• Reconstruction of parts is key for many industrial applications
• CAD models aren’t always available
• Toolpaths need to be generated to operate on parts
• Toolpaths require meshes
• Point clouds from 3D sensors alone aren’t always enough
Industrial Reconstruction - Yak

• Previously we have been using yak: https://github.com/ros-industrial/yak

• This tool uses an RGB-D camera and known camera position

• Generates a Truncated Signed Distance Field (TSDF)

• The TSDF is then converted to a mesh

• Requires CUDA and many other libraries to run

• Has an issue sometimes with edges
  • From the edge of the FOV of a camera being less accurate
  • From small inaccuracies in camera calibration
Industrial Reconstruction with Open3D

- “Open3D is an open-source library that supports rapid development of software that deals with 3D data.” [https://github.com/isl-org/Open3D](https://github.com/isl-org/Open3D)
- Provides an easy to use python interface that contains many capabilities including TSDF
- Can install by running ‘`pip3 install open3d`’
- Python interface allows easy interoperability with ROS
Industrial Reconstruction with Open3D

• Live mesh reconstruction with robot mounted camera using Open3D
Industrial Reconstruction with Open3D

• Fully colorized
• Clean edges
• Very quick
• Same ROS interface as yak
Industrial Reconstruction with Open3D

• Able to mesh tricky objects
Industrial Reconstruction with Open3D

• Open3D provides a user friendly interface
  • Quick to install
  • Many useful algorithms

• The results have been great
  • Colorized mesh
  • Live visualization of reconstructed mesh
  • Consistent clean edges

• We are currently developing a ROS interface
  • Mimics yak’s current ROS interface
  • Written entirely in python
  • Potential for many more features