

## **Team 2113 Vex Design Challenge 2012**

### **Process Description – Benefits of Digital Prototyping – What’s a DuctBot?**

DuctBot is designed to simplify inspections of horizontal ducts and drop-ceiling air plenums. It really works! Made of aluminum with a wide footprint, it can roll over the ceiling panels without crashing down. Special Drive Rail Technology protects wires, chains, gears, and sprockets from getting caught in mess. 360 Panorama rotating camera wires back images.

Teams 2113 and 2113a designed a robot to inspect horizontal ducts and drop ceiling plenums. They learned that maintenance people have a terrible problem finding leaks and checking wiring in ductwork and plenums. There is a need to inspect these tight, closed, areas regularly and current process is very slow.

They decided to build a robot to help. DuctBot is light to allow it to run on drop ceilings. It is low profile and flat but with wheels large enough to get over obstacles and joints. The robot has a panning camera that let's inspections cover a wide area. DuctBot mounts two lights at the front to inspect in the dark.

The coaches were very proud of the team as they used many of the ideas from their competition robots in the design.

The process they used was to brainstorm and sketch then use Inventor to design the robot. Once complete in Inventor, the team used Autodesk Showcase2012 to turn the model into a beautiful finished project and make a movie. What wonderful tools Autodesk provides. The team was blown away by what they could do using the Autodesk software. The limit was only their imagination.

The Vex design engineering process was also an important part of the project's success. The team first identified a need. They then met with the maintenance person to define the problem - visual inspection. They conducted research to see if someone else had done this - no. They brainstormed and sketched many ideas. Then, they did digital prototyping and evaluation. Finally they refined the design as they built and digitally and built the robot.

The team's mantra is now Dream It, Do It, Test It, Fix It. They feel like engineers already!