TRANSFORMING MANUFACTURING BY JT-BASED AUGMENTED & VIRTUAL REALITY

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VIRTUAL & AUGMENTED REALITY BACKGROUND:
START OF THE HYPE AND VC INVESTMENTS

Start of the Hype - Oculus Rift

- Crowdfunding campaign started in 2012 by 19-year-old Palmer Luckey, attracting $2.5 million – raising ten times the initial $250,000 goal
- Facebook acquired Oculus for $2.2 billion in 2014

$150 B
Revenue creation with AR/VR by 2020 with AR taking the around $120 billion
Source: Digi-Capital Report VR/AR 2015

$1.1B
Investment in VR since 2010, with ~ $500M+ invested in 2015
Source: Tracxn Virtual Reality Report

109.5%
Number of companies founded in VR has increased by in 2014, compared to 2013.
Source: Tracxn Virtual Reality Report
WHY INDUSTRIAL AR/VR? WHY NOW? DEGREE OF COMPLEXITY IS BECOMING EXPONENTIALLY HIGH
SIEMENS PLM INTEREST IN AR/VR: BETTER HMI LEADS TO BETTER APPLICATIONS IN EVERY STEP OF THE LIFE CYCLE

- Cost Reduction
- Faster Development
- Increase Understanding
- Better Quality

Product design
Production planning
Production engineering
Production execution
Services

- Customer Support
- Repair / Maintenance
- Manufacturing / Assembly
- Employee / Customer Training
- Walkthroughs / Quality Management
- Complex Data Visualization
- Program planning / Logistics operations
- Simulation optimization
- Telepresence / Collaboration / Ergonomics
- Design for marketing / reviewing purpose
- Spatial Designing / Virtual Prototyping
R&D IDE: UNITY3D FOR CROSS-DEVICE PUBLISHING

Under Study:
In this example, the user is inspecting a car engine.

The user has identified a part of interest through voice search and the part has been highlighted on the actual car, as well as the assembly tree.

The user then picks the part out of the engine through hand gestures and sets it aside to get a better look at it.

After selecting a part, the user can view properties (shown here), find work instructions, and look up other information about the part.
COMPLEX SCENARIO: REMOTE COLLABORATIVE MAINTENANCE AND TRAINING

AR HoloLens User(s):
On Site Maintenance Worker or Trainee

AR: User sees real engine augmented with CAD model of engine and Remote Expert Avatar

All users can manipulate synced CAD Model of engine with hand gestures

Avatar of VR User with position and hand tracking

VR Goggle User(s):
Remote Expert or Trainer

VR: User sees only CAD model of engine

AR Video Feed from AR User
Here a simulation from NX is overlaid on the physical product the simulation was performed on - in this case an air flow simulation of a race car.

The results from the simulation are pinned to the physical object. When the user walks around the car, the simulation results stay in position, allowing the user to see the results in context.

The simulation key is pinned to the HoloLens display.
This example shows a dynamic simulation, in which a virtual object is simulated in a physical environment.

Using the HoloLens, the physical test track is mapped. This allows us to simulate the car on the test track, and also allows us to line up the simulation with that test track. NX performs the simulation, and the results are overlaid on the physical test track.

The user can show or hide pieces of the model as needed to see how the virtual model is affected during the simulation.
This example shows a dynamic simulation, in which a virtual object is simulated in a physical environment. In this case the user is looking for a good place to attach a new experiment that meets their needs, before the experiment is formally added to the model.

As the entire space station is digitized in 3D, the system can look up vibration information for the specific area that the experiment is “attached” to. As the housing is “attached” to different locations, the simulation data is updated to show the impact of placing the housing at that area.

Simulations on the experiment housing are also shown so that any unwelcome interactions (such as a badly placed vent) can be seen through the HoloLens.
Here we show an engineer interacting with a repair simulation in order to determine whether the repair can be performed while wearing a space suit.

The simulation takes the user through a set of instructions to perform the repair. A view of the area, as seen from the person performing the repair, is shown as if the user was actually wearing the spacesuit and performing the repair. As the user proceeds through the simulation, if there are known areas where there are unwanted collisions—such as the users gloved hand trying to fit inside a control panel to remove wires—the system can indicate those areas with a notification.

Information relevant to the task, such as part data or electrical diagrams, is also available for the user to view.
COST CHALLENGES IN IMPLEMENTING AR & VR

Price, Form Factor

- Oculus Kickstarter Project: 1K USD
- Oculus acquisition: 2B USD
- Oculus Rift, Google Cardboard, HTC Vive, MS Hololens:
  - 100K USD
- Mainstream Hardware: Consumer space, gaming, social networking
  - 1000K USD
- Niche Hardware providers: Specialized solutions, Large Customers only
  - 100K USD

...but it is per person
TECHNOLOGY CHALLENGES IN IMPLEMENTING AR & VR

- Trust in a new technology that does not have a clear leader
- ROI justification for cost of equipment
- ROI justification for cost of content creation
- Adaptability to the device (e.g., motion sickness)
- Battery technology, which affects everything from field-of-view to sufficient memory to number of active hours for the device
- Security and safety concerns
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ANNOUNCING AUGMENTED AND VIRTUAL REALITY THEME FOR THE SIEMENS FRONTIER PARTNER PROGRAM!

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AUGMENTED AND VIRTUAL REALITY: APPLICATIONS IN EVALUATION

**Augment**, enterprise augmented reality platform, enabling users to envision any object in the real environment in real time from the convenience of a mobile application

**Cimaginet**, augmented commerce solution

**Ease VR**, an experience engine for digital realities

**Sentio Simulations**, tool to create training and assistance solutions

**Vital**, software platform for smart glasses

**Extend3D**, the laser and video projectors that enable you to display your CAD data on your workpiece efficiently and with absolute precision