

Intel Reverse Osmosis Membrane Removal Tool Spring 2008

Team Members:

Ron Groeger Jr.
Chris Rogers
Mike Neuwerth
William Dilg

PSU Advisor:

Dr. Sailor

Intel Engineering Advisor:

Christian Brown

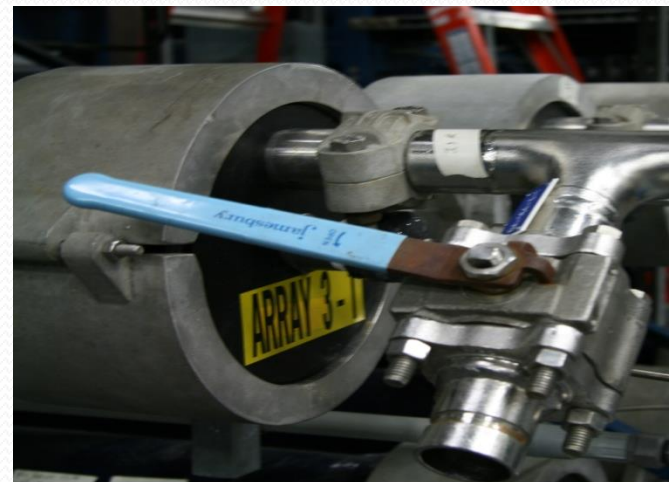
Introduction

- Purpose of our project
- Reverse Osmosis Unit Construction
- Current Method Used
- Concept Evaluation
- Parts of the Membrane Removal Tool
- Operation of tool
- Conclusions

Purpose of Project

- Remove membranes from reverse osmosis unit
- Maintain removal time the same or better
- Reduce the number of people needed
- Restricted on fluids we can use
- Build an ergonomic and safe tool for the technicians to use

Reverse Osmosis Unit Construction



Reverse Osmosis Unit Construction



Current Method of Removal

PVC pipe method



PVC Pipe method



Concept Evaluation

Pro's

Pulling Device

- Both technicians on same end of unit
- No external fluids necessary
- More control on removal

Pushing Device

- Less technician force needed to push
- One piece tool

Concept Evaluation

Con's

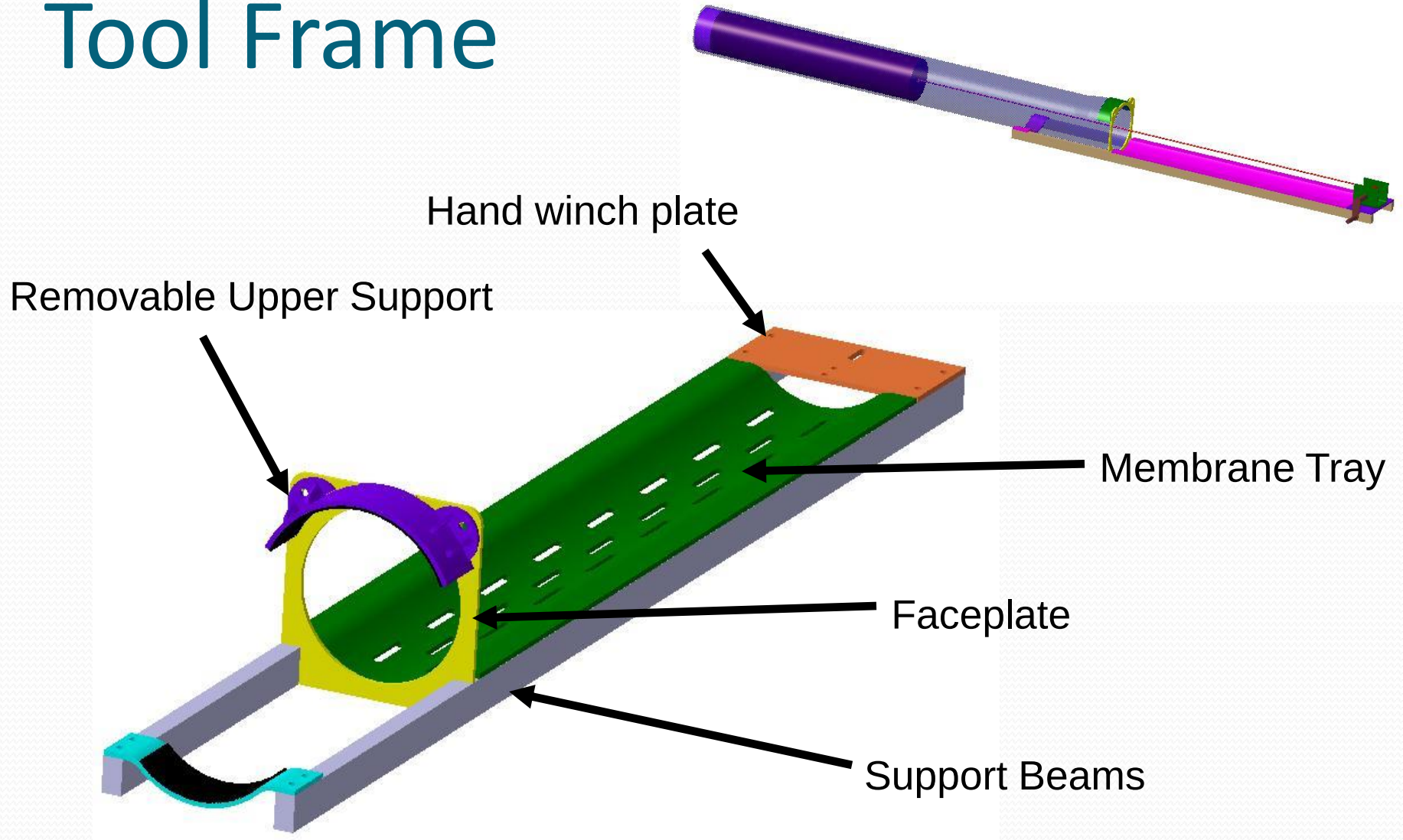
Pulling Device

- Need to counter weight the tool
- Wire rope must be stiff enough to feed through the membranes
- Long length of wire rope

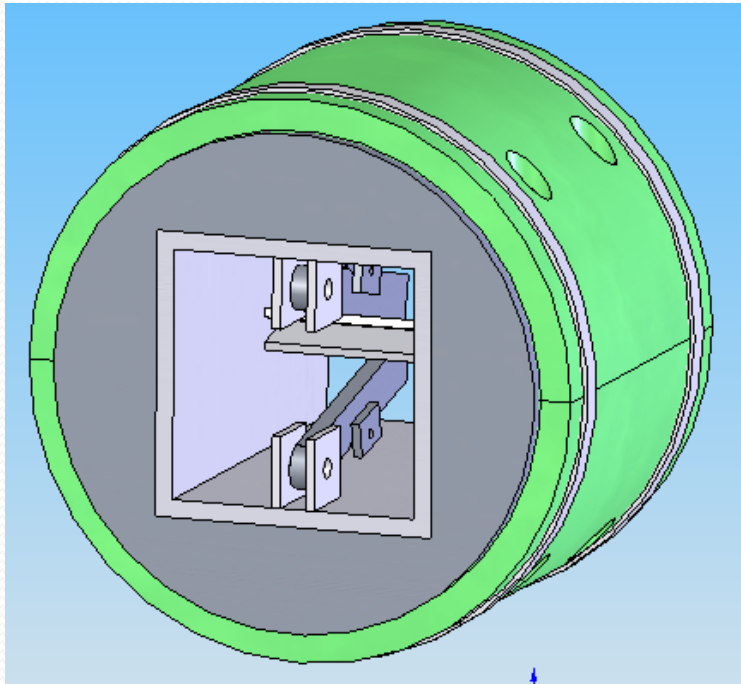
Pushing Device

- Rod must be long
- Limited to glycerin to use for hydraulic fluid
- Technicians on both ends of pressure vessel
- Less control on membrane removal

Tool Frame



Rear Assembly



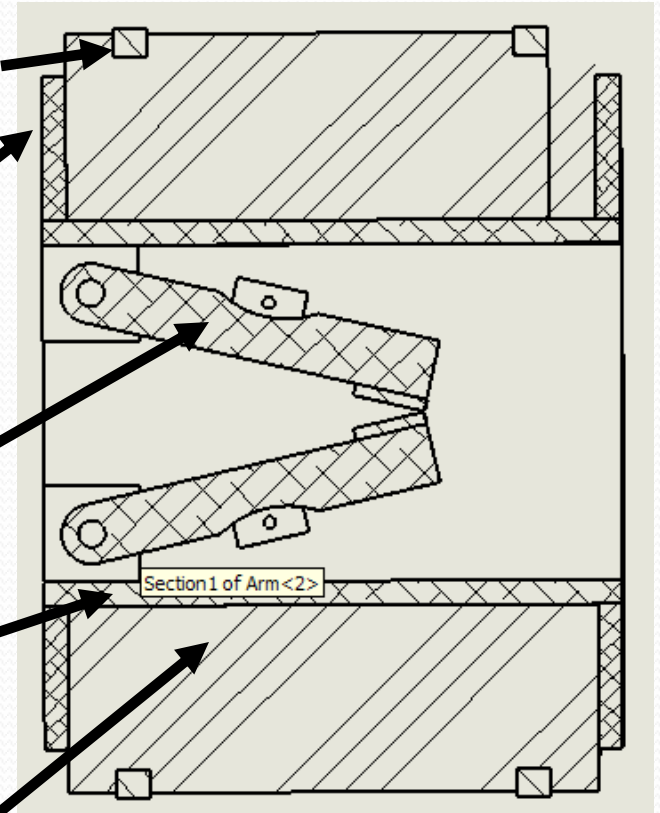
Chevron Gasket

Front Plate

Arm Assembly

Tube assembly

Nylon Block



Wire Rope

- 1/8" stainless steel 1x7 wire braid
- Stoppers crimped on in membrane length sections
- Interchangeable

Hand Winch

- 3.1 to 1 gear ratio
- Hand or Drill operated
- 1/8" wire rope

Removal Tool Operation



Conclusion

- Current removal practice was unsafe and unsound ergonomic practices
- Unique tool
 - Safer
 - Ergonomically sound
 - Only two people to perform job of four
 - Maintain same removal time
 - Can fit multiple reverse osmosis units
 - Does not damage membranes on removal
 - Withstands wet harsh environments

Thank you

- Intel
- Christian Brown
- Dr. Sailor
- Dr. Etesami
- Portland State University ME Staff



Questions?