

Expanding and Utilizing JMAG-Designer as Designers

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Abstract :

Designers rather than CAE-engineers at the Tohoku Pioneer Corporation utilize JMAG-Designer for the design and development of magnetic circuits for loudspeakers. This presentation introduces the configuration and environment necessary to use JMAG-Designer as a tool for designers to examine magnetic circuits in the design process.



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TOHOKU PIONEER Corporation

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Corporate Introduction

Established August 1, 1966
President Shunji Shiono
Location Tendo, Yamagata
Paid-in Capital ¥10,800 million
Net Sales Consolidated ¥55.7 billion
 (Fiscal year ended March 2010)

Main Products

Loudspeakers, car stereo mechanisms, factory automation (FA) systems, organic light-emitting diodes (EL), headphones, precision pressed parts, precision resin-molded parts, and precision molding/dies



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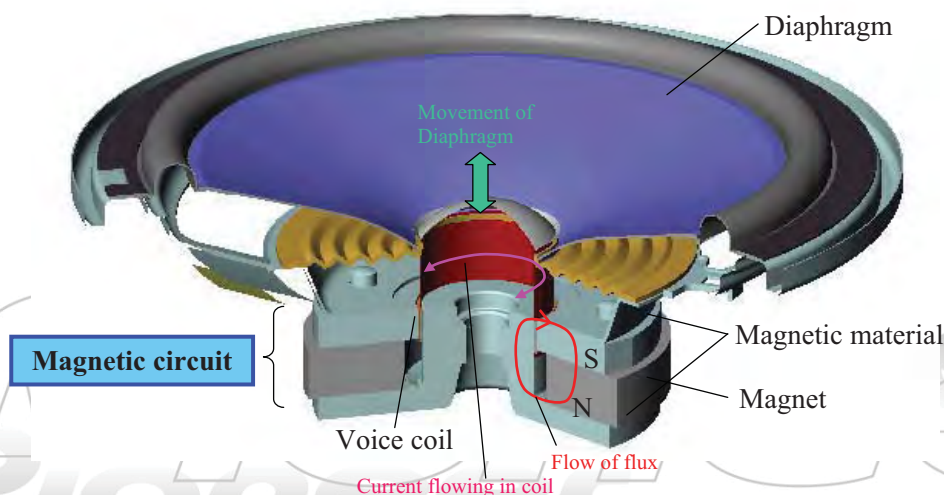
Loudspeakers and Magnetic Field Analysis CAE

- Loudspeakers are a product that uses magnets

Magnetic circuits are generated from the magnets and magnetic material.

-- The performance is evaluated using CAE.

The force produced by the interaction of the magnetic field and coil acts on the diaphragm and the vibrations are converted to sound.





Implementing Magnetic Field Analysis CAE

Conventionally manual calculations were used



- Main flow of the magnetic circuit with interior or exterior magnets
-- Designed using manual calculations



Creating smaller, more versatile magnetic circuits

- Regions appear that cannot be handled by manual calculations
-- Implementation of CAE (JMAG was not our first CAE software)



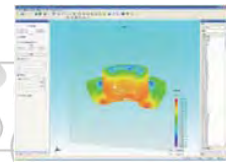
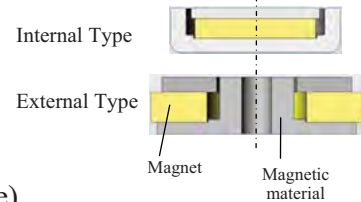
CAE specialists received and handled the designers' requests

- Started by using 2D axisymmetric models. Labor increased by **modeling from the designs**.
- Labor **further increased** when using 3D models.



Expanding 3D-CAD and Finding JMAG-Designer

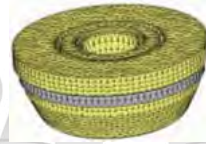
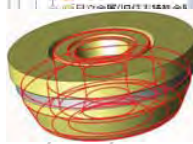
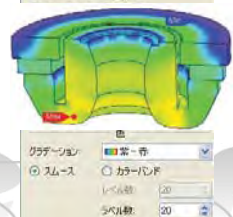
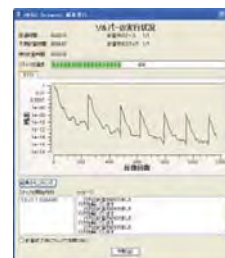
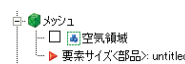
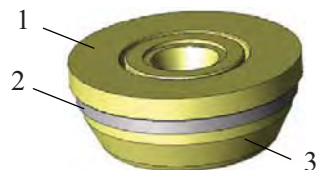
- CAD models can be utilized directly --- Modeling is **drastically reduced**
- Easy to use Interface -- Designers should be using it
- CAE software become independent of CAD software in version 3, further accelerating the analysis process.



Reasons Designers Use JMAG-Designer

The magnetic circuit of loudspeakers can be modeled easily

- Can be constructed in only three parts
- Condition settings (specifying materials and magnetization) can also be **completed easily**.
- No need to worry about the mesh in the air region
-- Benefit of JMAG-Designer





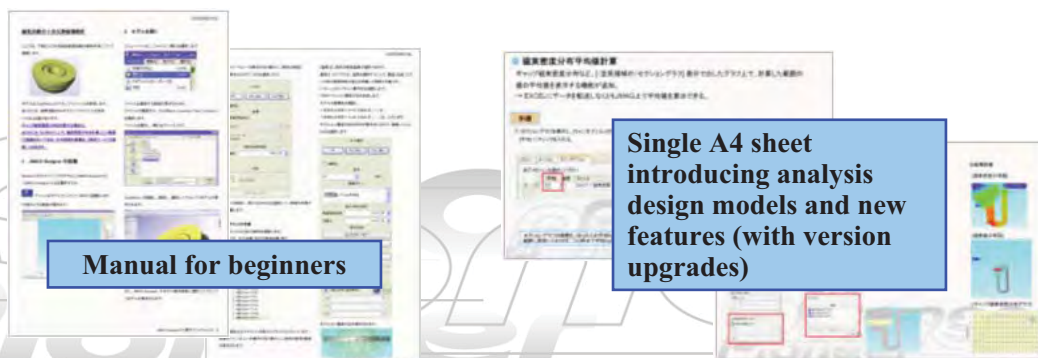
Specific Activities to Expand the Use of JMAG-Designer by Designer (1)

● Create and innovate manuals

- The manuals and tutorials that come with JMAG-Designer are easy to understand, but no one uses them.
- Create an instruction manual specific to design models that is 'simple'.

● Promote and gain recognition of the simplicity of the software.

- Designers do not want their time wasted.
- Let Designers know they can obtain results without much work.
(Utilized specialized manuals and internal direct mailings)



Specific Activities to Expand the Use of JMAG-Designer by Designer (2)

● Have designers requesting CAE use CAE.

- Show them it is faster to do it themselves while teaching them the operations.
- Generate word of mouth from the designer after they have learned the process.
(Presently 40 designers are using JMAG)

● Promote the information from results and the accuracy.

- Let Designers know the results they can obtain.
- Promote not only how easy it is to use, but how accurate the results are.
(Evaluating software before implementation is vital to improving accuracy)

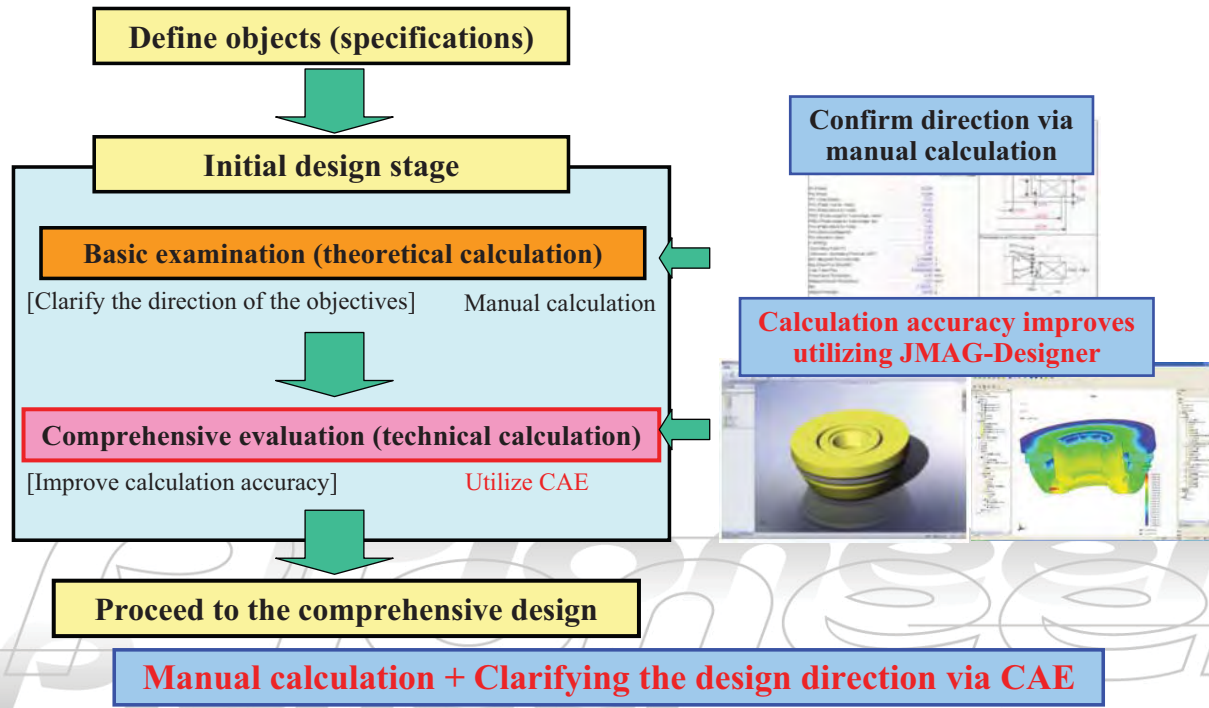
● Post FAQ and vital information at the CAD terminal.

- Post a single A4 sheet of information next to the CAD terminals. Share information.

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Penetrating the Design Process

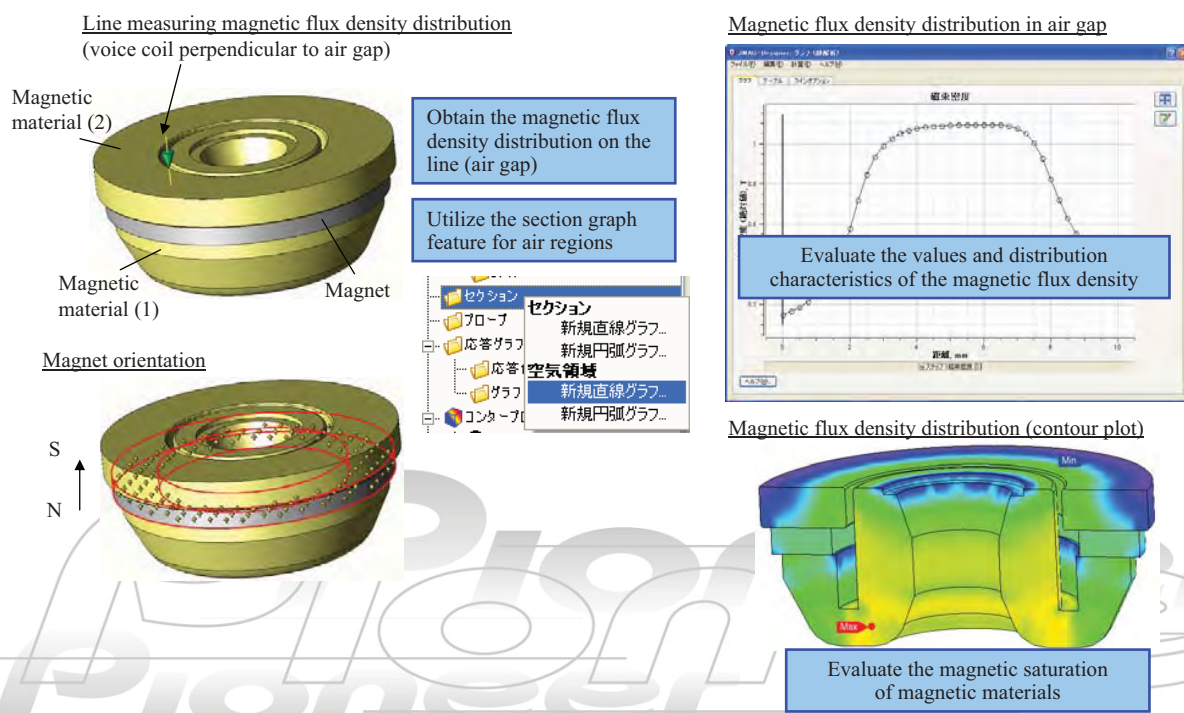
- Promote CAE at the early stages of design -- Let designers know the 'large effect' CAE has at early stages of design.



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Example Application for JMag-Designer

- Magnetic flux density distribution of an air gap for a magnetic circuit of a loudspeaker



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Conclusion: Expanding JMAG-Designer

● Promote the 'simplicity' to designers.

Let designers know how magnetic field analysis in JMAG-Designer is an extension of manual calculations.

Take advantage of every opportunity to actually use CAE.

JMAG-Designer is easy. Anyone will use CAE if it is easy.

● Results can be evaluated simply

Our examples -- Evaluating magnetic flux density distribution of air gaps and magnetic materials.

Define detailed parameters in later steps. CAE specialist can expand the range of applications as they feel appropriate.

● Promote the accuracy

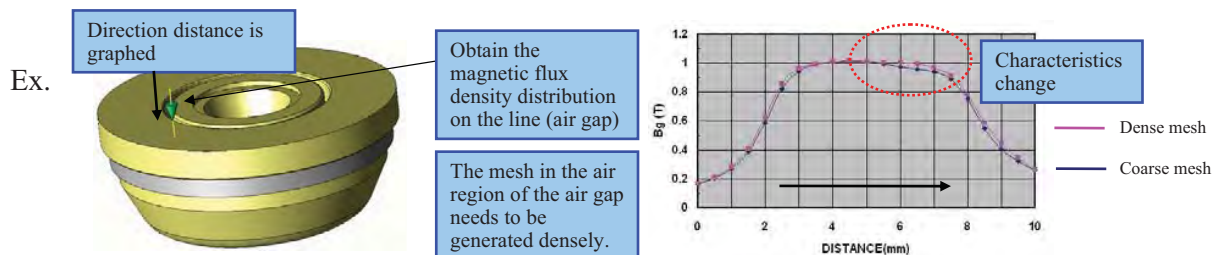
CAE will be used if the CAE results approx. match the actual results and if it is simple to use. (Much easier than building prototypes)

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Challenges

● Pitfalls of automatic mesh generation

The accuracy of results worsens if the mesh in areas to measure is too coarse.



- Handled by changing the element size of each part. (Define rules)
 - Educating designers about how to determine results is also necessary.
- (Let designers know not to simply trust the results)

● Handling the CAE results and managing data

- Done independently --- Data is held only by the individual --- Accumulating knowledge is difficult.
- Managing CAE data (.jproj files, etc.) --- Compress only CAE data on a disk. Determine what can be reused.

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END

Thank you for attending this presentation.