization capabilities, all focused on the specific needs of the CAS and Class A surface modeler
- Designers can now combine and switch between different mathematical approaches and design methodologies
- The **3DEXPERIENCE** platform brings together all data in one place with an integrated platform approach. This provides designers with direct access to mechanical, electrical and manufacturing engineering data. With a simple click, all stakeholders are considered from the very beginning of the project.

Design tools of the past may have hampered designers from exploring their full creative potential. Now, they have an opportunity to design with complete freedom, where the only limitation is their imagination.

It's time for a new, integrated approach from design to manufacturing to product experience, centered on productivity, collaboration and innovation.



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ICEM Design Experience is a specialized application and user experience for CAS and Class A surface modeling, made for and with CAS and Class A expert users. The application has been built from the ground up to focus on quality, efficiency and ease of use.

Intuitive interface

ICEM Design Experience has a completely new graphical interface with a customizable menu and shortcuts. The user can choose between ICEM Surf or CATIA navigation, taking advantage of mouse menu accelerators to get to the functions and tools they need faster.

Developers carefully analyzed typical modelling scenarios in various popular surfacing applications to identify which commands

are used most of the time. This determined how mouse miles could subsequently be reduced, placing popular commands in the optimum location where they can be easily accessed.

Smart, innovative omnifeatures also provide users with the appropriate tool based on their geometry selection. This accelerates creation by offering only relevant options. All required references, settings and parameters are stored within the feature to intelligently adapt to design changes automatically.

Predefined display shaders improve the visualization experience. They make it quicker and easier to review and spot surface imperfections with a selection of finely tuned finishes, offering appropriate backgrounds for instant, dynamic visual feedback.

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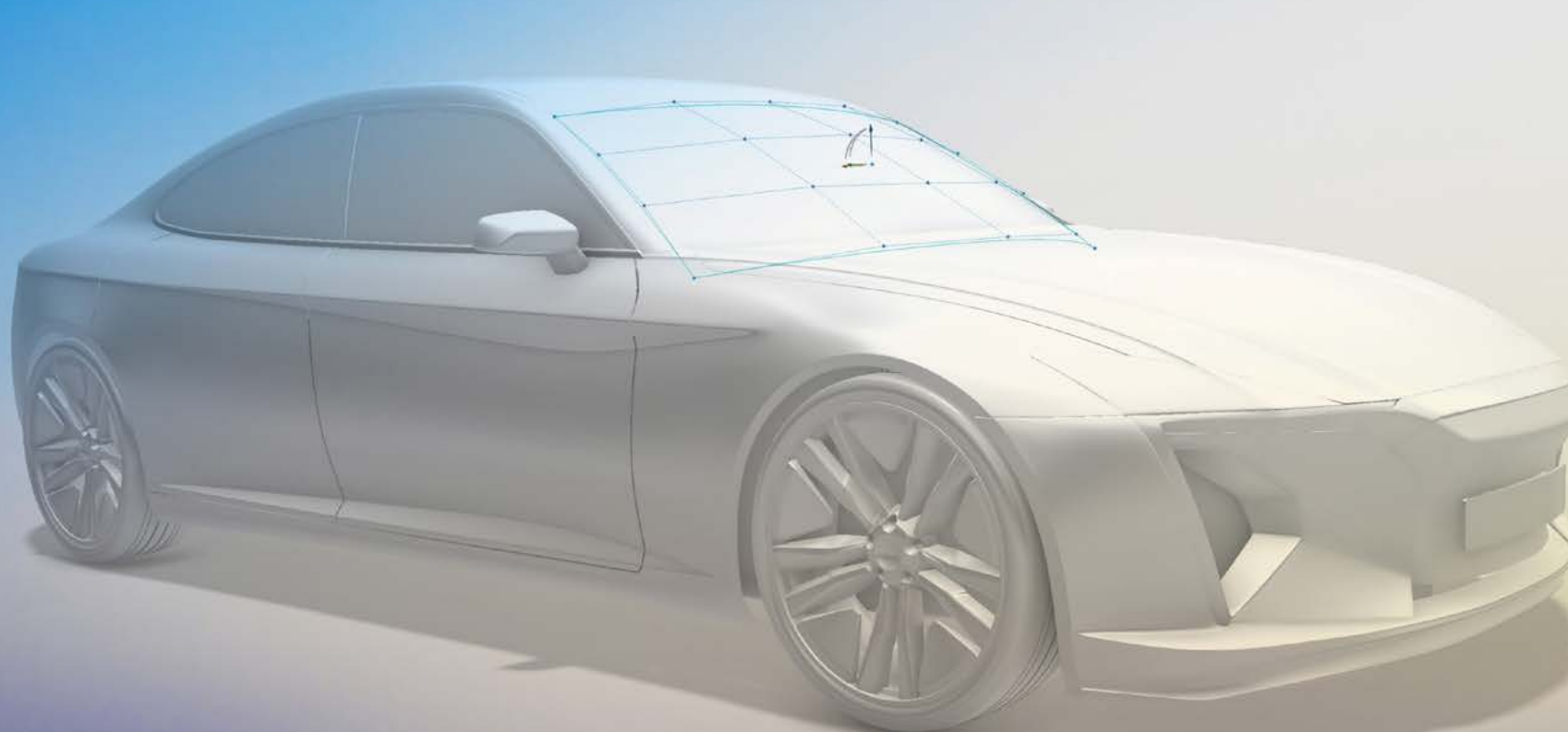
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Streamlined design engineering processes

With all data stored centrally within the **3DEXPERIENCE** platform, designers can quickly retrieve all the mechanical and electrical data they need to shape their initial design concepts, considering all requirements and restraints from the very beginning.

- No losing time or data. With ICEM Design Experience, all users know that they are always working with the latest version. Data is securely shared with the right people, at the right time, with the appropriate credentials.

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Real-time dynamic shape modelling

Sculpting curves and surfaces is fundamental in CAS and Class A workflows. ICEM Design Experience offers a wide selection of sculpting tools to dynamically shape designs. Users can directly push and pull the geometry and see it update in real time. Associative connections to other geometries help to explore more styling themes, and work around the physical and technical constraints from the beginning.

New modifiers and view options include:



Global and Greville points



Torque handles for curves and surfaces

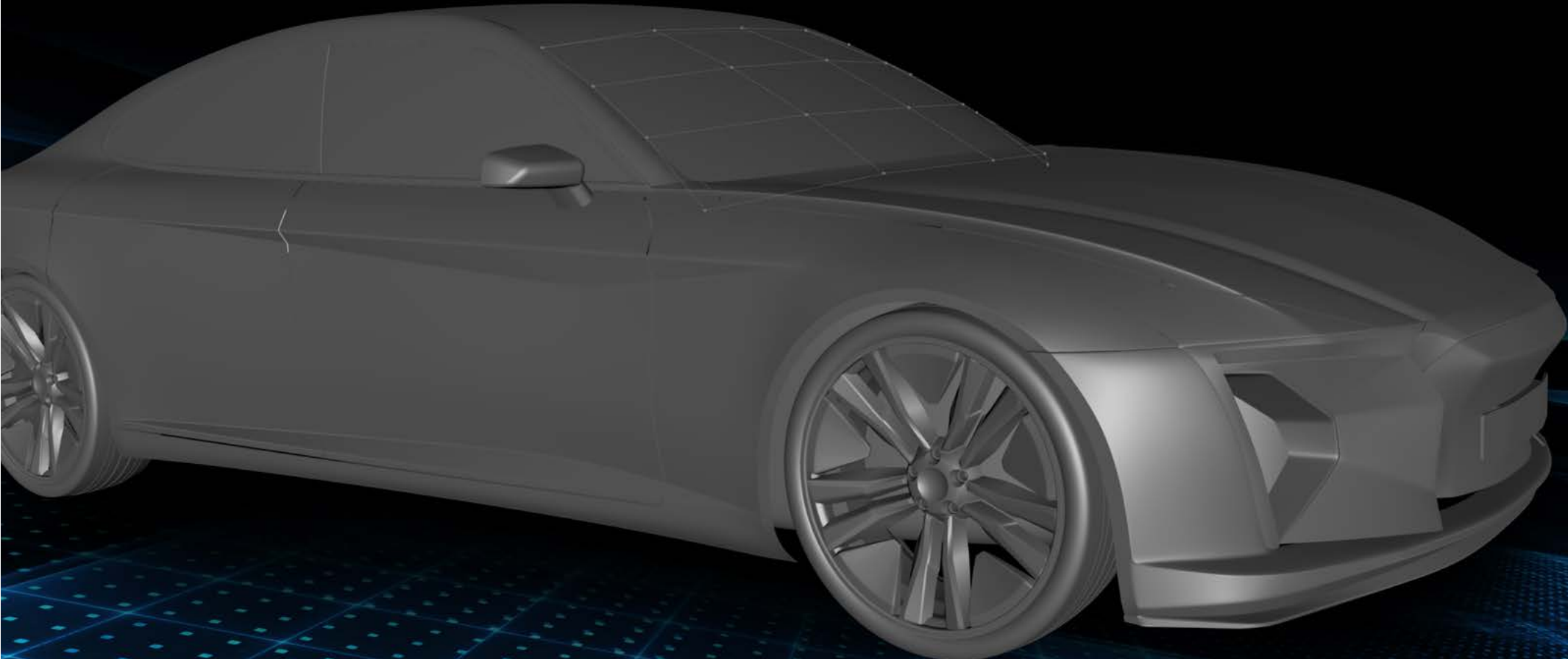


Stretch view to exaggerate shapes



Curve modifier box

With this approach, designers can easily get to the right shapes more quickly, allowing more time for refinement. This leads to higher quality, precise models that keep to the predefined requirements, delivering feasible models on time.



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Reverse engineering productivity

ICEM Design Experience empowers designers to create surfaces from external point cloud data, supporting reverse engineering workflows. The solution's reverse engineering capabilities allow designers to create automatic and semi-automatic feasibility models from a mesh to Class B up to 60% faster compared to more traditional methods.

Of course, physical models remain a vital part of the design process. But capturing the scale and proportion of a clay model in 3D usually requires time and skill to recreate the model to the right tolerance and quality. ICEM Design Experience offers designers a set of powerful but simple tools to rapidly prepare and analyze

scan data, with smart features to extract the key styling cues and feature lines, maintaining the design intent for further development and refinement.

ICEM Design Experience natively includes some of the essential reverse engineering tools including:

- Fictive edge to build theoretical lines from scan
- Contrast maps to highlight feature lines in the scan
- Deviation analysis to check the tolerance to the scan
- Image edition to choose, locate and scale images or sketches as a tracing reference.



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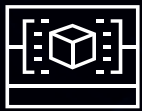
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ROLE-BASED USER EXPERIENCES

ICEM Design Experience has been created to deliver the right tool for the right job, and empower all users to collaborate both within their own team and across other departments, including engineering, manufacturing and simulation.

The application's rich capabilities have been classified into five role-based user experiences:



Style and Class A modeler

- 3D sketch and subdivision
- Human design
- CATIA Icem
- High-end rendering



Class A expert

- 3D sketch and subdivision
- Human design
- Reverse engineering
- CATIA Icem Expert
- High-end rendering
- Experience presentation with virtual reality



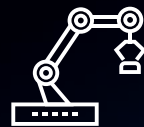
Transportation designer

- 3D sketch and subdivision
- Human design with animation
- Reverse engineering
- CATIA Icem Expert
- High-end rendering
- Experience presentation with virtual reality
- Mechanical design basics



Surface modeler for aerospace and defense

- 3D sketch and subdivision
- Human design with animation
- Reverse engineering
- CATIA Icem Expert
- High-end rendering
- Core mechanical design



Heavy machinery digital modeler

- 3D sketch and subdivision
- Human design with animation
- Reverse engineering
- CATIA Icem Expert
- High-end rendering
- Core mechanical design

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Linking Design & Engineering

ICEM Design Experience was created to seamlessly integrate design and engineering data in a single environment. With everything available in one place, designers can share their initial design concepts with engineering earlier, and engineers can incorporate their feedback at the earliest stages of product development.

The solution's concurrent engineering capabilities enable users to:

- Quickly produce 3D volumes from scanned physical models to pass to feasibility engineers early on to address surface problems faster
- Get data to those who need it quicker and expedite the development process
- Undertake feasibility studies with suppliers and the engineering and manufacturing groups as the design develops so that any potential problems can be detected at a stage in the development when the design can be changed more easily
- Ensure everyone involved is always working with the most up-to-date design information
- Compare new and previous versions side by side
- Share data with only those who are authorized to see it. Built-in data security ensures that only the right people have access to the data, and only the owners, or those with the correct credentials, can see or change it.

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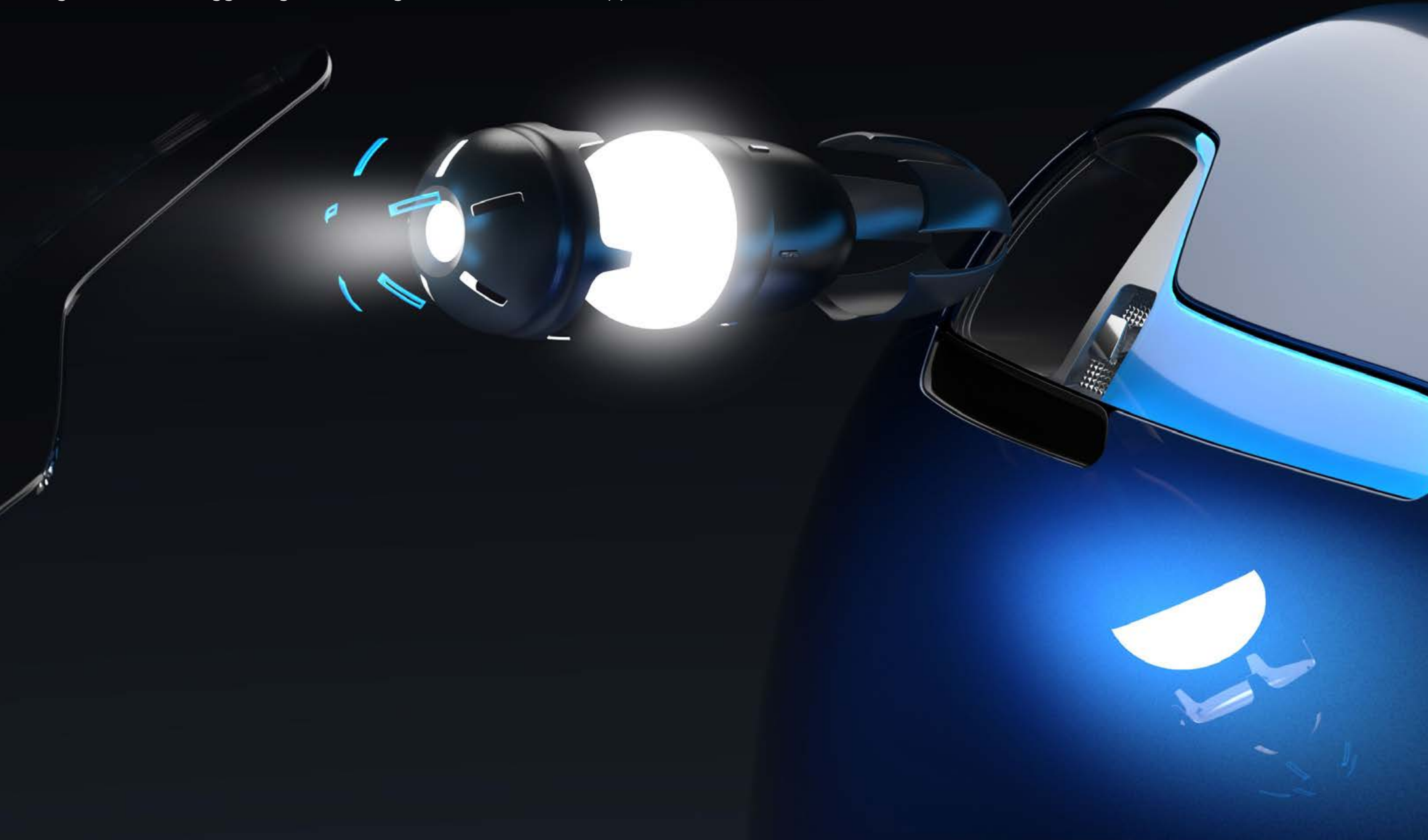
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ICEM Design Experience is the surface design tool that industrial designers have been calling for.

Hybrid modeling approaches

Do you prefer Bezier or Nurbs modelling? A curve or surface-based approach? With ICEM Design Experience, you can choose your methodology, way of working and mathematical approach.

In this unified modeling paradigm, different methods can be used simultaneously, without limitation, bringing together classical techniques with the latest technology.



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New design concepts

ICEM Design Experience introduces new sculpting workflow strategies, together with the latest ICEM technologies, such as Omni-feature and soft parametrics, with adaptable features to suit the needs of high-end surface modelers.

Omni-feature:

This new smart feature concept allows the user to create many different types of surface with a single command. Based on what the user selects, they are presented with the appropriate result type. For example, one edge creates a flange, while two separate edges create a blend, or two join a sweep and so on. This saves time and mouse miles by only displaying the relevant options for the surface type being created.

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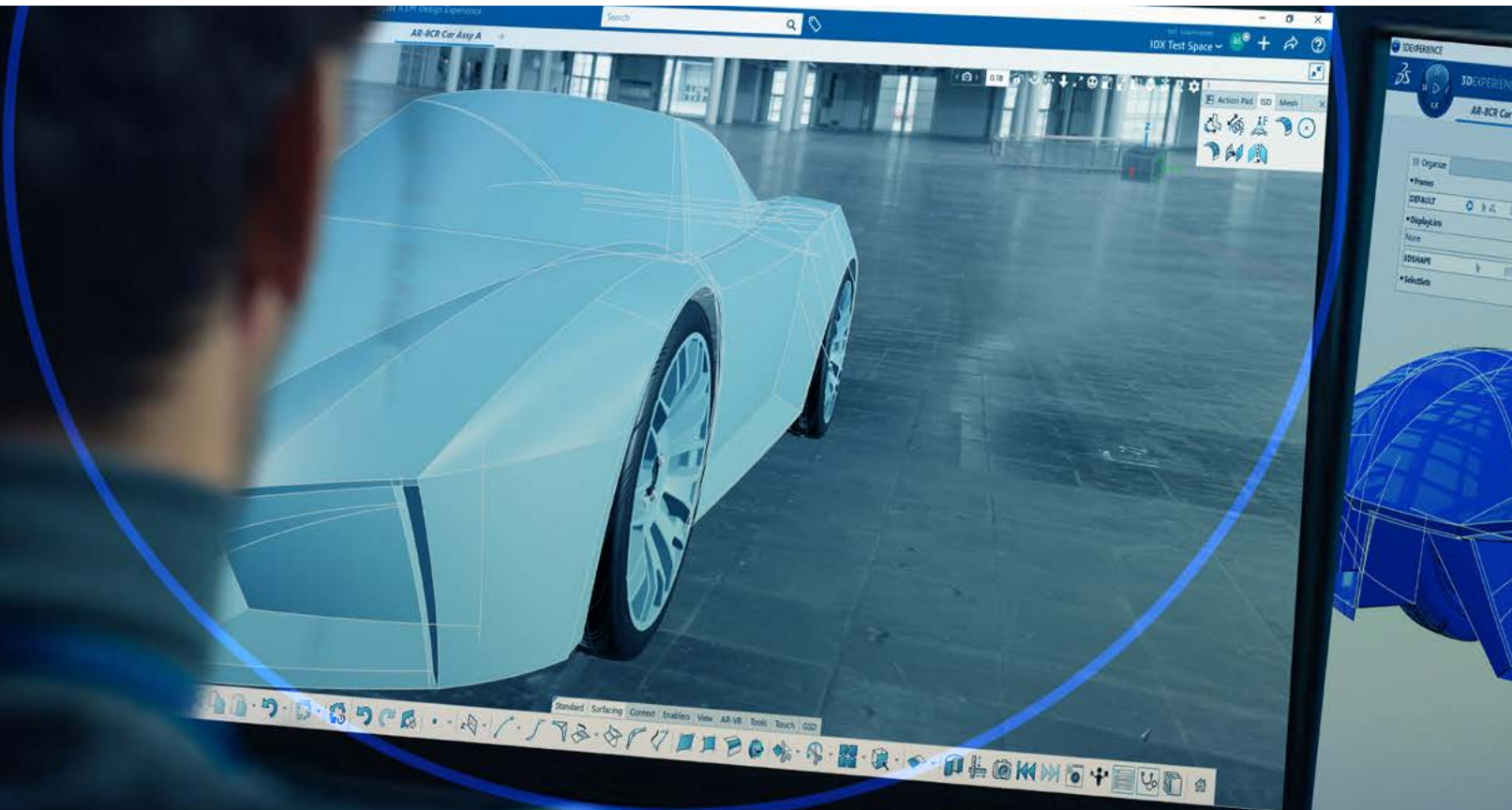
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Soft parametrics:

Switch between different modes to determine whether a design update does or doesn't modify the geometry, turning associativity on and off according to user preferences and needs. The modeler can choose between several levels of associativity they desire per feature, and even change it later down the line. For example, they can leave the feature associativity inactive, so it won't respond to changes in its references. Or they can choose 'adapt,' which allows the feature to stretch itself if the inputs change their shape or position. The levels go all the way up to the full parametric associativity CATIA users are familiar with. Plus, with 'reshape,' you can combine parametric modelling and direct modelling, obtaining the best of both worlds – associativity combined with styling intent. This is unique in the market.

To complement soft parametrics, ICEM Design Experience also introduces the concept of 'Frames,' which allow the user to easily organize the associativity in their models at the top level. They can selectively define areas where all associative updates are temporarily paused, leaving only the current work in progress active to improve performance in larger and more complex models.

With these combined capabilities, designers can create and modify highly stylized shapes and advanced forms in a fraction of the time. Compared to traditional surface modeling software, modelers will benefit from this faster, more efficient modeling approach.



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New virtual reality experiences

High performance visualization and virtual reality capabilities help designers explore materials, finishes, textures and colors in the virtual world. They can take advantage of real-time rendering to see and compare their designs with photorealistic reflections, shadows, lighting and environments.

Advanced virtual reality capabilities enable designers to review their models in a true 1:1 scale, providing them with a real-world proportion experience previously only possible through expensive and time-consuming physical prototypes and mock-ups.

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The **3DEXPERIENCE** platform is an industry-leading collaborative environment that empowers businesses and people to innovate in entirely new ways and create products and services using virtual experiences. It provides a real-time view of business processes across disciplines and organizations, connecting people, ideas and data.

Available on premise and on the cloud, the platform brings enterprise-level technology capabilities and rich industry functionality to all, supporting multiple disciplines from design and engineering to manufacturing to collaborate on the same data models within an integrated environment.

Companies benefit from a completely connected experience and integrated workflows from design to manufacturing to product experience, enabling them to build differentiating products and experiences in a highly collaborative manner.

Key benefits of the 3DEXPERIENCE platform

- Streamlined efficient workflows at a corporate level
- Securely opening up design data so it's more accessible early on
- Simplified IT structures: one IT platform covers everything
- Transparency: all data is accessible on the platform
- Industry-leading data management and security: roles keep information that needs to be confidential completely secure
- Available on cloud with all associated benefits, including flexibility, scalability, automatic upgrades and fast return on investment.

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At Dassault Systèmes, we strongly believe that virtual universes are a key enabler for our customers to imagine, design, test and build the new generation of innovative products. We work with the world's leading companies to build thriving and sustainable industries and products through the power of virtual technology on the **3DEXPERIENCE** platform. They trust in us to help inject productivity, collaboration and innovation right into the core of their business, and bring strategy, design and production together in one place.

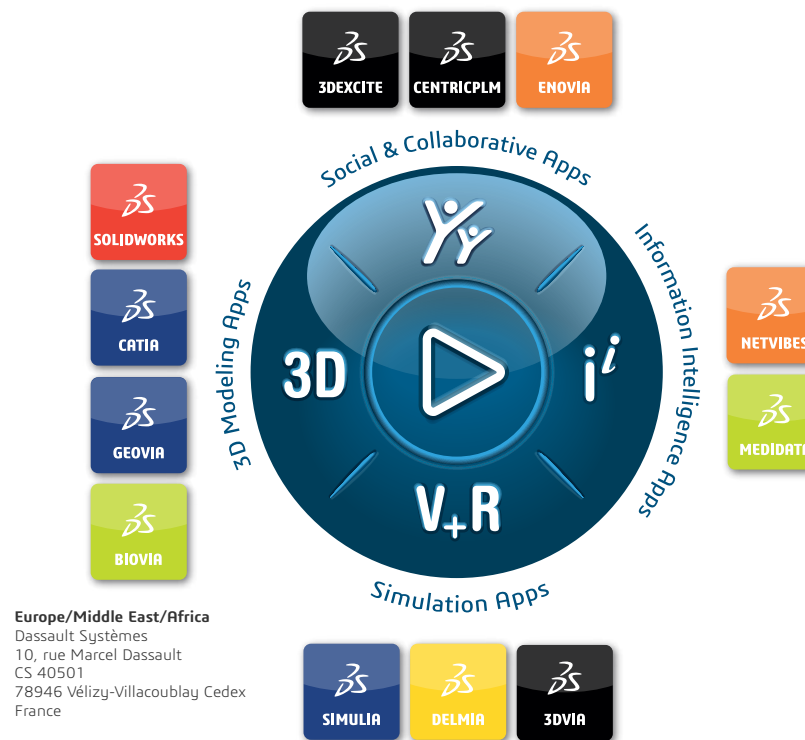
To discover more about ICEM Design Experience, join our active community, where you can meet experts and users and access tutorials and videos. You can also contact our specialist team for more information.

[CATIA Creative Design & Styling Community](#)

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

Dassault Systèmes, the **3DEXPERIENCE** Company, is a catalyst for human progress. We provide business and people with collaborative virtual environments to imagine sustainable innovations. By creating 'virtual experience twins' of the real world with our **3DEXPERIENCE** platform and applications, our customers push the boundaries of innovation, learning and production.

Dassault Systèmes' 20,000 employees are bringing value to more than 270,000 customers of all sizes, in all industries, in more than 140 countries. For more information, visit www.3ds.com.



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