

First Attempts To Use Model Annotation IAW ASME Y14.41

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Premium Partners:



Microsoft

Who We Are:

- ATK Launch Systems (ATK) is a \$2.4 billion advanced weapons and space systems company employing approximately 14,000 people in 23 states. ATK Launch Systems is the largest of 3 business units under the ATK corporate umbrella.
- ATK Launch Systems is the nation's only supplier of human-rated solid rocket motors for access to space. In addition to manufacturing the reusable Space Shuttle boosters, ATK is a leading supplier of solid propulsion for commercial, military, and scientific missions.
- Harold Mills has 37 years experience in drafting, drafting checking, tool design, and design engineering in the aerospace and other industries. In addition, Harold has 17 years of CAD experience including 7 years experience in 3D solid modeling.

Introduction

- Supporting the principals of concurrent engineering and believing in the advantages of developing engineering drawings based upon a 3-dimensional solid model for design, analysis, manufacturing, and inspection, our first attempt to follow ASME Y14.41-2003 through the generation of 3D solid models to the 100 percent checking of the solid model prior to their release for production.
- Implementing new ideas, practices, and innovations is not always easy. There is always those involved that do not want to leave their “comfort zone”, resisting any change to the way they do business.
- This presentation will reflect on our experiences in initiating the implementation of ASME Y14.41-2003 along with the electronic checking within our organization, the steps required for file transfers to other users, and the insight that we acquired in the process.

Intent and General Guidelines

The intent of this presentation is to:

- Provide the user with some practical applications of incorporating 3-D annotation and the checking of the 3-D solid model database.
- Show examples of annotated and checked 3-D solid models in I-DEAS 11NX.

Some general guidelines that we have established are:

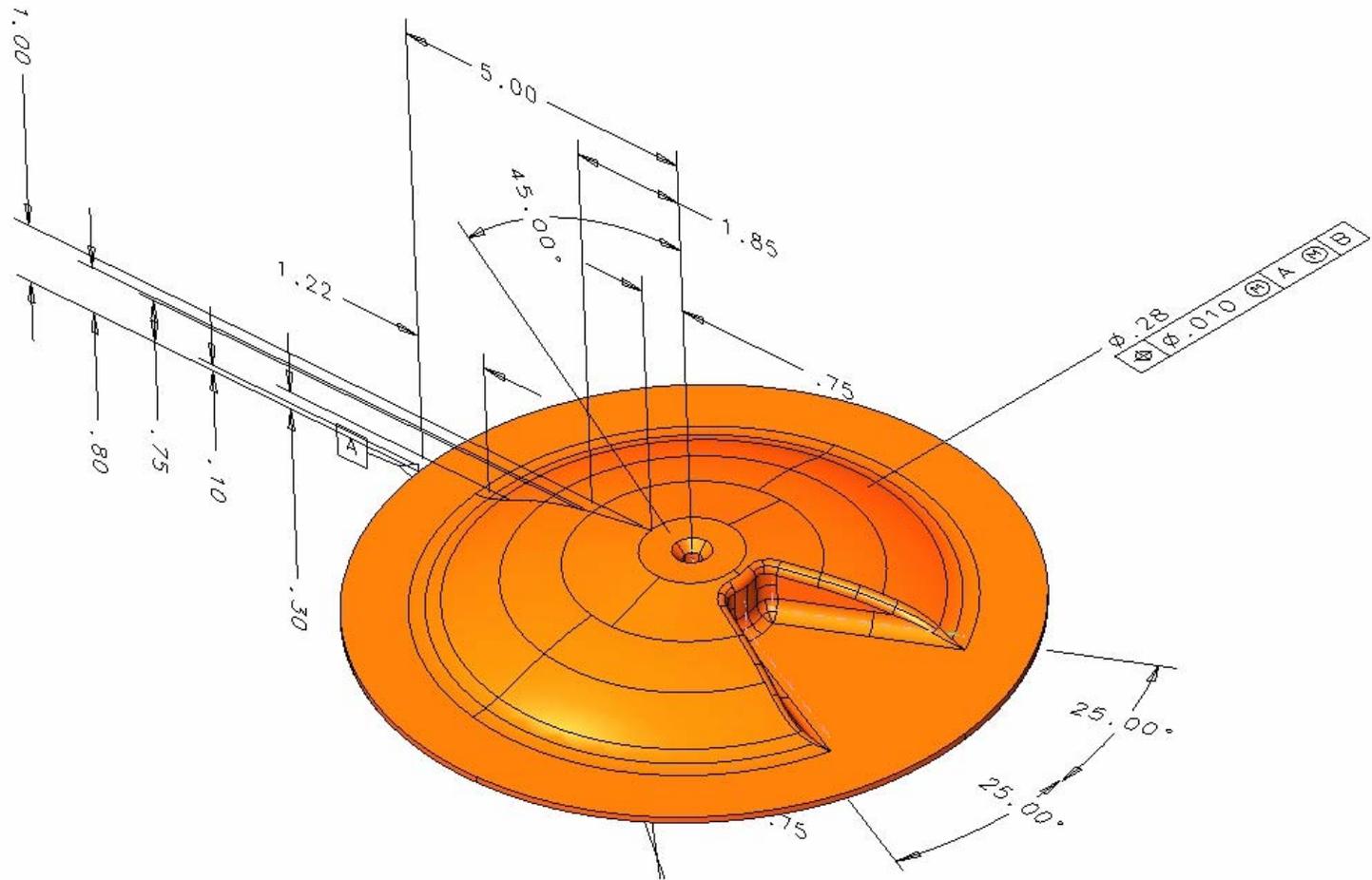
- Master models shall be constructed using a Base Orphan Reference Node (BORN), and shall be grounded and fully constrained (zero degrees of freedom).
- Master models shall be annotated in accordance with (IAW) ASME Y14.41-2003.
- Fully annotated part models will include constraining dimensions, tolerances, GD & T callouts, and drawing notes.
- Models are to be constructed in such a way that a minimum number of steps are required to build the model, and that established “Design for Manufacturability” practices are followed.

Model Verification – Checking Group

- Model constraints are verified.
- Verify model annotation is IAW ASME Y14.41-2003.
 - Verify dimensional callouts
 - Verify GD & T callouts.
 - Datum surfaces.
 - Reference frames.
- Verify model through cross-sections.
 - Verify surface profile.
 - Verify component envelope.

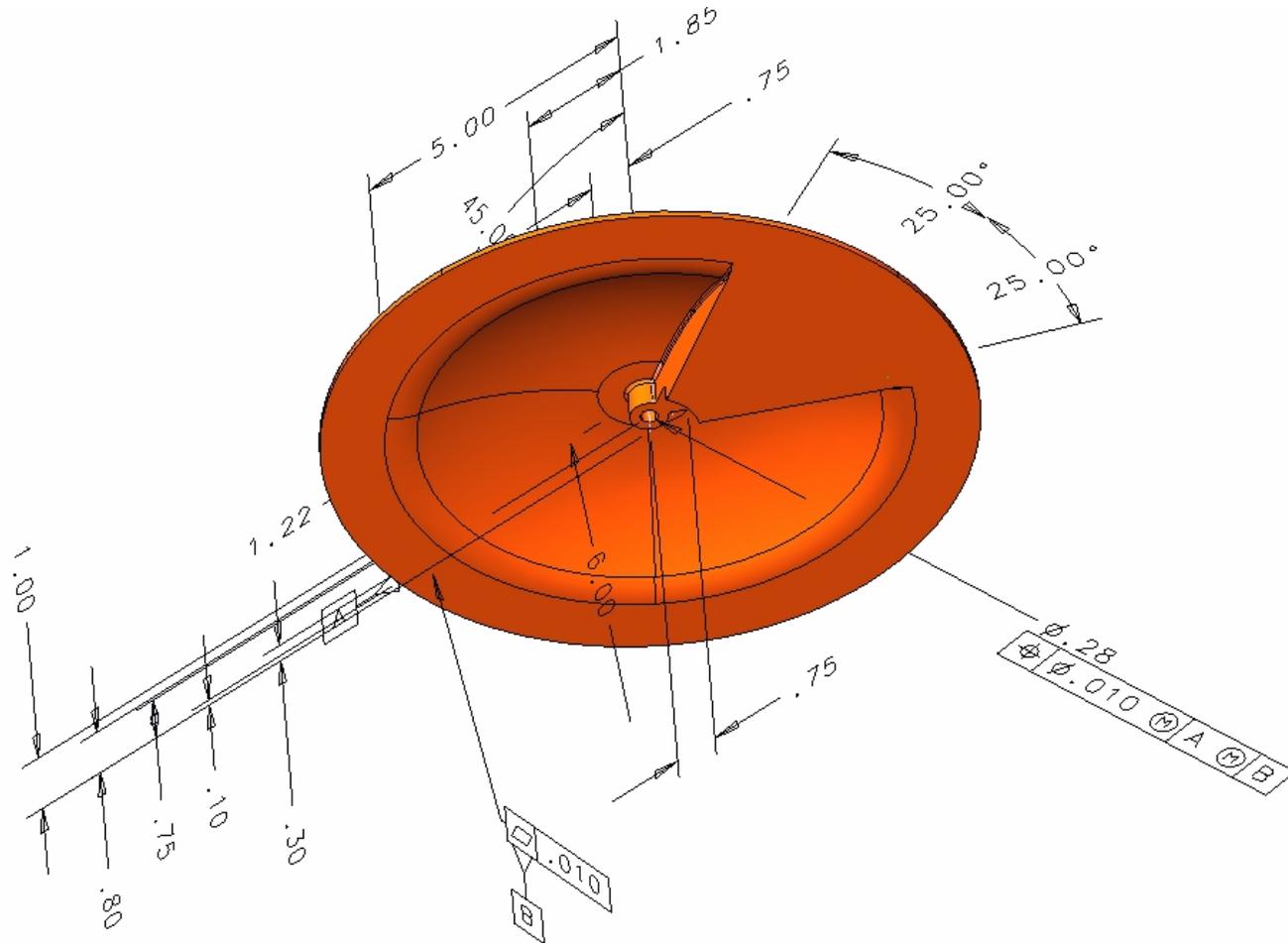
Model Verification – Checking Group

Example of Component Model With Annotation



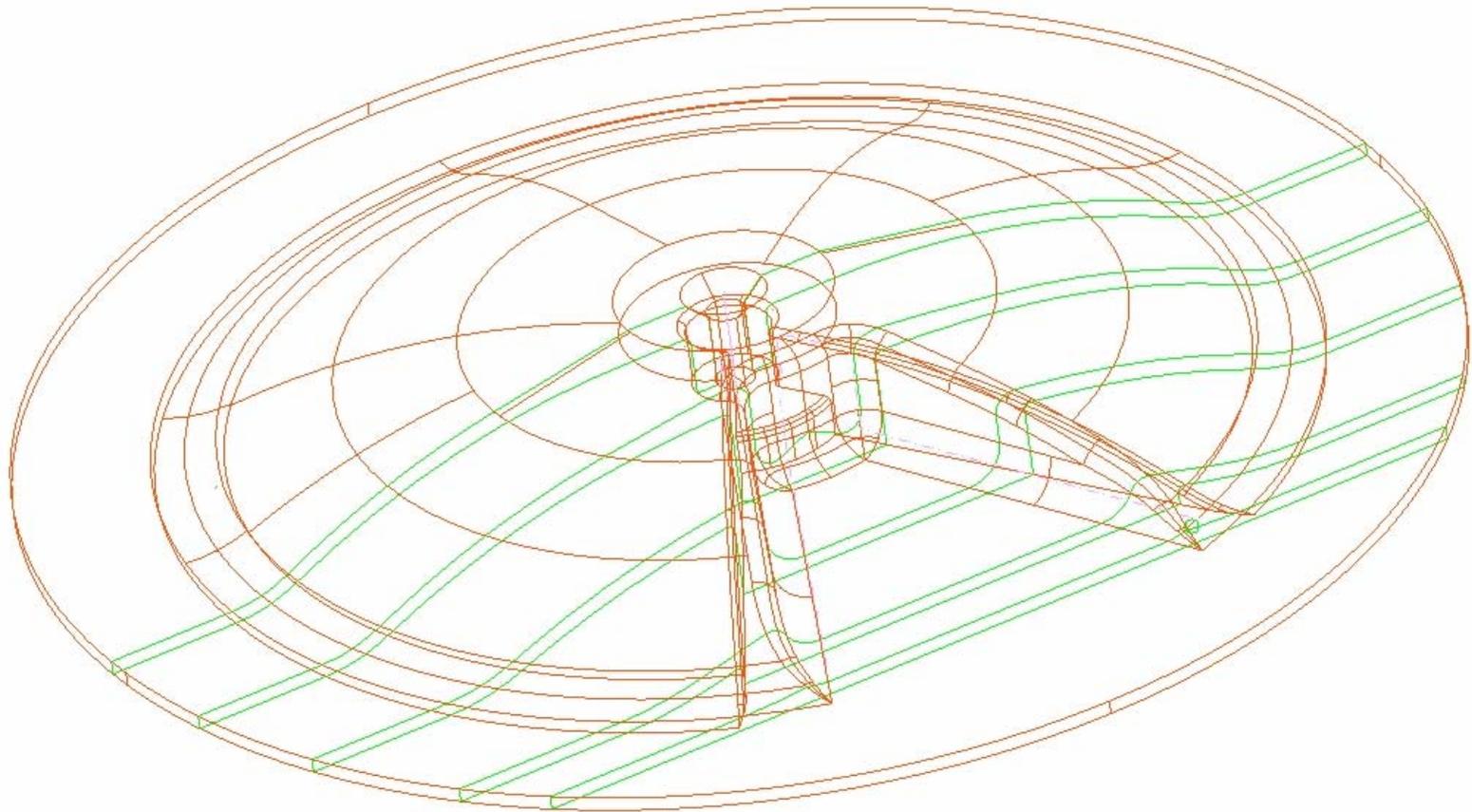
Model Verification – Checking Group

Example of Component Model With Annotation



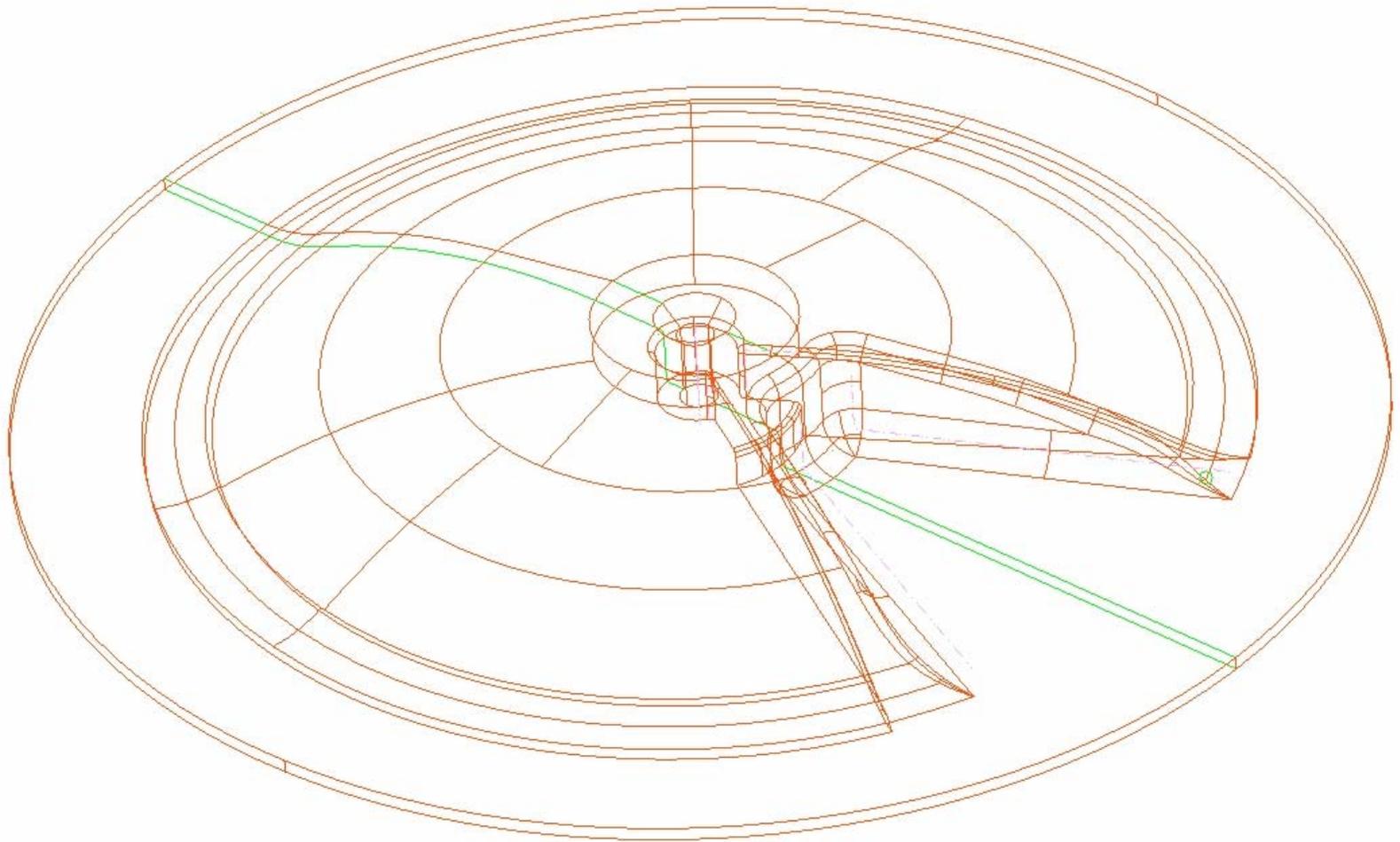
Model Verification – Checking Group

Example of Verifying Component Model's Cross-Section.



Model Verification – Checking Group

Example of Verifying Component Model's Cross-Section



Model Transfer

After the 3-D Model is verified (checked) it is ready for transfer to other users.

- This step was performed to verify that the data transfer method would work as intended by performing an internal transfer and check.
- Data transfer accomplished by exporting a “STEP” file.
 - Encryption for security purposes may be done at this time if required.
- Data (“STEP” file) was then imported into a different CAD software.
- Data then verified for completeness of transfer, ie, no loss of data.

Model Transfer

Data transfer for external use was accomplished.

- Data files can be transferred using several methods.
 - CD Media
 - Electronic
 - “STEP” files
 - “Zip” files
 - “Package” files
- Data transfer was accomplished by exporting a “STEP” file.
 - By encrypted files sent via email.
 - By a secure FTP site
 - By a secure link to ATK’s PDM (Team Center) System.

Questions

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