Automated 2D to 3D CAD Conversions – Myth or Reality?

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Tank Automotive Research Development & Engineering Center (TARDEC)
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Warren, MI

Presented at the SME WESTEC 2004 – New Frontiers in Manufacturing Technology Conference, Los Angeles, CA

March 24, 2004
**Automated 2D to 3D CAD Conversions-- Myth or Reality?**

**Dr. Raj Iyer**

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Outline

- Need to move to 3D
- Issues with legacy data
- Decision factors
- Methodology
- Conversion issues
- Demos
- Conclusions
Legacy data
- Paper and Mylar drawings
- Scanned raster images
- 2D CAD vector files
- 3D "dumb" solid models
Need to move to 3D

- Large holdings of legacy 2D drawings
- Redesign (or design new) parts based on older designs
- Manufacture spare parts using new machine tools – improved logistic support
- Archive designs for future use
- Visualize 3D models for non-engineering use
- Virtual prototyping – engineering analysis
Issues with legacy data

- **Scanned images**
  - Poor scanning resolution
  - Poor quality of hardcopy drawings
  - Multiple sheets because of scanner restrictions
  - Need to be vectorized first

- **Vectorized drawings**
  - Duplicate and overlapping edges
  - Disconnected and crisscrossing edges
  - Near zero length entities
  - Breakup of entities
  - Incorrect scale factor
  - Ambiguous dimensions
Conversion decision factors

- Future production quantities
- Remaining product lifecycle
- Potential for design changes
- Availability and quality of technical data package (TDP)
- Mechanical content
- System density
Available software solutions

- AutoBuildZ (PTC)
- SolidEdge (UGS)
- FlexiDesign (ASPIre3D)
Conversion methodology

FlexiDesign -> 3D UFO -> UFO-Pro/E Plug-In -> 3D Pro/E Model

Feedback

Back project to 2D

Associate 2D Drawing

Correct 3D model

Highlight differences

Edge compare original and final 2D

Compare

Isolate text and graphics

2D CAD Drawing

Text

Graphics
Conversion issues

- Works best with machinable piece parts
- Cannot handle assembly drawings
- Design intent
- Preprocessing and post-processing needed
- Automated vs. interactive
- Availability and completeness of data
- Pro/ENGINEER API issues
- Carryover of notes and non-geometric information
Process issues

- Can we mandate 3D across the enterprise?
- How to make 3D the official legal document for procurement?
- Do we need to hold on to the 2D?
- How do we manage raster, 2D and 3D concurrently?
- How do we interface with the PDM?
- Are our suppliers capable of handling 3D exclusively?
- Do we have rights to the contractor’s design data?
Potential savings

- Automated conversions 4-5 times faster than manual conversions based on pilot conversions
- May not require engineers or 3D modeling experts
- In-house conversions on an as-needed basis possible
- Flexibility in outputs – Pro/E, Catia, UG, SolidWorks
- Lower costs in procuring and manufacturing parts by providing supplier with CAD data that they can directly use
Demos
In summary

- Cost-saving automated software are becoming available and affordable today
- Take advantage of cost/time savings that automated software provides
- Not a 100% solution – but definite productivity improvements over manual conversion approaches
Contact

- Any Questions?

- For more information:

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Marsha

If you have any questions please contact me -- My hours are listed below.

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OPSEC Review

Subject: OPSEC Review

To: Jeff, Ray, C.

Sent: Monday, January 26, 2004 10:53 AM

From: Alfera, Marsha CONTR.
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