Real-Life Visualization of JT Data in Real-Time

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RTT - Realtime Technology
Company Profile – [http://www.rtt.ag](http://www.rtt.ag)

- **Industry Focus (Industrial Design)**
  - Automotive, Aerospace, Manufacturing, Consumer Goods
  - Design, Development, Sales and Marketing

- **Offerings**
  - Real-time Software Tools
  - Digital Content Production
  - Professional Services / Consulting

- **Focus**
  - Visual quality, Speed, Ease of Use
  - Produce tangible benefits – time to market, process improvement, quality
RTT - Realtime Technology

Business Model

RTT Software

- photorealistic 3D visualization in real time
- asset management of design data

RTT Services

- content creation
  - CGI (Film/Print), web. configuration systems, etc.
- consulting
  - process consulting, optimization concepts,

customer
Case Study
High-end visualization using JT
Case Study (Virtual prototyping)
High-end visualization using JT

CAD product development process

PLM XML

3D model database

Styling Applications
- emotion
- lifestyle
- mood
- aesthetics
- lighting

Real-Life Visualization of JT Data in Real-Time
Case Study (Virtual marketing)
High-end visualization using JT

CAD product development process

PLM XML

3D model database

- Structure
- Geometry
- Process
- PMI/DO&T
- Visualisation

multi-CAD

CAD neutral

JT XT Brep

Virtual garage  event  POS (point of sale)  print  film  web

Marketing Applications

Engineering data  Intellectual Property (CAD vs. JT)

product correctness  vehicle option content

Real-Life Visualization of JT Data in Real-Time
Process Overview
CAD to CGI

CAD data

Convert

Reference Model

Organize

Cut/Clean

Tessellate

Texture Mapping

Model

Appearance/Materials

Final Model
Real-Life Visualization of JT Data in Real-Time

Model Conversion
Data Gathering

- Creative Brief
- Reference (photos, material samples)
- Coordination (Engineering, Design, Marketing)
- PLM export/revisions
- Product completeness
- Product correctness
- Reference model
Model Conversion
Cut/Clean – engineering detail

- Engineering parts are needed for product correctness
- Engineering detail is too much for most production render firms
- Many components don’t contribute to overall rendering
- Visibility culling
- Automated simplification

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Model Conversion
Tessellation

Geometry is converted to a polygon mesh

Further preserves IP when model is distributed to production render firms

Quality control is essential and directly linked to production goal:

- internet $\rightarrow$ low res
- animated movie $\rightarrow$ med res
- dealer configurator $\rightarrow$ med res
- print image $\rightarrow$ high res

Tessellation attributes:

- surface smoothness (diffuse, reflective)
- accuracy (chordal tolerance)
- patch topology (crack-free)
Model Conversion
Modeling

Real parts that are missing or differ to the CAD have to be modeled:
- seat upholstery
- leather door panels
- seams & stitching
- leather bags for gear shift and handbrake
- icons for controls or scales
- soft tops for convertibles
- emblems
Appearance
Basic Lighting

Reflectance

- Lambert – diffuse
- Phong/Blinn – specular
- Anisotropy – non-uniform highlights
Appearance
Advanced lighting

<table>
<thead>
<tr>
<th>Illumination</th>
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<tbody>
<tr>
<td>Lighting plays important role in image quality</td>
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<td>Resulting image - blend between pre-computed and real-time results</td>
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Materials

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<thead>
<tr>
<th>Material</th>
<th>Emboss</th>
<th>Treatment</th>
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<tr>
<td>Leather</td>
<td></td>
<td>_ Clear coat</td>
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<tr>
<td>Cloth</td>
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<td>_ Fresnel</td>
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<tr>
<td>Plastic</td>
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<td>_ gloss</td>
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<td>Sheet metal</td>
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Real-Life Visualization of JT Data in Real-Time
Environment Effects
HDRI, Fresnel, Surroundings

- High-dynamic range imaging
  Greater dynamic range of exposures
  Wide range of intensity levels

- Fresnel

- Reflections
  Approximated

Real-Life Visualization of JT Data in Real-Time
Reflections/Refractions
Real-time ray tracing

Real-time ray tracing is employed to render object-to-object interactions and various optical effects such as

- reflection
- refraction
- absorption
Real-time ray tracing

Results

Max. Depth 1:

Max. Depth 4:

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Image Creation
Layer-based rendering

- Rendering layers rather than full images yields more control in final image creation.
- Supports flexibility in post-production.
- Generated layers can be dropped into existing images for quick changes by using masks and alpha channels.
Compositing
Sample Layer Generation

- Background
- Beauty Pass
- Diffuse pass
- Occlusion
- Reflection
- Specular

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Real-Life Visualization of JT Data in Real-Time
Results
Results

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Results

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Results

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Results
From JT to CG

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Parting thoughts

_ JT Open - simplifies multi-CAD issues

_ JT Open - as a 3D interchange format, protects IP

_ Accommodate 3D (refined) visualization assets in data management solutions
  _ Record of product portfolio
  _ Record of design decisions