



X-RHEA
The Real Power of Simulation

The new industrial role of spatial computing

An overview of the integration of immersive reality and artificial intelligence in industrial processes

by **Giulio Cenci**
Vection Technologies

VR immerses people in fully virtual environments, AR superimposes digital elements on the real world, and MR blends the two to create interactive experiences where physical and digital objects coexist. In design and engineering, XR enables teams to visualize and interact with prototypes in a virtual space, reducing costs and accelerating product development. In training, immersive simulations improve learning retention and provide direct experience without real-world risks. In customer support, AR-based remote assistance helps technicians diagnose and fix problems more efficiently, minimizing downtime.

The integration of AI into XR is a major step forward. AI algorithms enhance the XR experience through intelligent environmental

mapping, natural language processing for voice commands and personalized content delivery. As these technologies converge, businesses will benefit from more intuitive interfaces, predictive capabilities, and context-aware applications that adapt to user behaviour and environmental conditions.

This paper explores some industrial and engineering applications of Vection Technologies' suite of spatial computing software solutions within various business processes.

Introduction

In today's rapidly evolving business landscape, organizations are constantly looking for innovative solutions to improve their processes and gain a competitive

edge. XR technologies, including VR and AR, have emerged as powerful tools with the potential to revolutionize various aspects of business operations. Vection Technologies, a leading provider of spatial computing solutions, offers a range of software products designed to address specific business needs in different domains. This paper examines the applications of spatial computing technologies to key industry-specific business processes, highlighting their unique capabilities and potential benefits.

Virtual reality for technical training

Immersive VR training experiences for technical procedures related to commissioning, operations and maintenance are among the most mature. By simulating



Fig. 1. Not only 3D CAD models can be experienced in VR; now, immersive reality enables the visualisation of structured and unstructured procedures for technical training, design review, assembly and operation scenarios.



Fig. 2. Multi-channel (mobile, tablet, desktop, VR and AR headset) and collaborative scenarios can be easily set up with no-code software.

real-world scenarios, employees can acquire practical skills in a safe and engaging environment. The integration of AI enhances the training process by providing document analysis, troubleshooting support, and assisted virtual navigation. This results in better knowledge retention, reduced training time and increased employee competence.

Augmented reality for technical support

AR technology provides real-time support for technical procedures such as assembly, commissioning, quality control, checklists, and maintenance. By overlaying digital information on the real-world environment, technicians can access step-by-step instructions, detailed procedural guidance, and automated report generation according to job specifications. AI integration further improves efficiency by providing contextual assistance and streamlining documentation processes. Powerful integration with remote assistance using visual holograms and vocal online help from a technician can be activated for specific requests.

Virtual reality for design review and product presentation

Multidisciplinary design reviews of CAE campaigns in VR can help engineers evaluate product performance in different configurations and boundary conditions. This promotes team collaboration and facilitates early identification of design flaws. In addition, VR visualization of CAE results can be used for product and design

presentations in VR, providing decision makers with an immersive experience that effectively displays technical content and company expertise.

Virtual reality for "lightweight" DFMA processes

Lightweight design for manufacturing and assembly (DFMA) processes, which eliminate the traditional loop between CAD design and prototyping, are supported by specific VR applications with a new and disruptive process that enables tangible assembly scenario evaluation and VR design optimization with the following benefits:

- Managing 1:1 ergonomics, spaces, and tooling workflows
- Identifying every detail, error, gap, and mechanical interference with infinite zoom
- Enabling virtual perceived quality and precise measurement
- Ensuring complete safety by avoiding real resources and workshops
- Reducing prototyping and design costs through continuous technical collaboration
- Creating a new, simple, and intelligent framework for suppliers, customers, and engineers

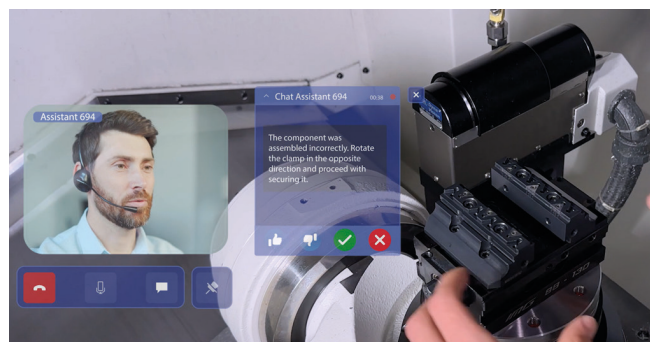
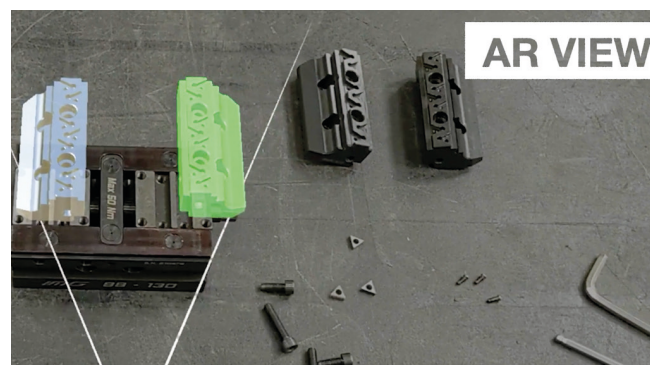
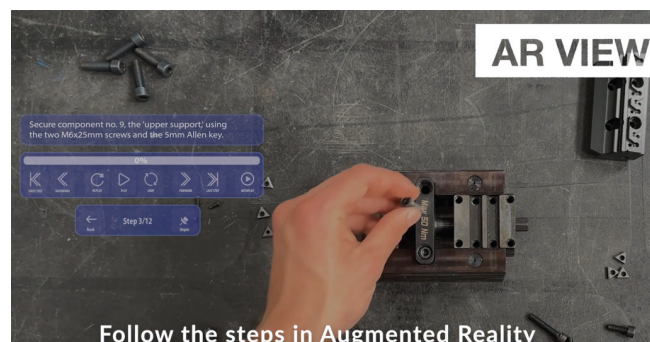


Fig. 3, Fig. 4, and Fig. 5. A complete process can be set up in the same editing software, from VR training sessions to AR operations support with 2D and 3D procedures, remote assistance and AI troubleshooting, and manual integration.

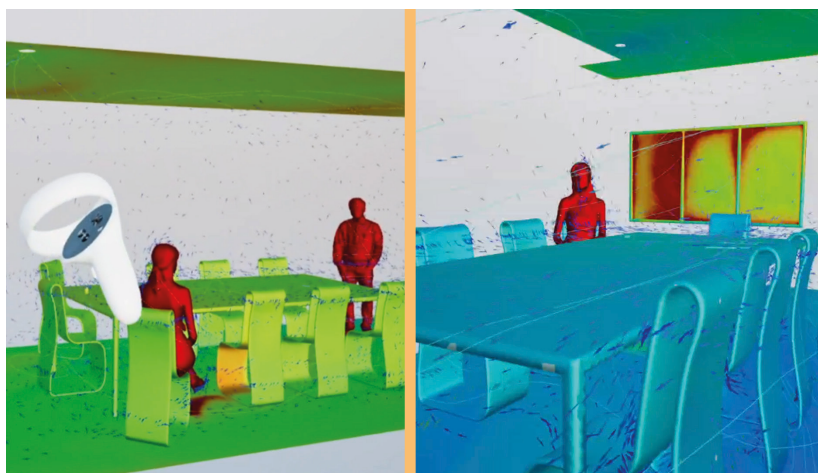


Fig. 6. X-RHEA is designed to easily create customer experiences focused on the immediate and immersive presentation of multi-disciplinary structural mechanical, thermo-fluid dynamic, and electromagnetic analyses campaigns, as well as other engineering data related to components or systems. The observer's viewpoint can be external or internal, offering immediate visualization, understanding and decision-making capabilities even for top managers, entrepreneurs and customers.

DFMA and INTEGRATED PROJECT DELIVERY EFFORT

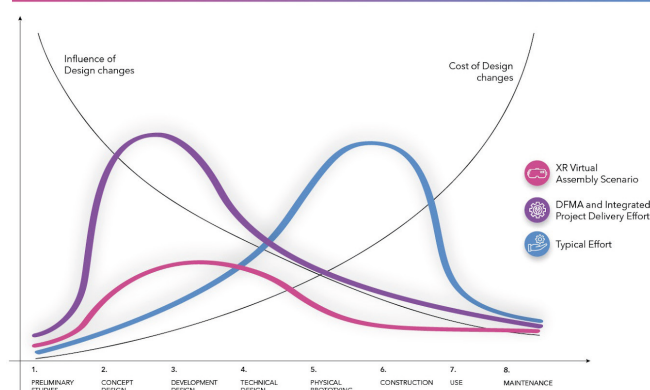


Fig. 7. The light purple curve represents a disruptive, lightweight XR virtual assembly scenario that addresses a sustainable trade-off for SMEs to implement a lightweight DFMA process focused on reducing the design and prototyping cycle through a new collaborative XR assembly evaluation and communication process.

By promoting and facilitating an efficient and inclusive communication between designers and prototypers from concept to critical design, VR significantly reduces development time, investment, and costs compared to traditional DFMA approaches, especially when applied to small and medium-sized companies.

Conclusion

Spatial computing solutions (XR & AI integration with specific hardware appliances) provide a complete ecosystem of software solutions for a transformative approach to various business processes. By harnessing the power of VR, AR, CAE and integrating them via AI, these tools improve efficiency, collaboration, and decision making across a wide range of industries.

From technical training and support to design review and product presentation, Vection Technologies' software enables organizations to optimize their operations and achieve new levels of productivity.

Collaboration with EnginSoft and the development of X-RHEA

Vection Technologies, an ASX-listed company focused on spatial computing solutions and the full integration of XR and AI technologies, is partnering with EnginSoft, an Italian engineering simulation boutique that provides cutting-edge CAE software and specific high-level services, to develop X-RHEA.

This collaboration aims to increase the communicative and commercial value for customers using engineering simulation expertise in their product development processes.

With their combined technical expertise, Vection and EnginSoft will enable customers to rapidly develop multi-disciplinary design reviews in virtual reality using X-RHEA. These reviews can then be presented to their own customers, providing a compelling and informative customer experience that effectively demonstrates the value of their products, processes, and expertise to increase value, branding, and competitive advantage.

This strategic partnership enables customer companies to bridge the gap between complex technical data, simulations, and effective communication, driving business growth and strengthening customer relationships. The future of computational engineering is closely linked to emerging technologies such as XR and AI, which can unlock the full value of our customers' technical expertise.

For more information:

Giulio Cenci - Vection Technologies
giulio.cenci@ext.vection-technologies.com