Real World Virtual Reality and Manufacturing

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Overview of Talk

- Some VR Definitions
- Two Different Types of VR
- Manufacturing
- Experiences with Deneb Robotics QUEST and Black & Decker
- User Interface Issues
- Image-based VR as a User Interface - Immersion as an Organizing Principle
- Integrating the Internet and a VR Environment (VRML)

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Some Virtual Reality Definitions

- **Immersive vs. Non-immersive**
- **Desktop VR**
- **Image-based VR**
- **Virtual Environments, Synthetic Environments, Augmented Reality, See-thru VR**

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Components of Immersive VR

- Position Trackers
- Head (Helmet) Mounted Displays (HMD)
- Spatial Audio
- Whole hand input - Gloves
- Tactile Feedback

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Manufacturing

- Investigate use of VR for a variety of manufacturing processes
- Use commercial off-the-shelf software
- Work with “real” industrial partners - Black & Decker

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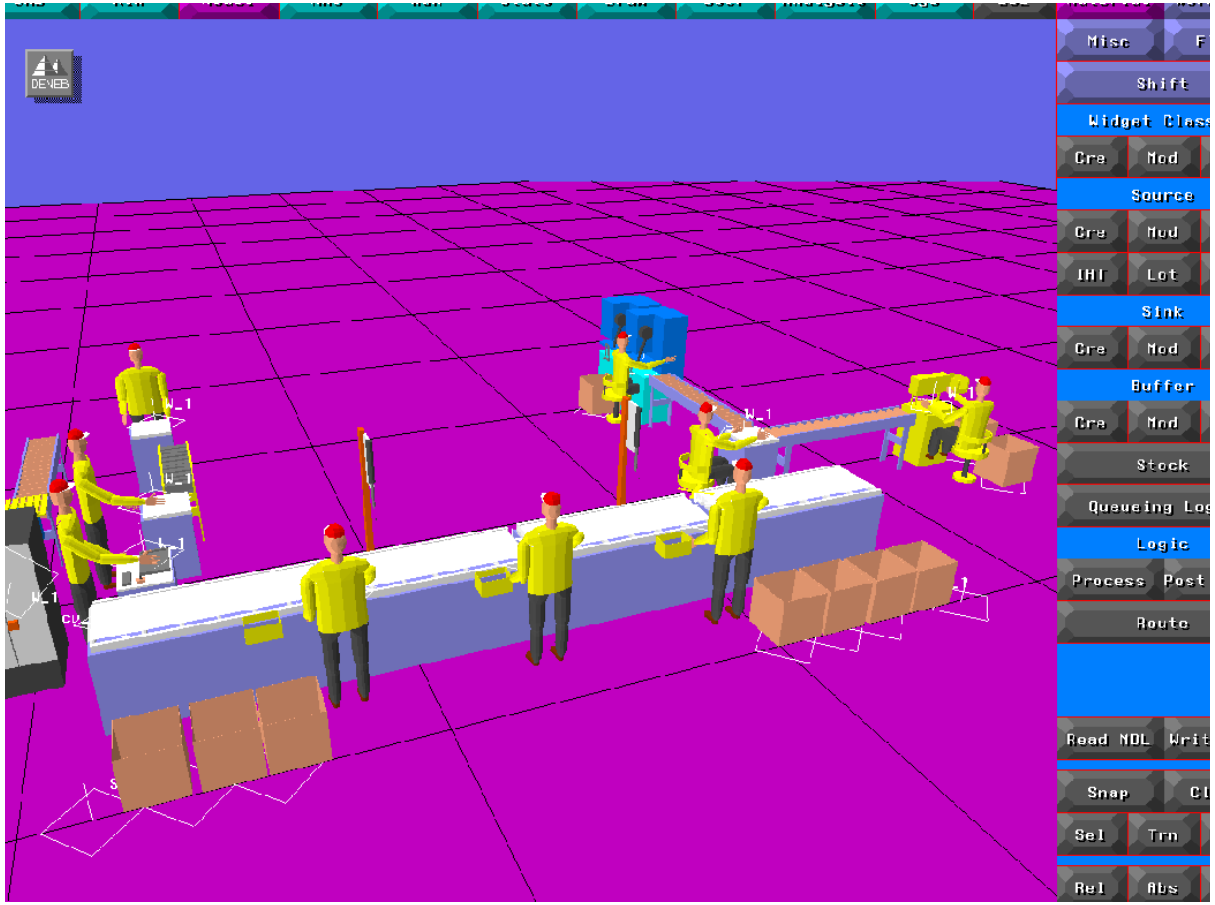
Simulation of a final assembly area at B&D



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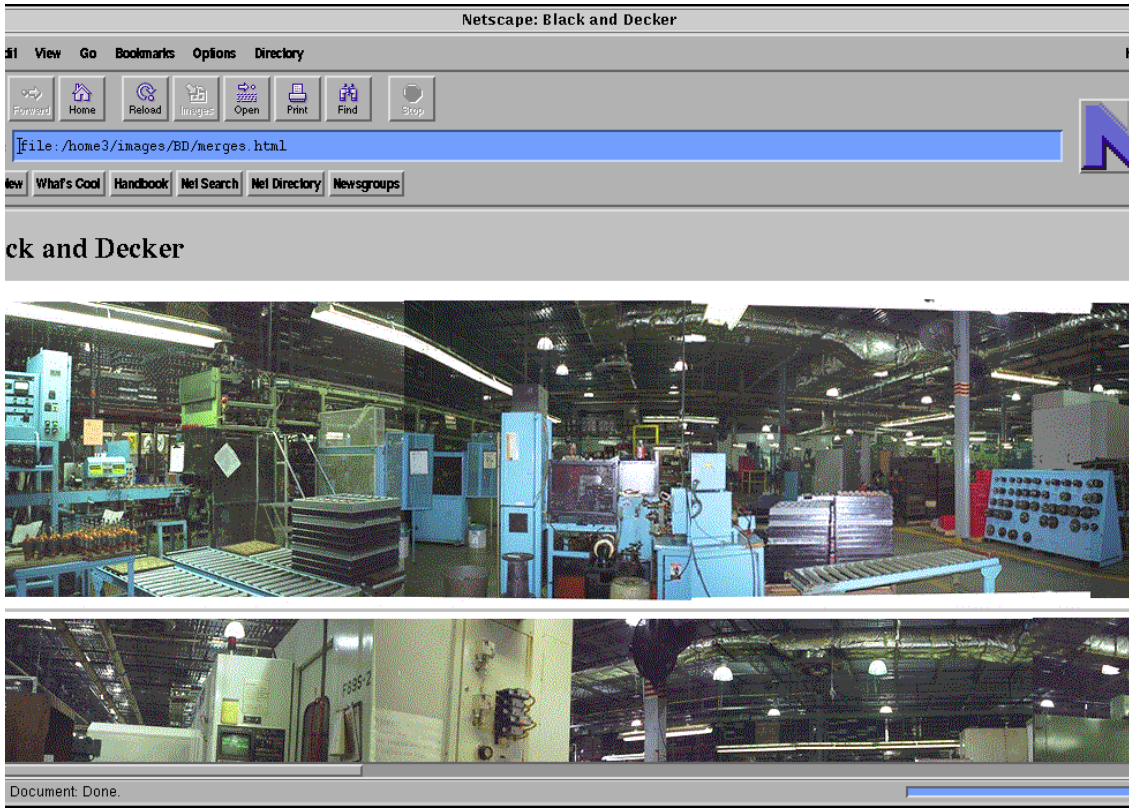
Factory floor images for image-based VR



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VR as a User Interface - Immersion as an Organizing Principle

- First person point-of-view (POV) environments are natural - we are in them every day.
- Computer based POV environments attempt to move users from the real world to a virtual world.
- Movement in the virtual world is not natural and must be learned.

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VR as a User Interface - Immersion as an Organizing Principle (cont.)

- Arrangement of items in and around the user can be highly personalized. (I can find stuff in my messy office because I've internalized the location of objects).
- Spatial metaphors can be tailored to the individual, office, building, city, maps.
- One can "objectify" locations - i.e. turning locations of interest into objects (a la 3D clip art) and placing them in memorable locations

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.Entertainment as a Technology Puller

- **Nintendo/Sega - Jurrasic Park**

  Alternates between typical 2D video game and 3D POV views for interior scenes, cartridge based.

- **Broderbund/Cyan - MYST**

  Move around environment, sync sound highly photorealistic.

- **Virgin Games/Trilobyte - 7th Guest**

  First person POV plus active elements (actors/agents)

- **Id - Doom**

  Highly responsive real time POV and networking

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Entertainment as a Technology Puller

- All of the games provide First Person POV
- All synchronize sound with the action and environment of the moment.
- Level of interactivity is highly variable ranging from no time dependence to real time requirements (i.e. you die if you don't do anything).
- Increasing level of autonomous sophistication, actors/agents.
- Autonomous agents can be carried into more "serious" applications for information grazing/ retrieval.
- Tools for information discovery with increasing degrees of intelligence embedded in natural spatial environments.

  People VOLUNTARILY pay money for these.

  Why not use these environments as user interfaces?

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Familiar space as organizing device

- **Customized User Interfaces via Image-based VR**

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Immersive VR - Fan Press Operation

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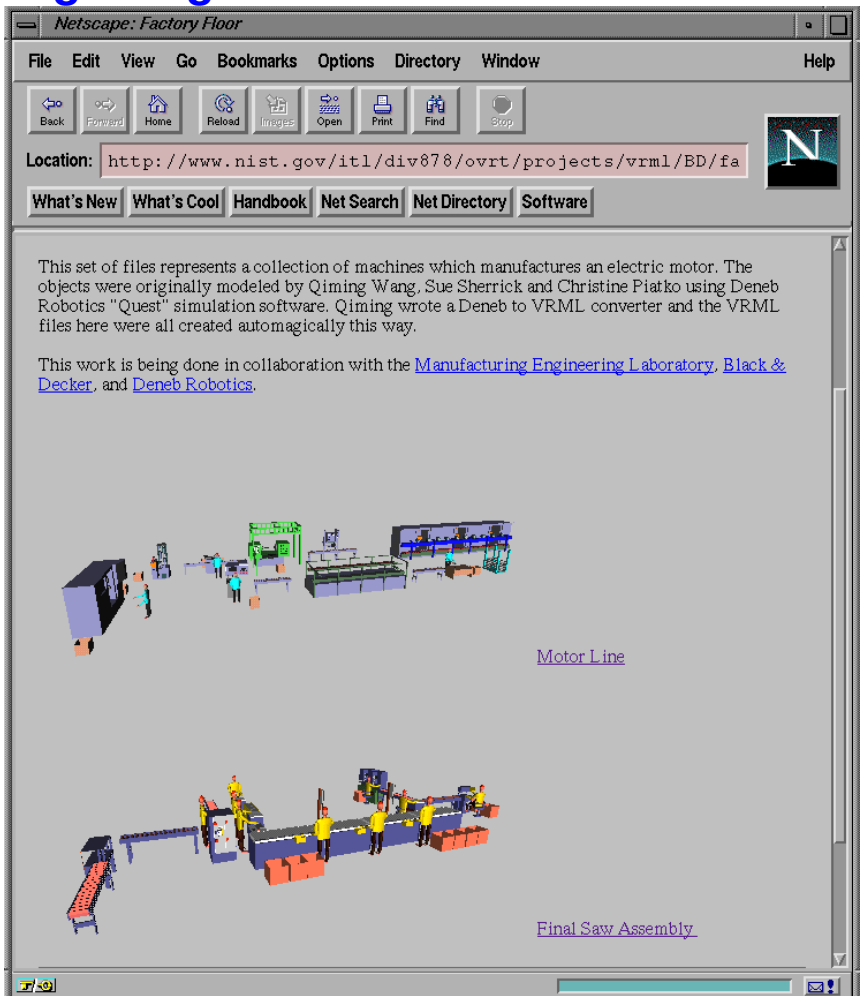
Integrating Internet with VR Environment



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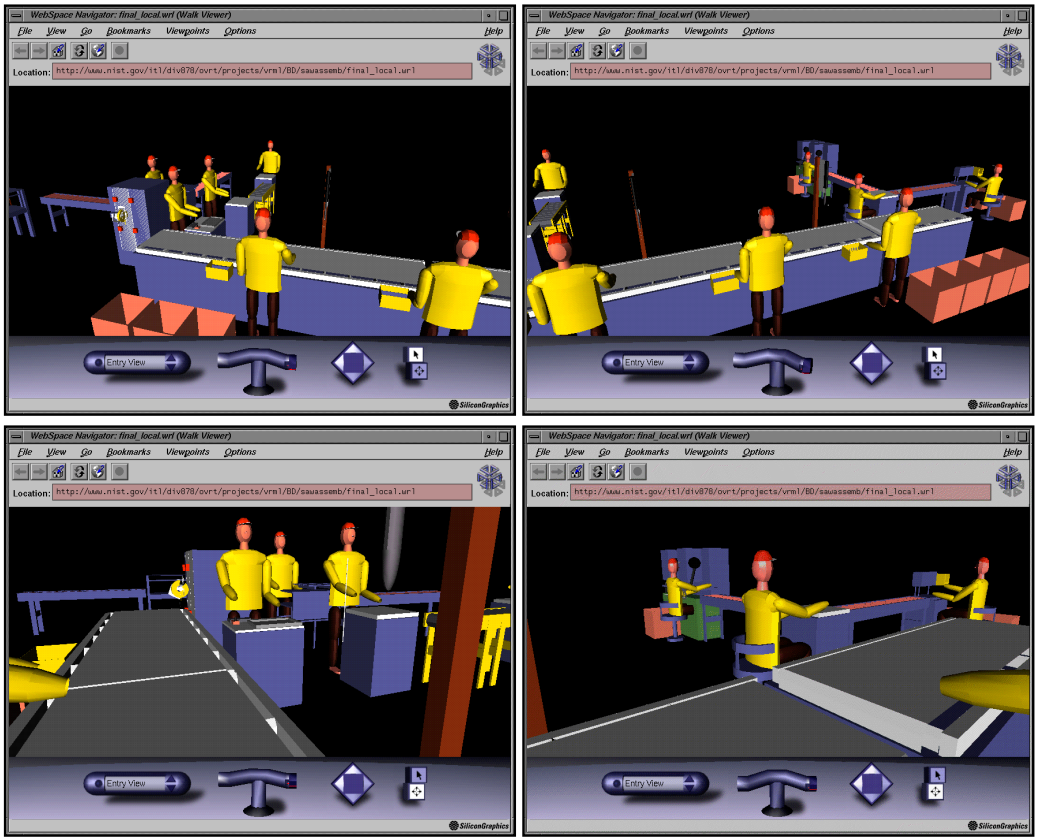
VRML View of Assembly Area



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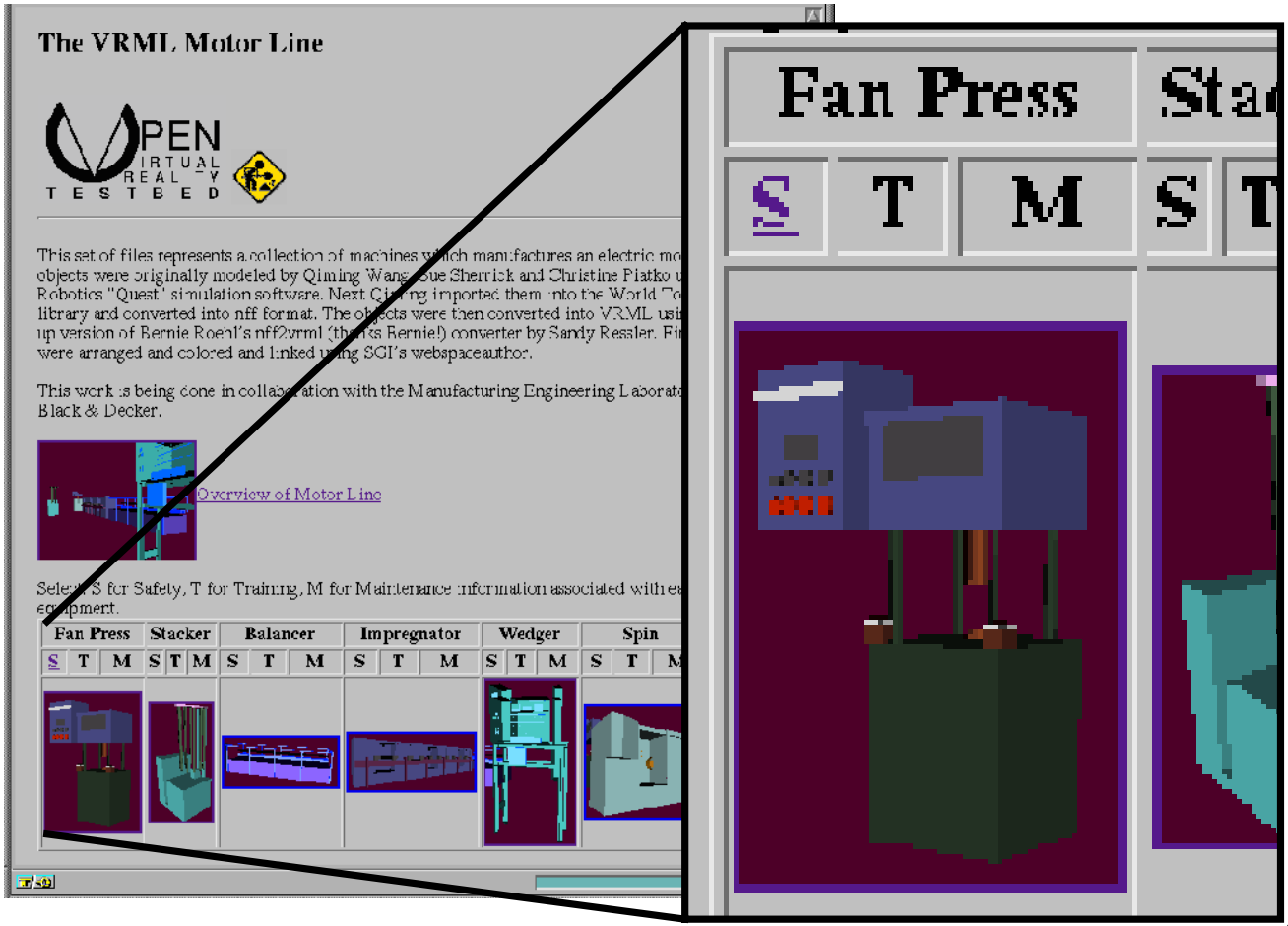
Integrating VR with the Internet (conf.)



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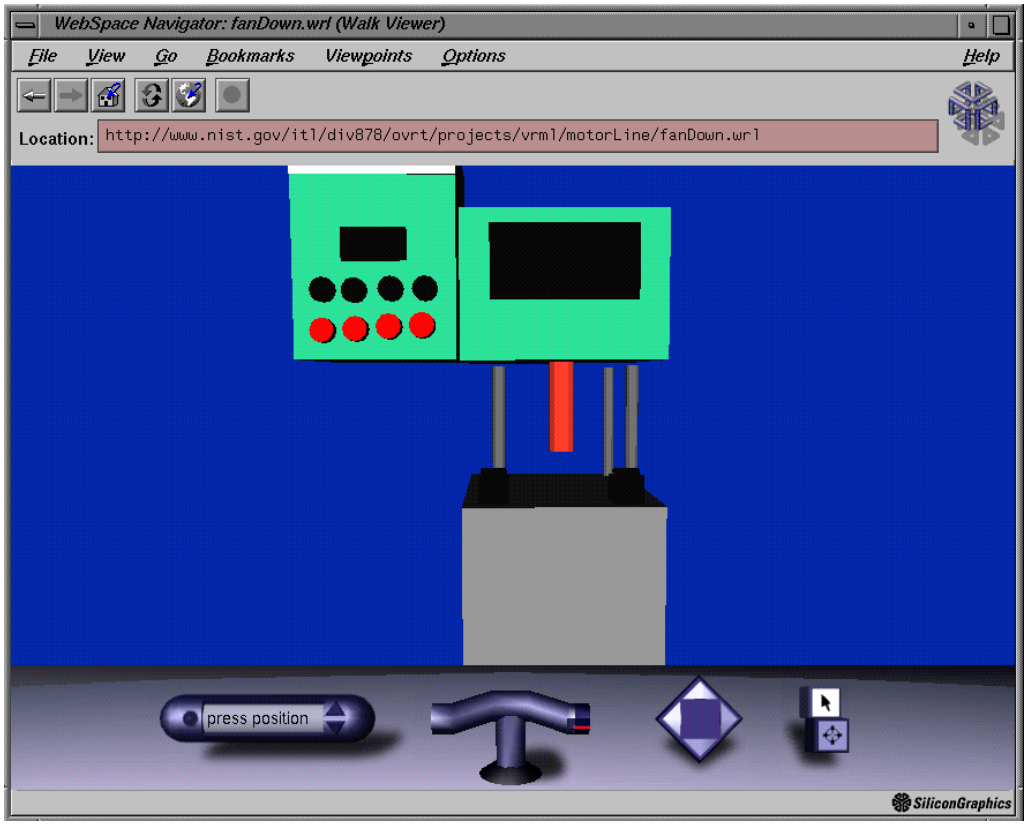
Integrating VR with the Internet (cont.)



- **VRML Web browser (WebSpace)**

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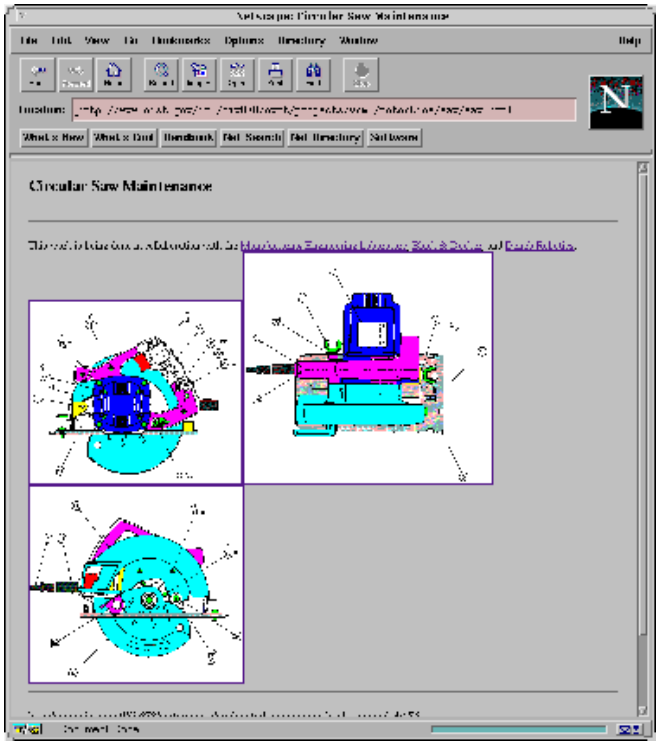
Associated Technical Documents



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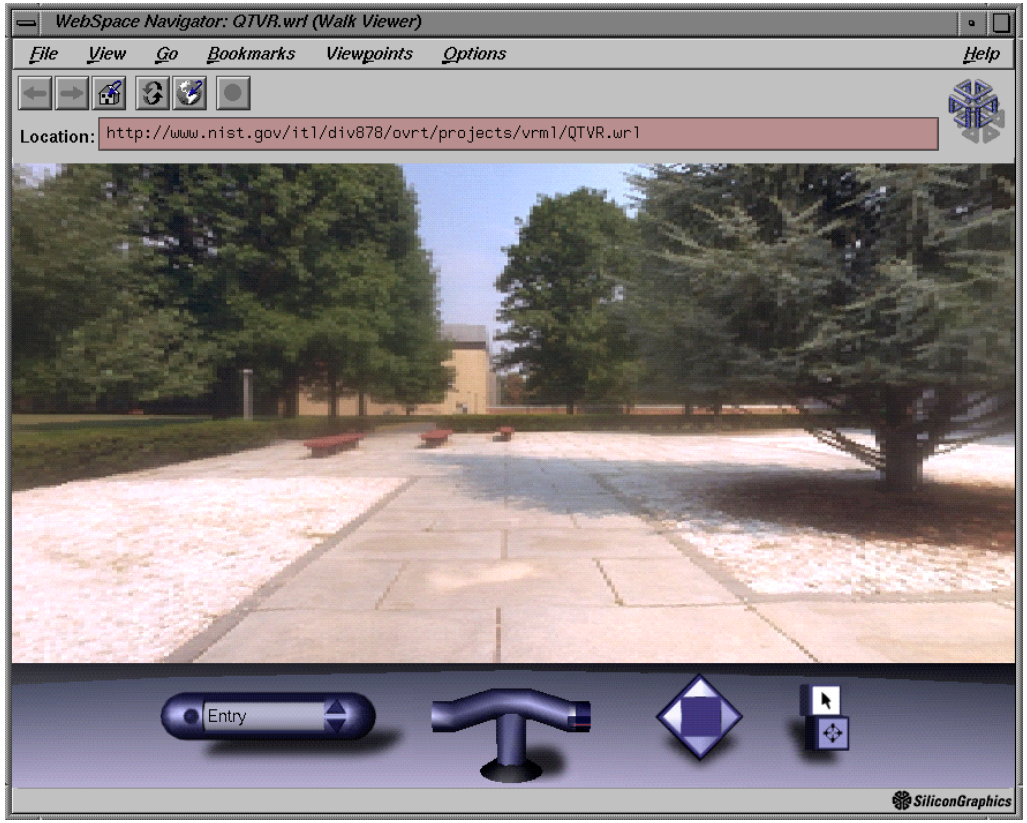
Fusion - Images and Polygon (QTVR & VRML get married)



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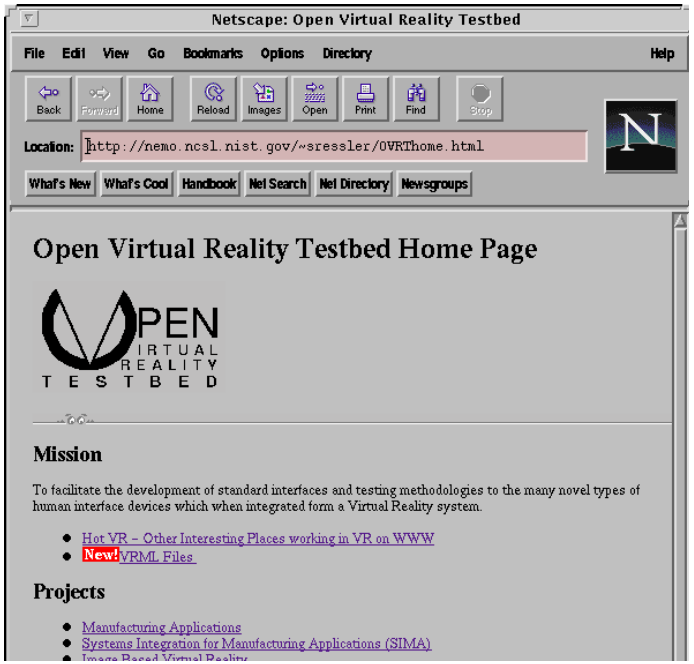
Open Virtual Reality Testbed — On the Web (cont.)

- **Project "Home Page" URL - http://www.nist.gov/itl/div878/ovrt**
- **For more information contact Sandy Ressler: sressler@nist.gov**



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