

been working hard to enhance the CADD program by introducing the state-of-the-art software and hardware such as Autodesk Inventor, Pro Engineer, and 3D printer into various courses, but the program name did not reflect what we were doing. Most people still refer CADD simply as a “drafting” program. Another reason for this decline is the lack of growth opportunities for the graduates. No colleges in this country offer CADD programs beyond the associate level.

In the meantime, Industrial Design as a discipline has been recognized as an important player in the area of product design and development. In many cases, whether it is the design of a new car, design of a new medical device, or design of a new commercial electronic gadget, we have seen that industrial designers are now playing key roles and are involved in the entire product development process from initial product planning to post implementation.^[1-4]

In light of these developments and after an extensive research, one year ago, the Department decided to create a new program called Industrial Design Technology (IND) to replace the existing CADD program. This change not only reflected the changes we made over the years on our original CADD program, but also provided growth opportunities for our graduates, as they’re many industrial design programs at the baccalaureate and graduate levels in the country.

Curriculum Design

Industrial design as defined by Industrial Designer Association of America is “the professional service of creating and developing concepts and specifications that optimize the function, value, and appearance of products and systems for the mutual benefit of both the user and the manufacturer”. This not only requires the designer to have the artistic talent to design attracting products, but also to have the sound engineering knowledge to design products that are functional and easy to manufacture.

Most existing Industrial design programs in the country tend to emphasize the aesthetic aspects related to the product design and development. The IND program we developed intends to emphasize both the engineering principles and the aesthetic aspects. This will make our program a multidisciplinary one in nature.

As today’s products become more and more complex, the product design has evolved to be a field that requires multidisciplinary approach. This concurrent design and engineering approach along with the advancement in design technologies has contributed to the lower cost and higher quality of products^[5]. It has become the standard in product design and development.

To create a balanced multidisciplinary program in industrial design, we considered the following key areas:

1. Mathematical level
2. Easy to use CAD tools
3. In depth engineering principles
4. Various important manufacturing processes
5. Computer aided manufacturing (CAM)
6. Key elements of Industrial Design

In the original CADD program, the mathematical requirement was quite low. It only required MA 275, Introduction to Mathematical Analysis, which covers intermediate algebra. In the new IND program, the math requirement is MA 375, Mathematical Analysis, which covers advanced algebra and pre-calculus functions. This is to reflect that students need higher levels of math to really understand the underlying engineering principles and design theories. We introduced various engineering and design software such as Autodesk Inventor, Pro Engineer, and MasterCAM in the program. The software is easy to learn and is integrated tightly into various engineering and design courses. In addition to the existing basic engineering and manufacturing courses, we introduced key courses in industrial design, such as industrial Design I and II, and Industrial Design Processes.

The Curriculum

This new curriculum contains a large variety of courses in design, animation, manufacturing, strength of materials, engineering materials, and engineering programming using the latest equipment and software packages. The manufacturing sequence consists of MT101, Manufacturing Processes Lab, MT 201, Computer-Aided Manufacturing Systems (CAD/CAM), and IND401, Advanced CAD/CAM. Recently, the department has acquired a new CNC milling center, which would enhance our CAD/CAM area. CNC stands for Computer Numerical Control. A CNC milling center is controlled by computer and can be programmed to perform automatically a series of machining operations. The industrial design sequence consists of IND313, Industrial Design I, IND406, Industrial Design Processes, and IND410, Industrial Design II. Other important courses in the curriculum include: IND304, Advanced Solid Modeling, IND340, Engineering Structures, and IND420, Engineering Animation and Presentation.

Initial Results

Since we introduced many of the state of the art computer software, modified, and eventually changed our CADD program to IND, we were able to offer many new courses and the students were able to learn the latest design and engineering tools in product design and development.

Some of the students work is shown in the Appendix.

Figure A1 is timber house model created by Mr. Rafael Negron in IND 340, Engineering Structure.

Figure A2 is a work created by Mr. Reiad Subrati in IND 304, Advanced Solid Modeling.

Figure A3 is an excellent work created by Mr. Nelson Ho in IND 410, Industrial Design II, formerly known as Computer Aided Design.

Figure A4 shows a hydraulic front loader created by Mr. Rafael Negron in IND 420, Engineering Animation and Presentation.

We were encouraged by the initial results of the new IND program. We will monitor the progress of the program closely. We estimate that it will take at least two years for us to determine if the new program will have an impact on enrollment.

Conclusion

In conclusion, we believed that the program and the name changes have achieved the following benefits:

1. It truthfully informed the general public about what we are offering in the program.
2. It helps high schools with industrial design curriculum to guide their students to our program. Many high schools have changed their CAD program into Industrial Design.
3. It provides more opportunities for our graduates to achieve a four-year degree in Industrial Design in other colleges.

References

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- [3] G. Gemser and M. Leenders, "*How Integrating Industrial Design in the Product Development Process Impacts on Company Performance*", Journal of Product Innovation Management, Volume 18, Issue 1, page 28, January 2001
- [4] M. Yamamoto and D. Lambert, "*The Impact of Product Aesthetics on the Evaluation of Industrial Products*", Journal of Product Innovation Management, Volume 11, Issue 4, page 303, September 1994
- [5] Bill Evans, "*Improving Competitive Advantage through Industrial Design*", Medical Device & Diagnostic Industry (MDDI), November 2005.

Appendix: Students' Work

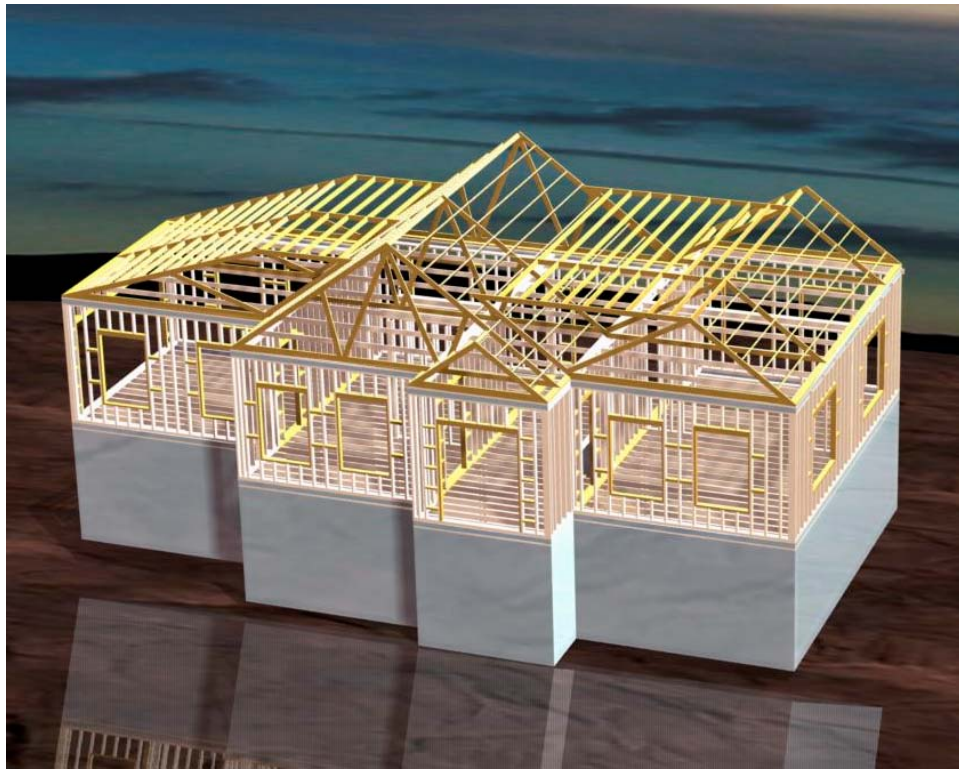


Figure A1. Timber House Model (created by Rafael Negron in IND 340)

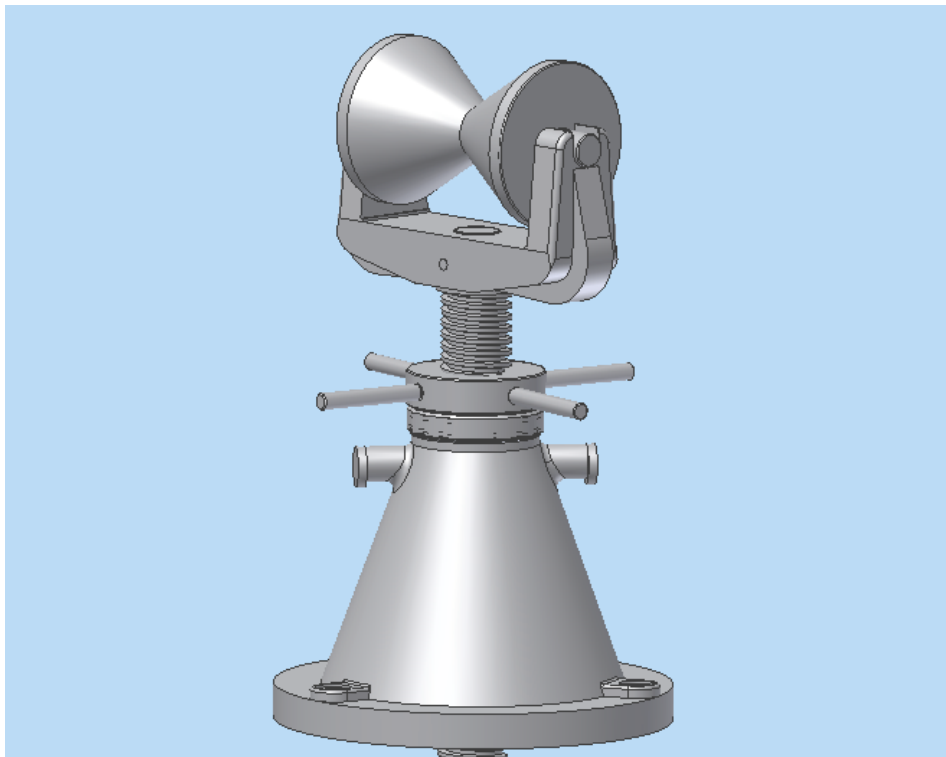


Figure 2. Stock Bracket (created by Reiad Subrati in IND304)



Figure A3. Power Fan Model (created by Nelson Ho in IND 410)

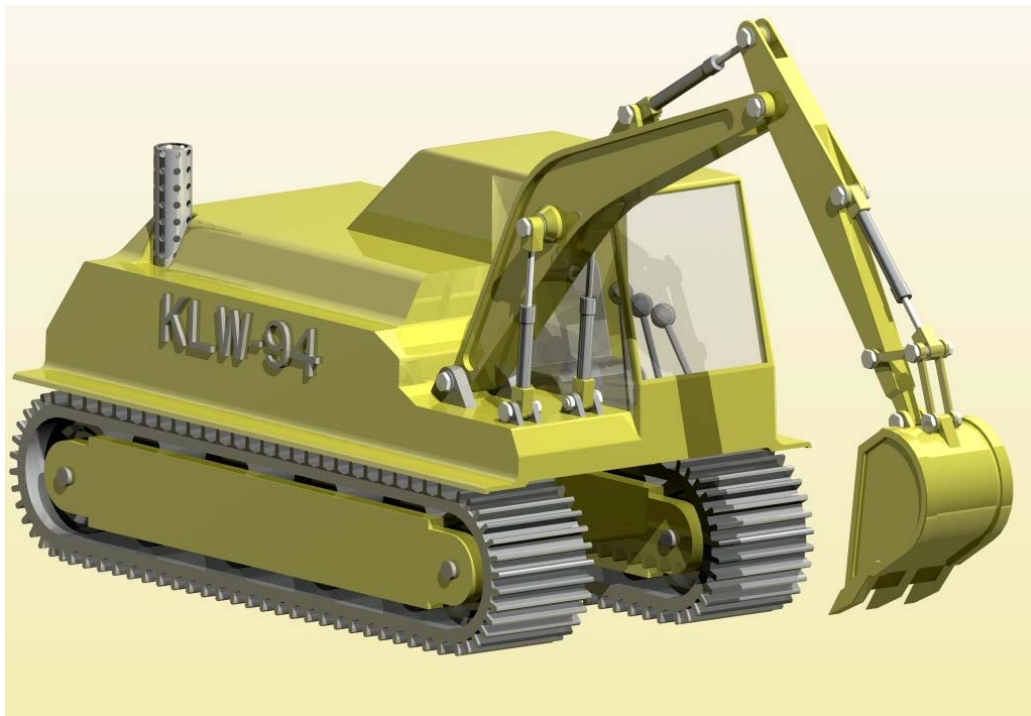


Figure A4. Front Loader Design Model (created by Rafael Negrón in IND 420)