

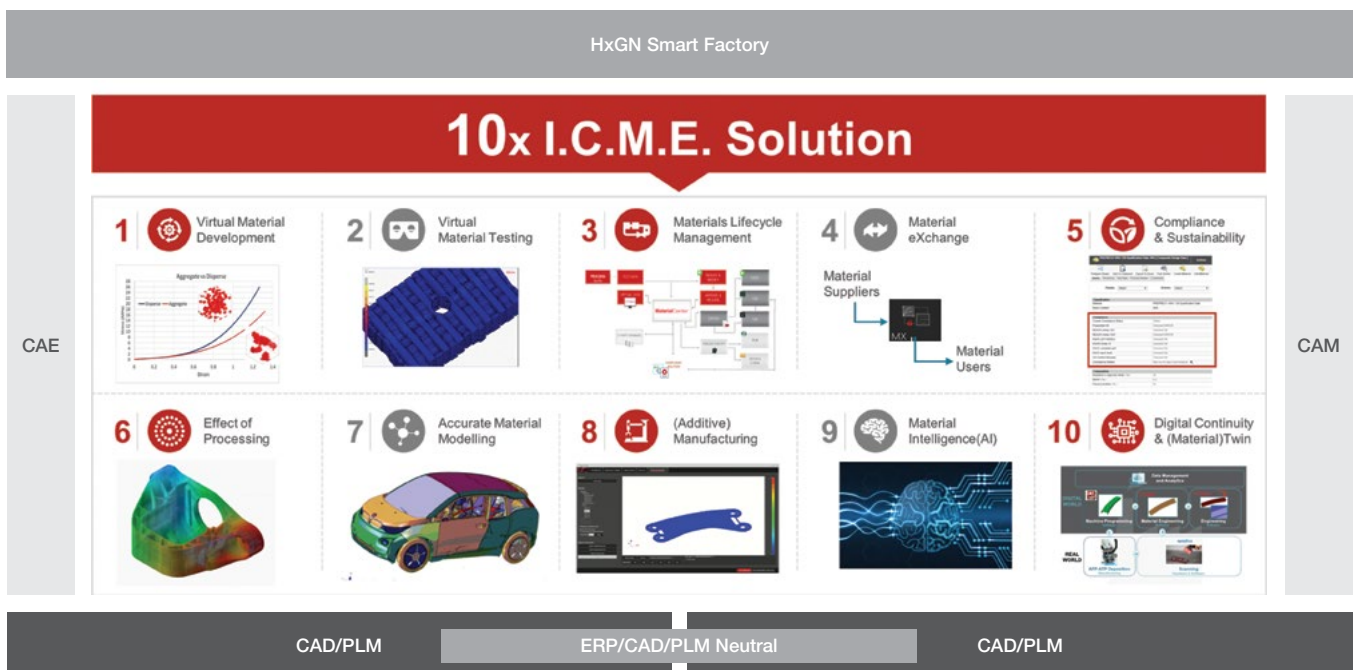
# 10x ICME

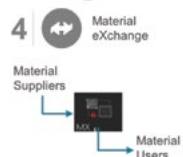
## to Save Time, Cost and Weight in Materials Simulation



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**M**aterials are everywhere in the world that we inhabit, be they polymers, rubber or metals all the way through to exotic materials like composites, foams and ceramics, and they underpin every engineering application in all disciplines of computer-aided engineering today. Developing and integrating new engineering materials into a product can be a very expensive and risky endeavor requiring numerous years of research & development and millions of dollars invested in prototypes and testing. We at Hexagon and MSC Software have developed what we call our 10x Integrated Computational Material Engineering (ICME) Solution to address this very issue. The 10x ICME Solution was developed in collaboration with global equipment OEMs and material suppliers and partners, and is applicable to the latest advanced materials, reinforced materials and additive manufacturing materials. If you currently face a materials challenge, Hexagon and MSC Software is ready to partner with you to make your product a success. With 10x ICME we aim to make your process less costly, more productive than other alternatives, and *first-time-right* to address both the commercial, environmental and engineering challenges commonly found in the materials development process. Each individual solution within 10x ICME contributes to the whole, and they are integral to successful outcomes.





1. **Virtual Material Development** – Many contemporary materials are made of multi-phases, but existing engineering simulation tools typically are unable to model at the micro scale where many material properties are determined. Different mixtures, or combinations of material constituents, at the micro scale can be simulated with our 10x ICME Solution.
2. **Virtual Material Testing** – Developing a new composite material for instance can take 2-3 years of testing and millions of dollars. The process usually involves testing numerous coupons. To compress this time and lower costs we have created a solution to perform the coupon tests via simulation software to the same level of accuracy.
3. **Materials Lifecycle Management** – After you complete expensive material testing, your valuable material data must be stored, and sometimes it is in a simple PDF or Excel file, which can become difficult to track on your systems. We have created a solution to store, manage and distribute material data within a company, enterprise wide.
4. **Material Exchange** – Materials provided by material suppliers are usually proprietary. To allow for this in your supply chain, we have created a capability that makes the supplier's proprietary material models available in an encrypted manner and allows for subsequent engineering analysis without giving away IP.
5. **Compliance and Sustainability** – An increasingly important and critical aspect of materials development is ensuring environmental compliance and sustainability of the end product. To this end, our 10x ICME Solution features an integration with our partner iPoint-systems GmbH's unique software that allows you to identify and avoid restricted substances early in the design.
6. **Effect of Processing** – The injection molding process for polymers itself influences the performance of the final manufactured part, but simulation tools typically leave out critical details such as fiber distributions and fiber orientations. Our 10x ICME Solution addresses this by providing mechanical simulations that incorporate critical details of the FEA simulation, giving greater accuracy of the performance of the part being simulated.
7. **Accurate Material Modeling** – A manufactured part composed of a reinforced material for instance must be validated to perform well during its service life. Finite Element Analysis (FEA) is used in the 10x ICME Solution during its validation process with accurate material models.
8. **Additive Manufacturing (AM)** – Typically, modern simulation tools are unable to simulate the AM process well for polymers and composites, and analysts resort to physical prototypes to develop AM procedures and components. Our 10x ICME Solution makes possible the simulation of the AM process for polymers, thus minimizing costly physical prototypes. It offers a unique combination of material engineering, process simulation and structural analysis solutions.
9. **Material Intelligence (AI)** – A significant amount of real and virtual test data is generated during engineering simulation. The challenge to design engineers is to make decisions based on the large volumes of data generated. We have uniquely implemented Artificial Intelligence (AI) methods embedded in our 10x ICME Solution to improve your material selection process.
10. **Digital Continuity & Material Twin** – Material development processes usually involve multiple steps, some of which have simulation equivalents that have high predictability as a result. Our 10x ICME Solution includes an extensive suite of simulation equivalents for material development, material characterization, manufacturing simulation and final part performance. Ultimately a digital twin of the material manufacturing process is obtained and improves predictability.