Return on Investment in Virtual Reality Solutions

Virtual reality (VR) has been proving its worth in the manufacturing industry for decades. Organizations are experiencing faster buying cycles, decreased time-to-market, and minimized risk, all resulting in higher return on investment (ROI). When organizations first consider what VR solution would work best for their workflows, many can become hesitant due to the cost of initial investment. However, Mechdyne's clients have proven that ROI on VR solutions skyrockets, negating initial investment and providing millions of dollars in cost savings. Whether organizations leverage VR during design reviews, proof-of-concept validation, or customer engagement, they meet and exceed their ROI goals.

Design Reviews and Prototyping

- During a virtual design review of one of a turbine product, General Electric, Mexico, found interference between a bolt head and another bolt. If service was required, there would be insufficient room to get a wrench on the bolt head. In the past, the design rework of a single interference could cost anywhere from $100,000 to $1 million in physical prototyping. Thanks to their 90-degree angled wall/floor display system, GE saved thousands and perhaps millions of dollars.
- During a virtual design review, a vehicle manufacturer found a way to optimize the driver interface and controls. In the past, this would not be caught until the physical prototype stage. By avoiding the need to change the physical prototype, the client estimated a savings of $100,000.
- Using their immersive 3D display, an agricultural equipment manufacturer achieved a 60 percent development cost reduction for an air handling system and a 50 percent decrease in assembly labor. Collaboration in the immersive space between design, engineering and manufacturing enabled reduction in design time from 27 to 9 months and savings of over $100,000 by eliminating physical models in the design cycle.

"It enables us to bring design team or a set of mechanics or technicians into the system and immerse them into the virtual world so they can understand how they are going to perform an activity. We do this virtually without having to spend a lot of money building prototypes and trying to prove it out on hardware."

Jeff Fisher, Lockheed Martin
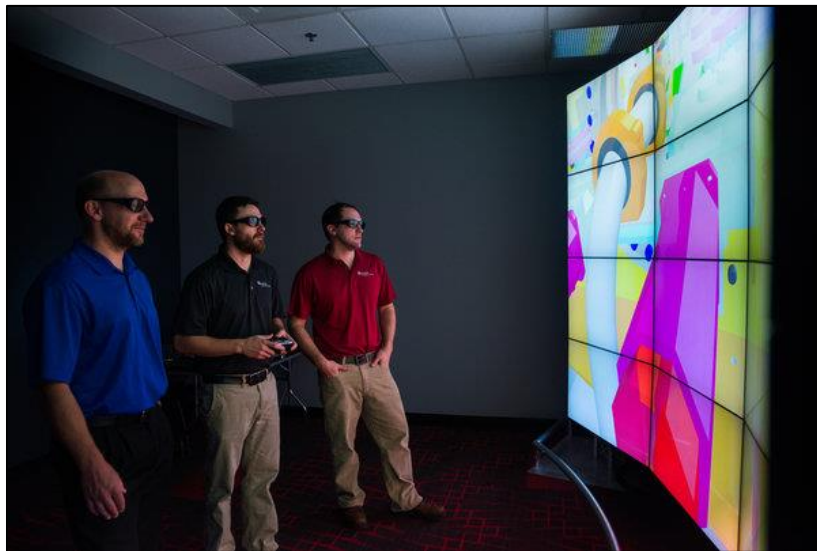
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Internal Collaboration

- Raytheon's CAVE2 solution enables teams to manage development projects and display 3D prototypes. Designers, engineers, manufacturing, and project managers work in the space regularly to review the project status and estimate the impact of changes in design. They estimated a return on their CAVE2 within three years. In reality, they reached full ROI within eight months of installation.

- Genesis Systems Group, a robotics systems integrator, has a curved, multi-panel 3D display they call the 3DG. The investment was made with a goal of improving the internal design process, enable ergonomic testing and increase team collaboration. Now, every team provides insight into creating an optimized product (**full story here**):

  - Mechanical engineers and designers make design recommendations and plan for production more easily
  - Technicians make recommendations for cable runs
  - Applications engineers have a better direction to begin programming requirements
  - Sales is more comfortable with engineers and designers directing conversations with clients during design reviews
  - The display was also designed to be portable so it could be taken to industry trade events to attract attention and generate new sales opportunities. The system is used so frequently for design projects and sales demonstrations that a permanent system is being planned so the portable can be dedicated to events and other applications.

"Because of the size and capacity to engage multiple people simultaneously, the Powerwall gave a tremendous boost to the designs we were developing."

Dulcidio Coelho, Salford University

Customer Engagement and Sales

- Navistar Commercial Vehicles has a custom Mechdyne Powerwall, scaled to display a bus. They made a 100-unit sale to an international company, citing the Powerwall was a critical factor of the sales tour. Navistar's ability to demonstrate their design quality and process as well as new model features closed the sale for them. One bus sells for a minimum of $100,000. In this instance, Navistar had an estimated $10 million sale.
- Genesis Systems Group also uses their 3DG—described above—to introduce customers to new products. Their users dive deep into concepts, ask questions, and make design requests before development begins. As a result, Genesis users who were once hesitant to use the technology are now the biggest promoters. Recently, Genesis experienced their largest sale day thanks to the 3DG, totaling over $10 million in a single day.

"This CAVE is mostly a decision-making tool. In fact, the different engineers prepare scenarios, descriptions, and decision makers check the design to make sure it's acceptable… and they check with others on the collaborative stereoscopic screen. I can see very precisely, I can interact with my model. That's high-quality images, high resolution, and it's not intrusive."

Andras Kemeny, Renault

Questions to Ask

Return on investment can be realized from multiple benefits of VR systems, regardless of format, scale and cost. Consider the potential for the following areas of your workflow:

- Virtual Prototyping

    - What is the cost of one physical prototype and how long to build?
    - What is the cost of any rework on the prototype?
    - How could better access and ergonomics improve material flow and production?

- Reduced design/development cycles.

    - What is the value of a designer's time?
    - How much insight can be gained by viewing digital prototypes in 1:1 scale instead of on desktop or wall monitor?
    - How would cycle time reduction improve responsiveness to capitalize on new user demands/trends?

- Collaboration

    - What efficiencies could be realized when product teams can work together in a comfortable workspace and evaluate the impact of changes more quickly?
    - What errors (and their costs) could be avoided through improved collaboration
    - How can product assembly and servicing be assessed sooner and be made more efficient?

- Decision-Making

    - How could virtual designs enable faster, better decisions at any stage of development?
    - What product quality elements could be assessed before physical prototypes or production begins?

- How could more insightful reviews inform executives and reduce risk?
- If critical decisions are not made in a meeting, how long does it take to get stakeholders to gather again?

- Marketing
  - How could digital prototypes enable better user input at the design stage?
  - What VR content could marketing develop for impactful presentations?

- Sales
  - What is the value of making an impression and getting to the next meeting?
  - What is the value of a new client?
  - What is the full opportunity cost of losing or not attracting a client?
  - What is the value of taking advanced orders based on the ability to show digital prototypes?
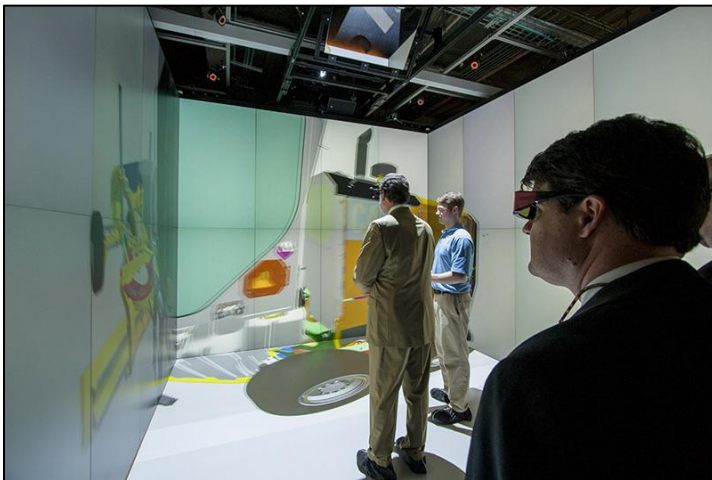
Articles Discussing the Value of VR for Manufacturing Applications

A transportation logistics company published **this article** about VR for manufacturing. This is a good summary article about the categories of possible benefits.

Iowa State University recently published **an impartial study** of VR in manufacturing. The size/scale of the virtual products may be different but the areas of opportunity for saving and improvement remain the same.

This article is about using VR for designing retail stores but the efficiencies realized are very similar for product companies as well. The marketing/end user review of concepts, especially multiple concepts side by side, is also noteworthy.

This global accounting firm did **a survey** of how VR is used. Product design and development topped the list. This article also says that lack of understanding the value of VR can be the biggest obstacle to using the technology.