

MSCOne^{XT} – Extending our CAE ecosystem

By Sam Wade, Technology Partner Programme Manager, MSC Software

MSCOne is Hexagon | MSC Software's unique cross-product token system. It orchestrates flexible token licensing to provide instant access to any CAE software in our suite that users need throughout their product development lifecycle – from materials R&D and engineering to virtual manufacturing and product testing. It covers best-in-class technologies and products for simulating acoustics, fluids, structures, system dynamics, manufacturing, materials and autonomy. It offers leading engineering companies the agility to provide immediate access to CAE simulation tools when and where the software is needed and thus allows organisations to maximise their return on investment, no matter their CAE budget.

MSCOne customers today can easily access additional simulation tools that their company may not be able to justify with a separate license purchase. For example, a design team that uses MSC Apex could also use Simufact Additive to validate a new part design for additive manufacturing. This flexibility also allows an organisation to allocate resources by distributing tokens across teams and regions, or to use on-premise computing interchangeably with cloud

HPC centres. MSC Software has also extended access to its extensive CAE e-learning platform through MSCOne tokens. This enables any MSCOne user to develop new skills and certifications for any discipline, physics, or product group with structured on-demand courses and step-by-step workshops using the tools available through the platform.

Launched in 2020, MSCOne^{XT} (MSCOne Extended Edition) enhances our MSCOne token offering by including industry-leading technology partners. MSCOne users are now able to try new products that extend and complement the capabilities of their existing MSC tools by using tokens. Engineering projects will be able to take simulation one step further with access to partner software tools that enhance their workflows, but without the complexity, risk, or cost of managing agreements with multiple CAE suppliers.

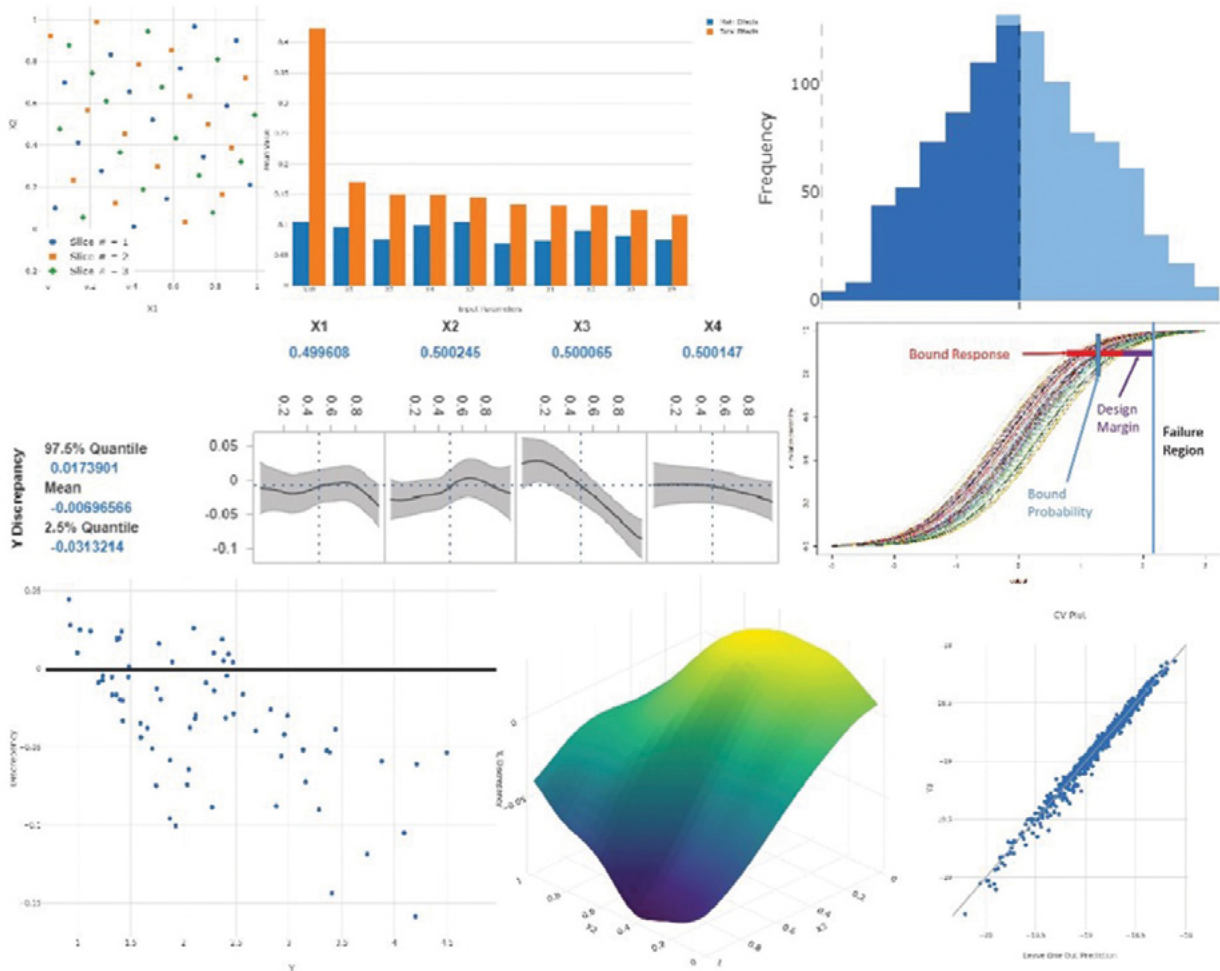
John Janevic, Chief Operating Officer of MSC Software, explains this innovation: "Companies in every industry are turning to simulation to improve cost, quality, and innovation from R&D through to manufacturing

and testing. By extending MSCOne to our technology partners, we are offering our customers a smarter way to access tools that enhance our offering to help them achieve greater innovation and productivity." He adds that "manufacturers have more reasons now to become agile than ever before and CAE underpins many manufacturing decisions. Through MSCOne, customers can now access our extensive simulation portfolio and e-learning wherever and whenever it is needed, so they can respond to their engineering and commercial priorities and adapt to new working practices."

MSCOne^{XT} supports the entire CAE ecosystem – from supplier to user – by providing an easy way for engineering and design professionals to try new products, and for partners to gain exposure to a new customer base. MSCOne^{XT} is available to companies of all sizes, budgets, and skillsets so that we can lower barriers to the digitalisation of manufacturing and help companies move towards 'industry 4.0.' New partners and tools are constantly being added, and prospective partners are invited to join the programme.



SmartUQ - Predictive analytics software for working in an uncertain world



SmartUQ from Wisconsin, USA, was the first technology partner to join the MSCOne^{XT} programme to help mutual customers solve difficult analytics problems while reducing costs and saving time. SmartUQ (www.smartuq.com) is a powerful predictive analytics and uncertainty quantification (UQ) software tool that incorporates real world variability and probabilistic behavior into engineering and systems analyses. It was built from the ground up to solve some of the most challenging analytics problems faced by manufacturing companies. In industries like Automotive, Aerospace & Defence, Turbomachinery, Heavy Equipment, Medical Device, Semiconductors, Energy, Oil & Gas, Heating, Ventilation, and Air Conditioning and Consumer

Products, SmartUQ software has saved customers millions of dollars and thousands of hours of work. Model calibration and validation, Digital Twins, and Manufacturing Analytics are just a few of the advanced applications SmartUQ adds to the MSC solution set.

SmartUQ applications

- Acceleration of simulation efforts
- Testing and evaluation planning
- Uncertainty analysis
- Optimise decision-making under uncertainty
- Real system applications
- Model calibration and validation
- Digital Twins/Thread
- Additive manufacturing
- Root cause analysis

SmartUQ benefits

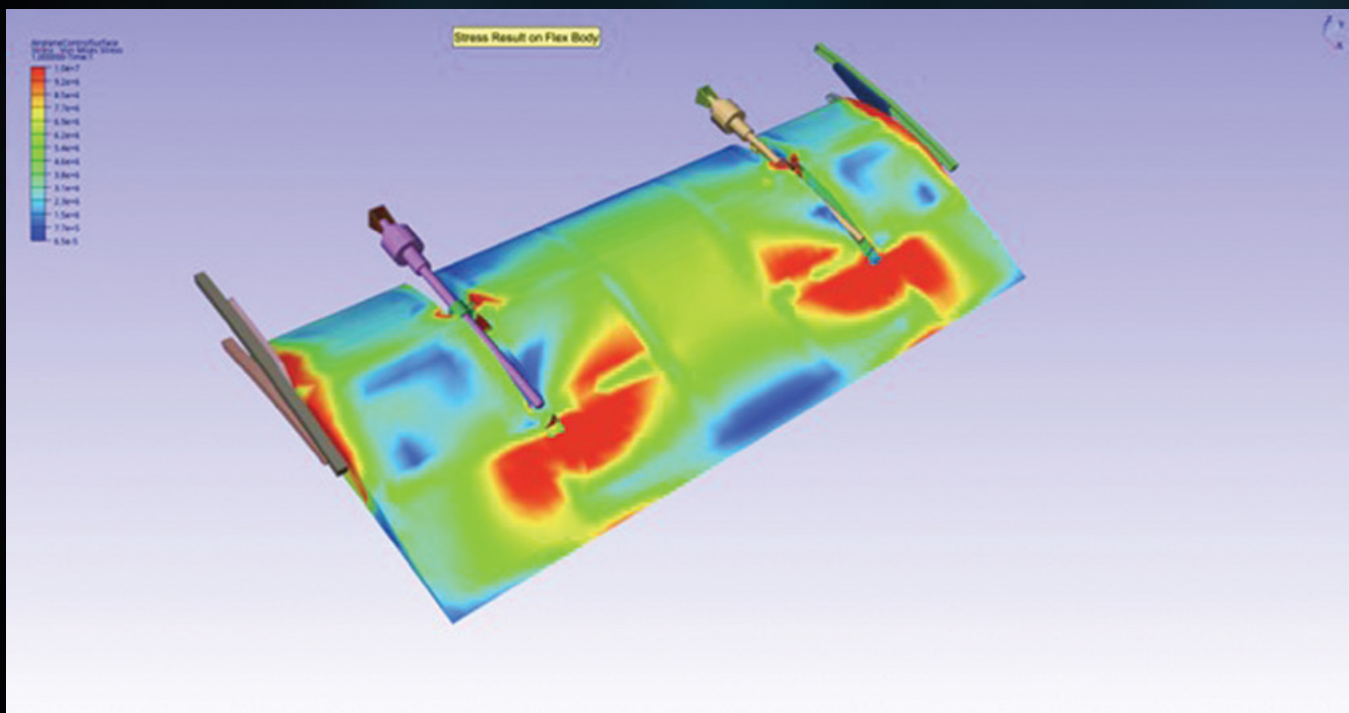
Save time

- Reduce duration of simulation and testing
- Catch problems early, reducing development time
- Prevent unnecessary design iterations

Decrease costs

- Increased utility of simulations
- Fewer tests & prototypes
- Reduce cost associated with unexpected failures

Improve quality and reduce risk



- Validate that the simulation agrees with reality
- Maximise product reliability and durability
- Meet oversight requirements (FAA, FDA, DoD)

SmartUQ capabilities

- **Modern design of experiment** tools designed to efficiently collect data from simulation, physical testing, or digital twins.
- **Unique data sampling** tools for subsampling or dividing large data sets into evenly distributed batches to build large-scale machine learning models.
- **Flexible predictive modelling and machine learning** tools to cover a wide range of scenarios including high dimensional problems, large sample sizes, spatial data, and functional/transient responses.
- **Statistical calibration** tools to determine model calibration parameters even with limited simulation and test data and provide model discrepancy to improve simulation and perform model validation.
- **Inverse analysis** tool to calculate the probability distribution of inputs based on a set of outputs from a system, helping verify hard-to-measure system properties.
- **Sensitivity analysis** library to rapidly determine which factors have a relatively low or high impact on the outputs, allowing engineers to focus efforts appropriately.
- **Optimisation library** handles multiple objectives and accommodates very large numbers of inputs.

VCollab - Improve collaboration during product development

The Digital CAE reporting software, VCollab, joined the MSCOne^{XT} programme to enable MSC Software customers to produce interactive model visualisations and build reports using data from CAE tools such as MSC Nastran, Marc, Adams and SimManager that share valuable product development insights with business and technical stakeholders to aid review meetings and improve productivity.

VCollab helps organisations maximise the return on their simulation investments by automating the creation of “Digital CAE Reports” from native simulation results. These can be easily shared with stakeholders to streamline design decision-making processes and keep up with the cadence and accessibility of information sharing that’s increasingly required in product development. These capabilities are now available through MSCOne^{XT}, which enhances MSC’s comprehensive CAE portfolio with access to tools from industry-leading technology partners.

Reports that are typically created manually as slides can take hours to compile. These Digital CAE Reports are designed to provide high-fidelity, actionable simulation insights in an interactive html-based format that can be accessed and explored by anyone with a web browser. This portability was driven by the needs of CAE analysts within major OEMs that needed a way to provide actionable insights efficiently to stakeholders – be that discrete engineering teams

that do not necessarily have access to the same CAE tools or designers and product management.

The ability to automatically create the browser-viewable post-processing required from CAE tools has been shown to reduce the preparation time for a meeting or call from hours to minutes, producing interactive visualisations that allow walk-throughs to aid discussion. Where the analyses have been conducted using independent tools, VCollab can also serve as the post-processor to present multiple physics in one report.

John Janevic, COO, MSC Software, commented: “Some of our largest customers have used VCollab tools for many years and we have also employed it internally to great effect. We are pleased to welcome VCollab to MSCOne so that our customers can access this complementary technology to improve their processes and collaboration. As development timescales are compressed and efficient cross-functional engineering and supply chain collaboration becomes critical, VCollab is one of the tools that can be deployed quickly and easily to improve processes and maximise the return on CAE investments.”

Prasad Mandava, CEO, VCollab, commented: “VCollab is excited to be a partner in delivering industry-leading simulation solutions from MSC. By combining the power of MSC Nastran, Marc, Adams and SimManager with VCollab’s unique 3D Digital CAE Report, we are helping companies to streamline the way they process and share simulation results with product

design stakeholders. Compared to traditional 2D CAE reports, this allows CAE report consumers to quickly and clearly understand product performance for faster, better informed design decisions. Democratising this information can help transform the process of simulation to bring better, more innovative products to market.”

MSC Nastran and Marc have existing integrations with VCollab, providing easy access to powerful reporting. Adams multibody dynamics also integrates with the software to seamlessly export interactive 3D models of systems shown to great effect. Customers that employ Simulation Process Data Management (SPDM) using SimManager gain instant benefits from token-based access to VCollab, enabling them to exploit the rich data from SimManager to

report on a project’s progress across engineering disciplines.

VCollab’s Digital CAE Reports provide a standard data format for visualising, comparing, interrogating, and documenting CAE results across multiple 3D physics domains including the support of multi-disciplinary design, co-simulation visualisation and optimisation activities so that MSC customers can maximise the utilisation of simulation models and results.

VCollab benefits

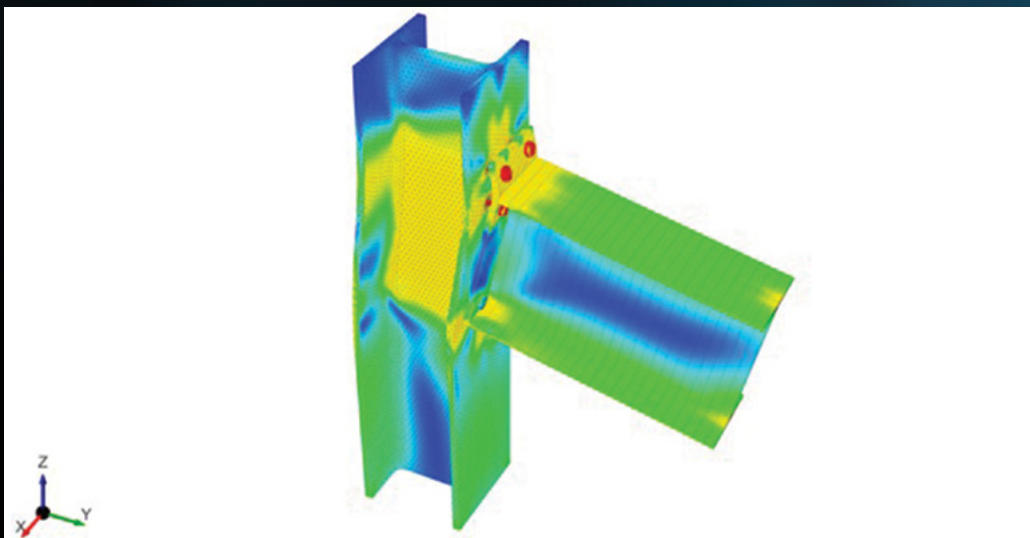
VCollab helps manufacturing companies to maximise the returns on their simulation investments:

- Accelerates the post-processing of results
- Reduces human error during post-processing and creating CAE Reports

- Enables manufacturers to improve product quality
- Streamlines the design decision-making process
- Helps companies digitally transform CAE reporting processes for greater efficiency

With VCollab, analysts spend minutes instead of hours and create far superior simulation insights. Global analysis teams can collaborate on Digital CAE Reports to review and validate the analysis models and results from multiple CAE software packages. Design teams, OEMs and suppliers can collaborate on reports that tell the full story and help them to make faster design decisions, reducing product costs and timelines. And CIOs pursuing digital transformation strategies can use the tool to maximise return on CAE investments.

Ingeciber - Improve safety and innovation with simulation



We are thrilled to extend our long-established technology partnership with Ingeciber S.A., a specialised CAE company with more than 30 years of experience in civil engineering, to offer customers easier access to simulation software that helps civil engineers deliver innovative, sustainable and safe infrastructure projects via the MSCOne^{XT} programme.

CivilFEM powered by Marc – MSC’s nonlinear structural analysis solution – is a powerful and versatile programme used for advanced analysis in all construction sectors. Its rich set of tools and unique capabilities streamline the creation of analysis models for construction, dams, forensic structural analysis, seismic design, geotechnics, soil-structure interaction, rock and soil mechanic analyses. It is used by civil engineering teams to validate innovative new designs and analyse the safety of major infrastructure projects from foundations, tunnels, mines to oil and gas assets, power plants and skyscrapers.

Used by companies such as BASF, SACYR, STI Norland and TransNet, the solution makes it easier for civil engineers to apply nonlinear Finite Element Analysis (FEA) to simulate their designs in various scenarios, including normal use and situations such as earthquakes that affect the integrity of structures, extreme loading and long-term degradation and wear. Using the CivilFEM interface and tools, engineers

apply the highly advanced Marc nonlinear solver to assess the feasibility, safety and durability of new structures and the materials used to build them without needing a simulation expert.

Ingeciber’s CivilFEM powered by Marc software suite is now available through the MSCOne^{XT} programme, enabling customers to use CivilFEM and other simulation software through a common pool of tokens. In this way, customers globally can purchase the solution from a single vendor. The partnership also opens new avenues for joint solution development, including modelling the effect of wind flow on structures such as skyscrapers using Cradle CFD, which can also be accessed through tokens.

José Miguel Moreno, CEO of Ingeciber, said, “We are delighted to offer customers easier access to CivilFEM. We look forward to building on our partnership to offer new solutions that apply Marc’s broader simulation capabilities to provide new insights to civil engineers.”

John Janevic, COO of MSC Software added, “CivilFEM is a compelling solution for civil engineering, combining the power of our nonlinear simulation technology with Ingeciber’s deep knowledge of structures and the underlying mechanisms that can lead to failure. We are delighted to extend our partnership through MSCOne^{XT},

making it easier for our mutual customers to build solutions that help them understand complex problems with simulation insights.”

CivilFEM capabilities

- Nonlinear buckling
- Nonlinear staged construction process
- Crushing and cracking nonlinear reinforced concrete
- Concrete creep and shrinkage and time-dependent properties
- Pre-stressed reinforced concrete
- Fibre reinforced concrete
- Soil material behaviour laws
- Check and design by the most important codes and standards
- Soil-structure interaction
- Nonlinear advanced contacts
- Insert elements
- Advanced seismic analysis
- Heat transfer and coupled thermal-structural analysis
- Seepage-structural analysis
- Python Scripting

To find out more about the MSCOne^{XT} Partner programme or to enquire about joining, visit: www.mscsoftware.com/msc-one-xt-partners or contact: sam.wade@hexagon.com