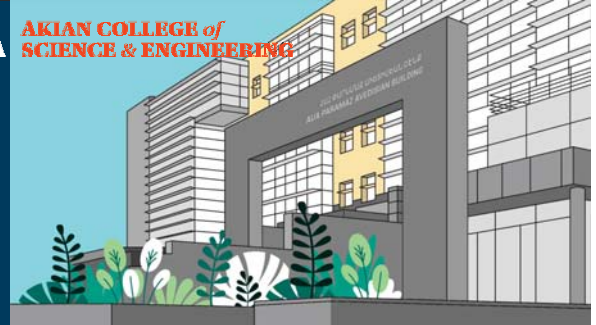


Design of a Rotary Engine

Authors: Mikayel Stepanyan and Ofelya Barseghyan

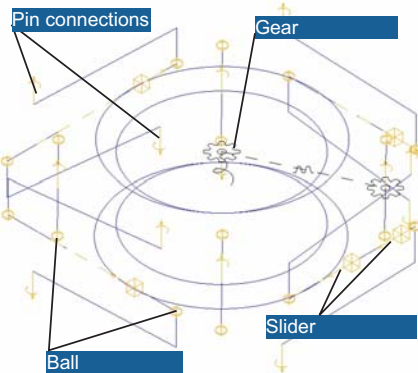
Akian College of Science and Engineering

Software: Pro/ENGINEER Year: 2006



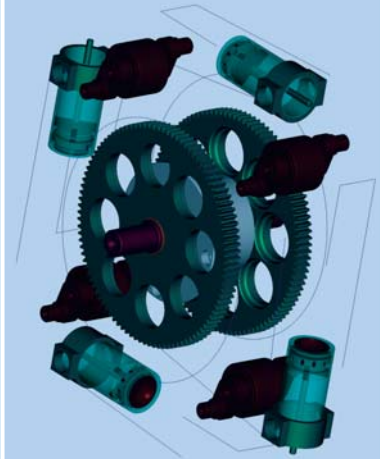
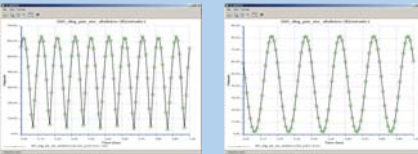
I prepared this poster not only as a report of a successful student project done during the Advanced CAD/CAM Applications course but also in memoriam of my good friend and old colleague, valuable CSE collaborator **Vladimir Sergeevitch Mkrtychyan**. Four of the projects represented in this series of posters are the implementation of his ideas conducted by our students under his careful mentorship and consultancy. Many of our students benefited from his rich engineering knowledge and willingness to share it with us. The idea of this project, along with the hand-drawn sketches, was also provided by Vladimir Mkrtychian. He proposed to design a rotary engine - a mechanism to transform a linear motion into rotational motion. Our task was to verify the functioning of the mechanism through modeling, assembling, and simulation.

Design Approach



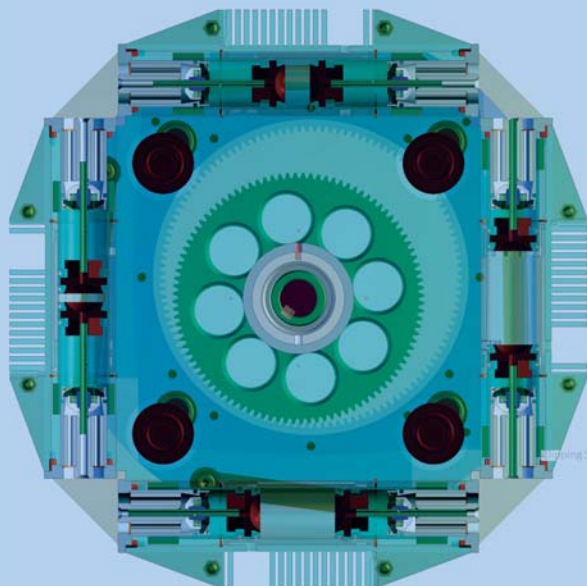
We used the Top-Down assembling method in Pro/ENGINEER. The basis of this approach is the skeleton model, where different parts of the mechanism are represented by primitive geometric objects - lines and circles. Since we aimed to model a functioning mechanism, we connected these objects using real connections. You can see the pin, slider, ball, and gear connections in the picture on the left. Then we inserted a "motor", defined its speed, and the mechanism was ready to move. Once the links of the mechanism move in an intended way, we can define different measures, run a kinematic analysis, and retrieve the values of those measures. Two graphs below the skeleton show the linear velocity of the piston and the distance between two piston endpoints.

Another advantage of the Top-Down Design is that you use the skeleton model links to assemble the parts and subassemblies or even model new parts in an assembly context using the skeleton or other external references. For example, the pistons put on the corresponding skeleton lines will move along with them, and the gears put on the skeleton's central axis will rotate along with it (see the picture on the right).



Assembled Engine

These two pictures show the assembled mechanism. The left is the section view that provides a better understanding of how the engine works. The right picture is the spatial view of the engine. Different appearance tools, such as transparency, textures, and colors, give the model a realistic look. If you scan the QR code, you can see how the engine works.



Scan to see how engine works!

