

# ShipScan: Low-cost, High-availability Ship Scanning and Procedures

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So you want  
to **scan** a ship



# Why?



# What's **stopping** you?

Equipment · Personnel · Training



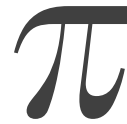
# appropriate

*adjective*    ap·pro·pri·ate    \ ə-'prō-prē-ət \

1. suitable or proper *in the circumstances.*



# Accurate



**3.14159**265358979323846264338327950288419716939937510582097494459230781640628  
620899862803482534211706798214808651328230664709384460955058223172535940812  
84811174502841027019385211055596446229489549303819644288109756659334461284756  
4823378678316527120190914564856692346034861045432664821339360726024914127372  
458700660631558817488152092096282925409171536436789259036001133053054882046  
65213841469519415116094330572703657595919530921861173819326117931051185480744623  
799627495673518857527248912279381830119491298336733624406566430860213



(not as) Accurate  
 $\pi$

3.141592653589793238462643383279502884197169399375105820974944592  
307816406286208998608314159294365947474664542883278831677260327847070665258223066470938446  
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79962749567351885752724891227938183011949129833673362440656643086  
0213

3.14159

But is it appropriate?



# Pat's Super Baguette Recipe

## Ingredients

7.0873808 g

**Yeast** ¼ ounce

14.786765 mL

**Honey** 1 tsp

354.88236 mL

**Water** 1 ½ cups

9.4498409 g

**Salt** 2 Tbsp

542.18463 g

**Flour** 4 ½ cups



# simplify

*verb*

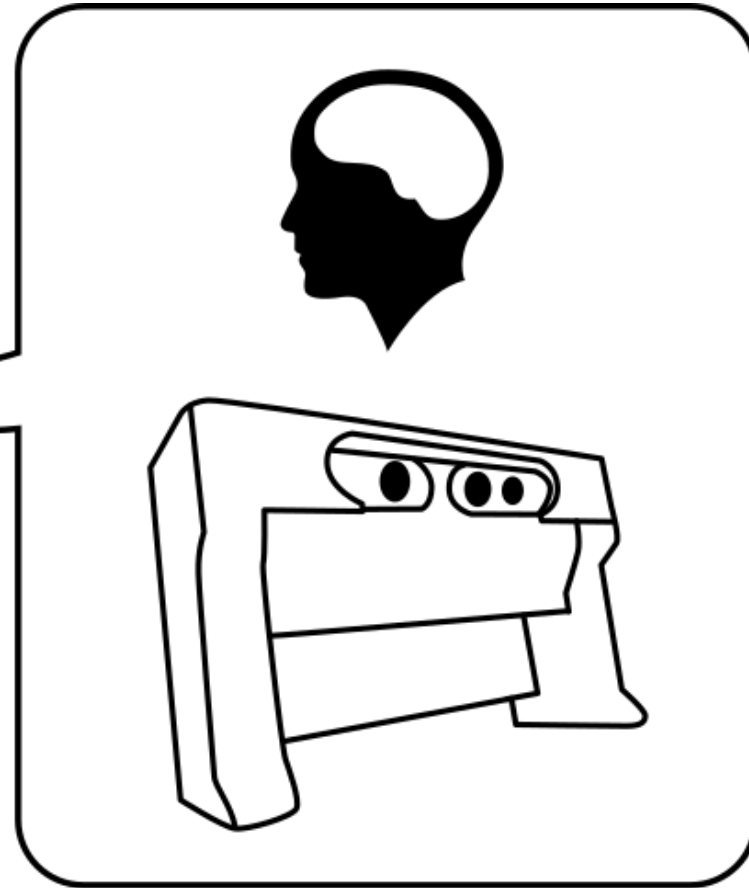
sim·pli·fy

\ 'sim-plə-,fī \

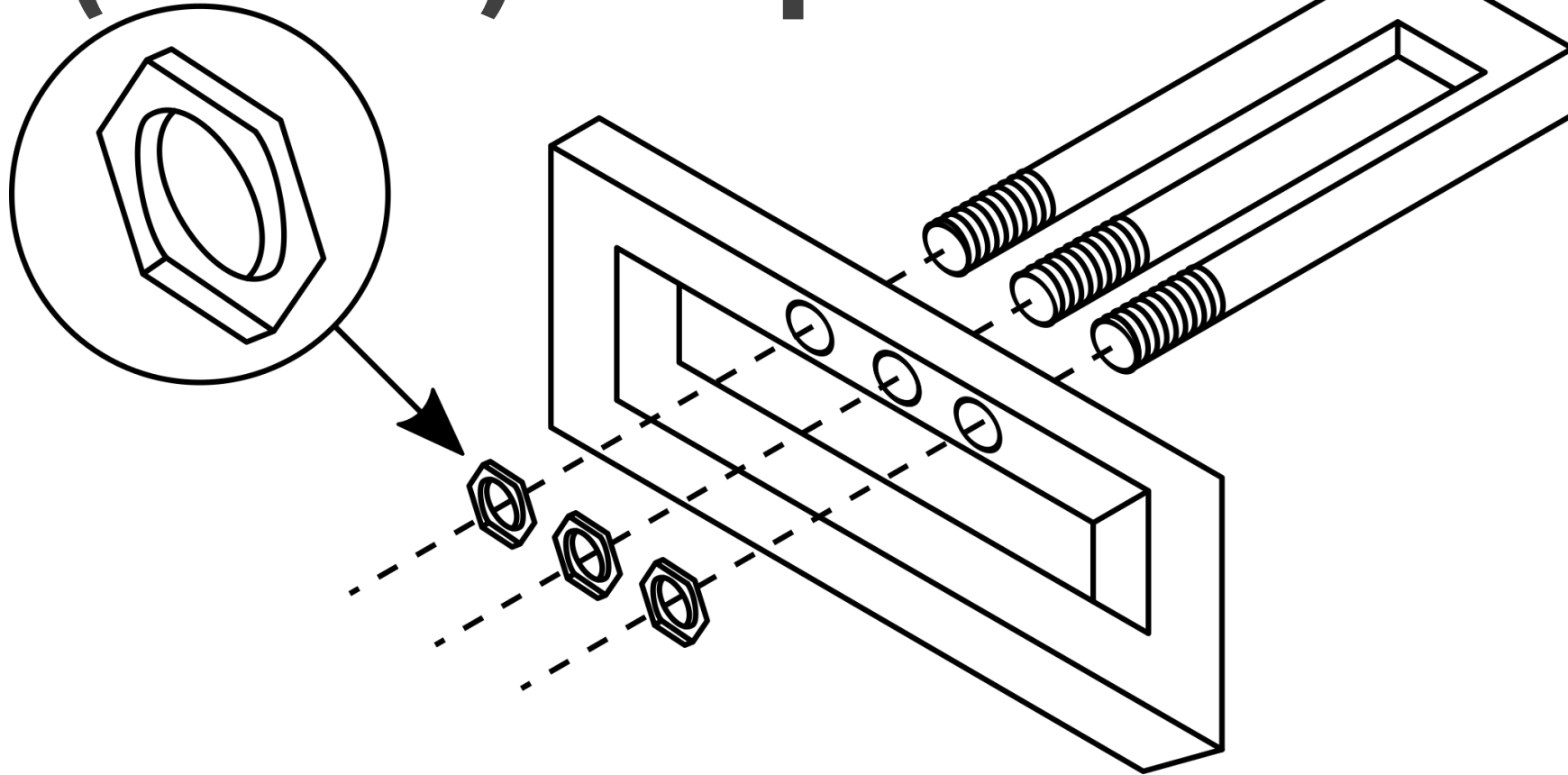
1. Make simpler or easier *to do or understand*



# Simple



# (not as) Simple



# **Cost**

## **Traditional Hi-Res Laser Scan**

**Equipment ~ \$40-100k**

**Personnel ~ \$200/hr**

**Time ~ < hour**



# The Unit



**In  
Use**



**James Breakfield for scale...**

# Shipyards Visits

- **Austal**
- **Bollinger**
- **Conrad**
- **VT Halter Marine**
- **Omega Protein**



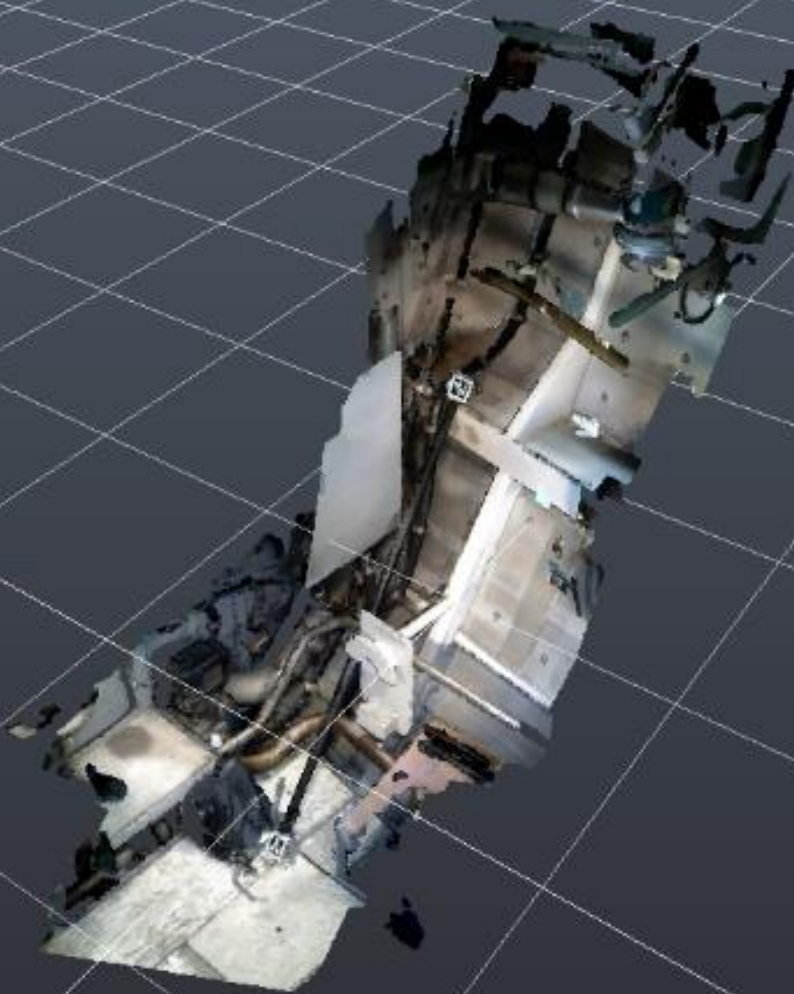


Austal



x - m y - m z - m



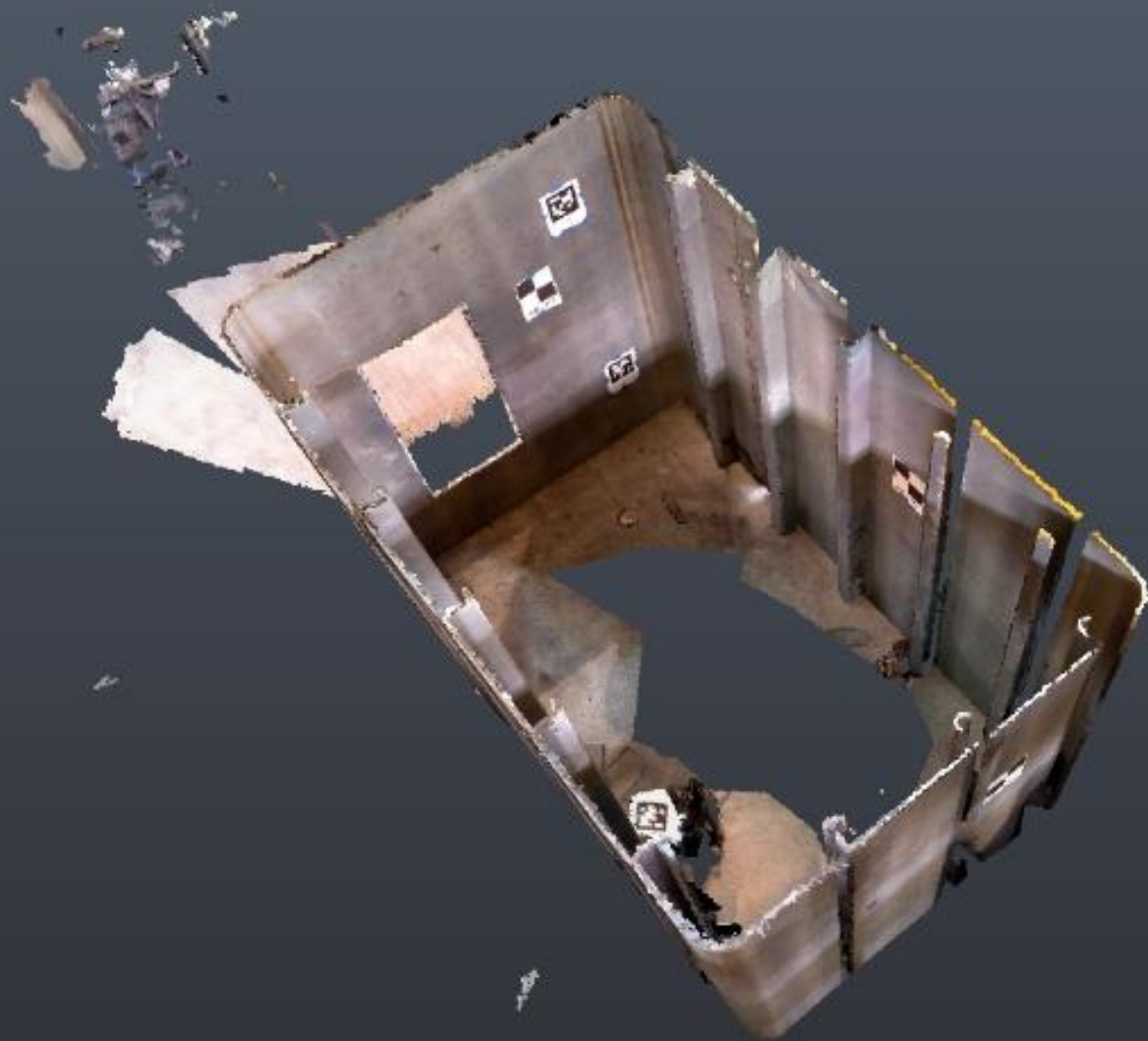


x - m    y - m    z - m



Bollinger





x - m    y - m    z - m



# Conrad

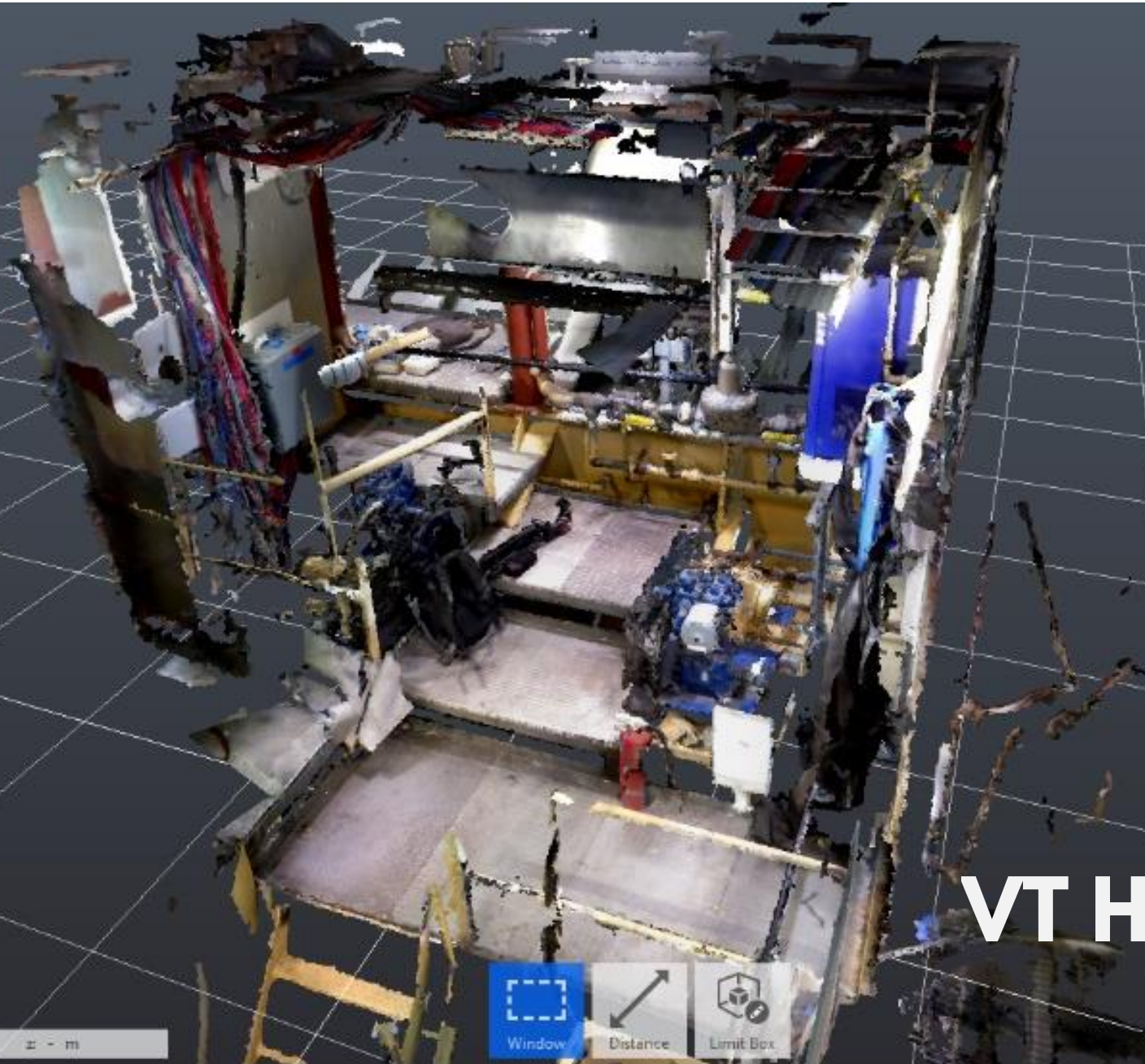




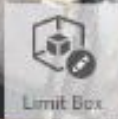
# VT Halter Marine



x - m    y - m    z - m



**VT Halter Marine**





Start Drawing1\* BROMINATOR.rvt with Pointcloud\* +

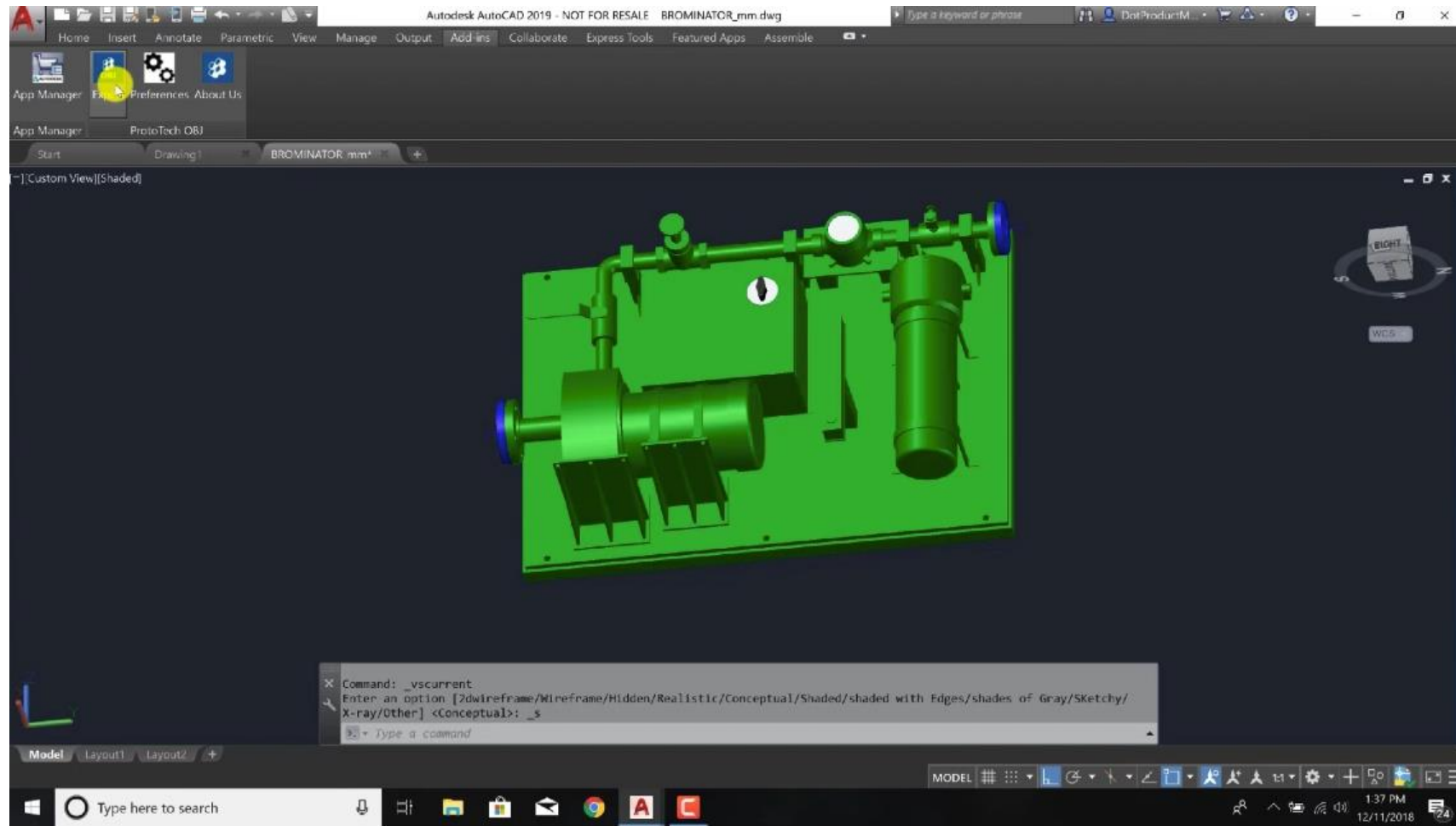


# Omega Protein

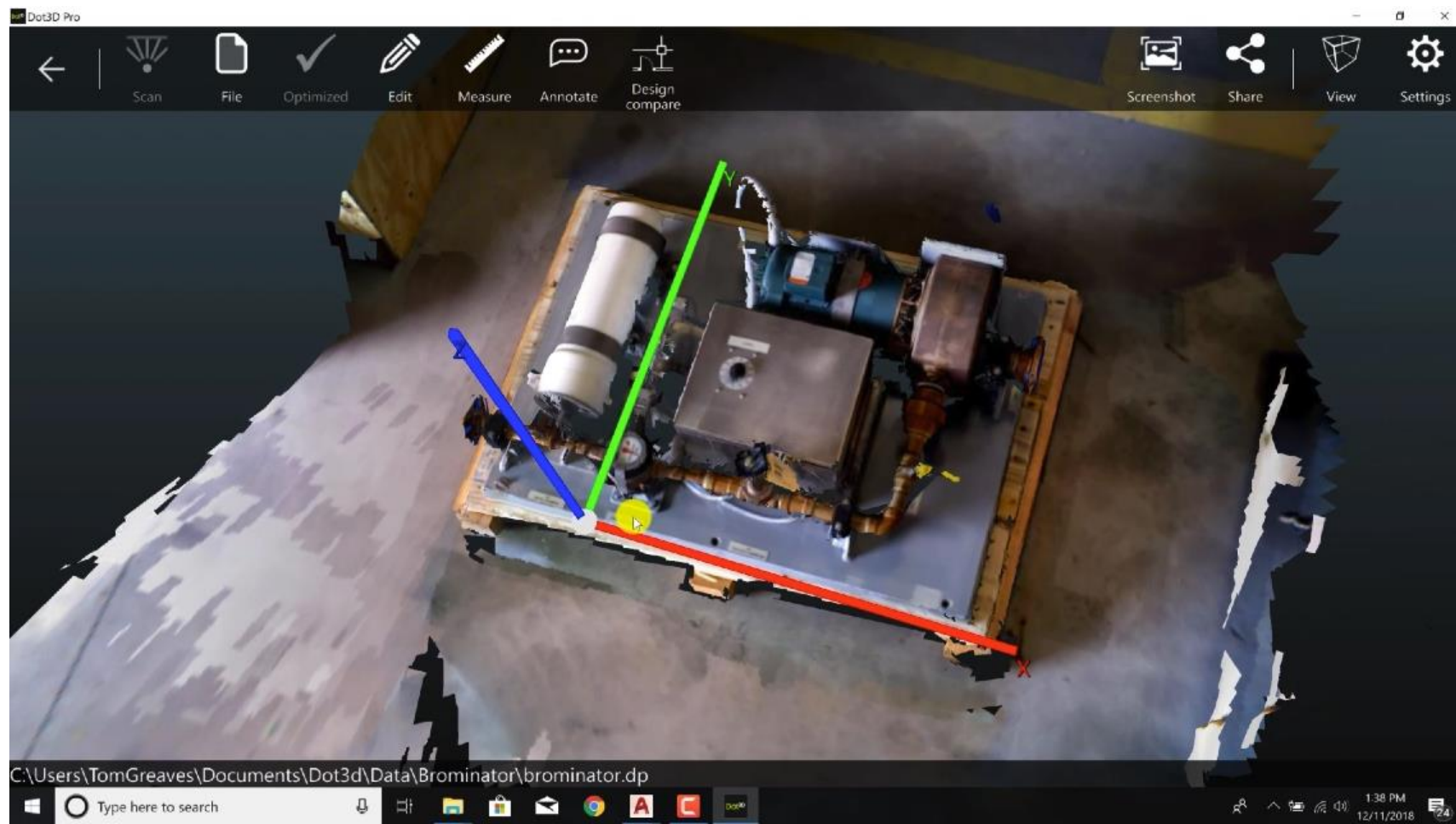


# Workflow



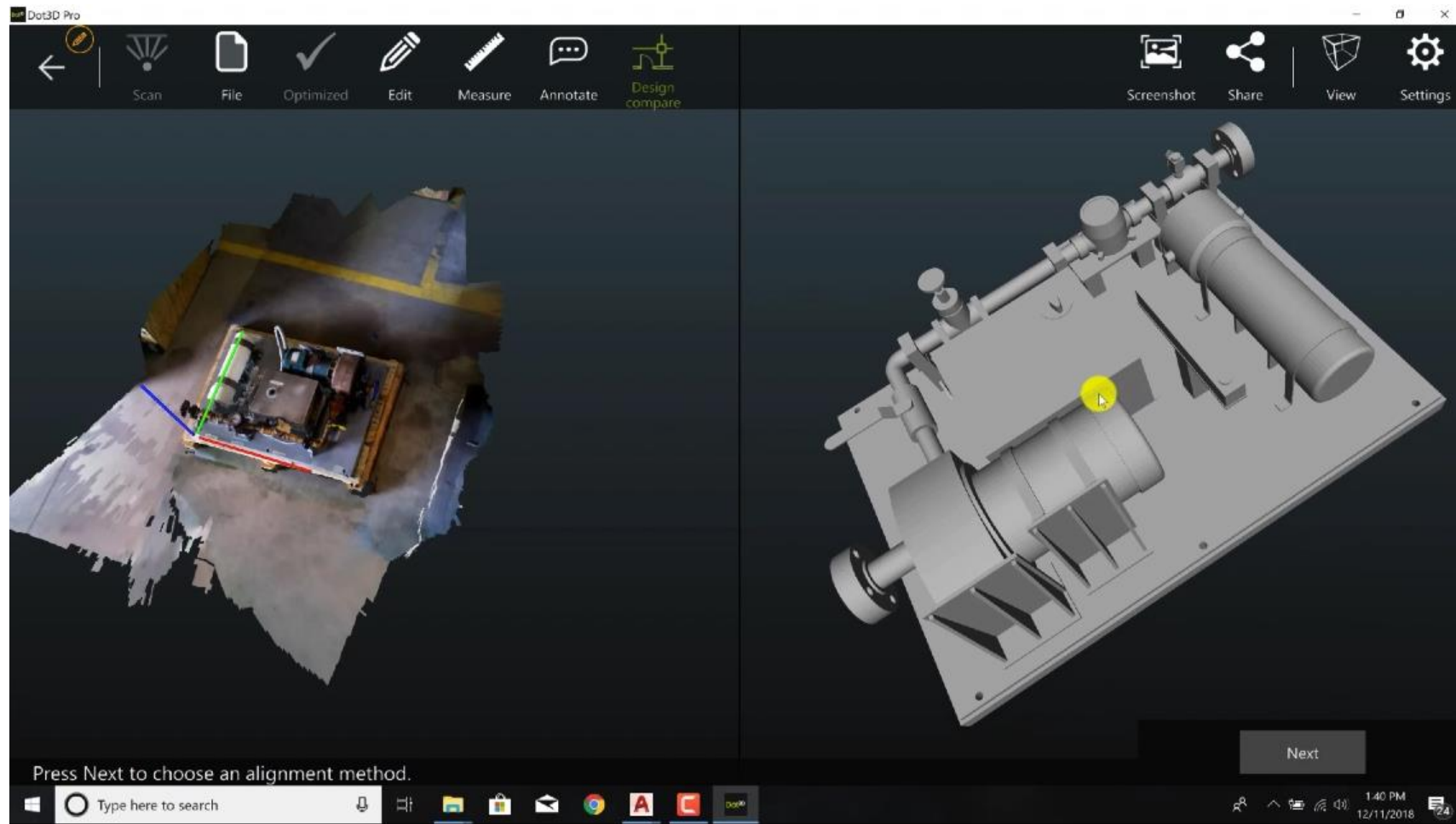


## Brominator CAD Model



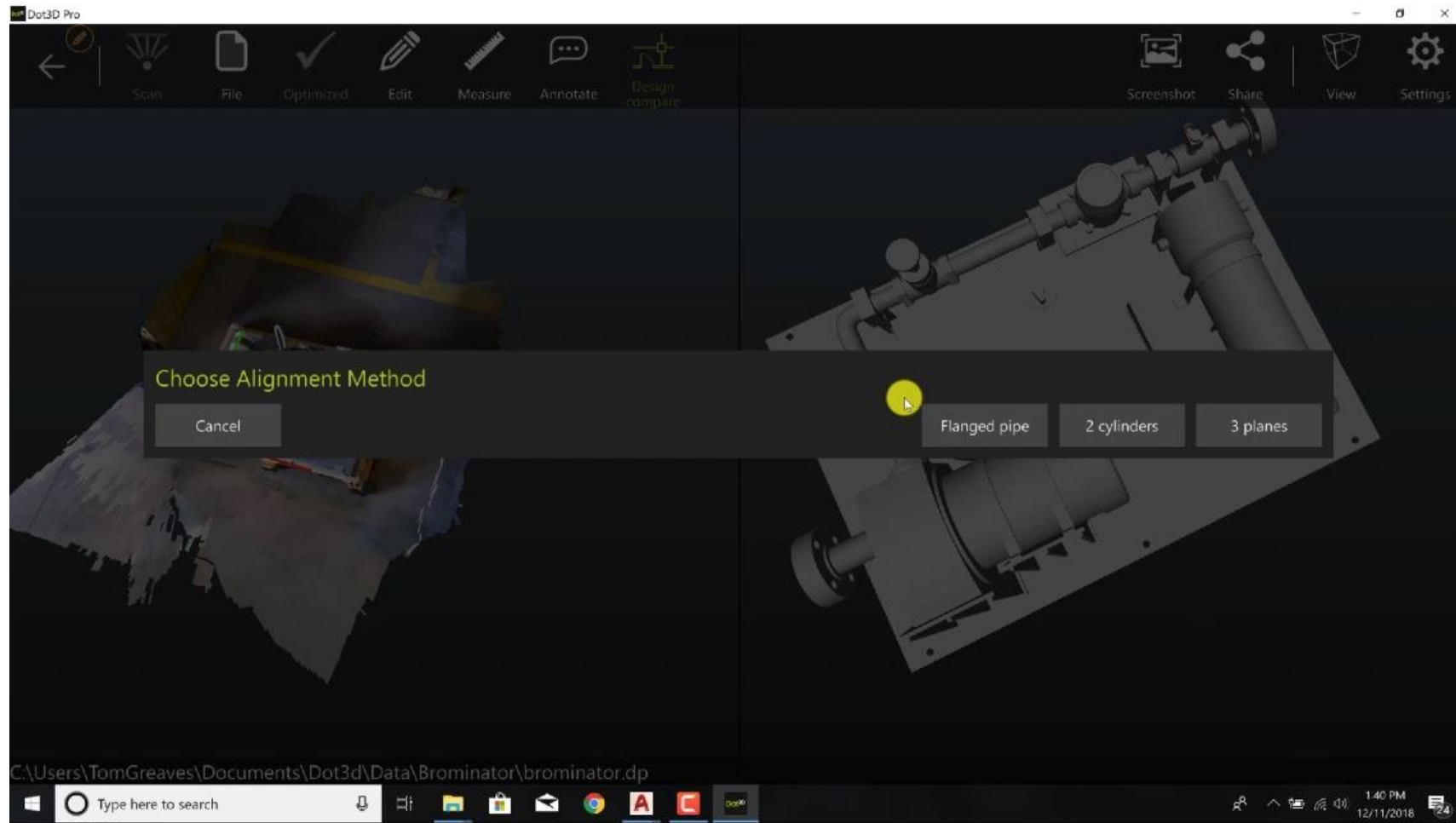
## Brominator Scan Results



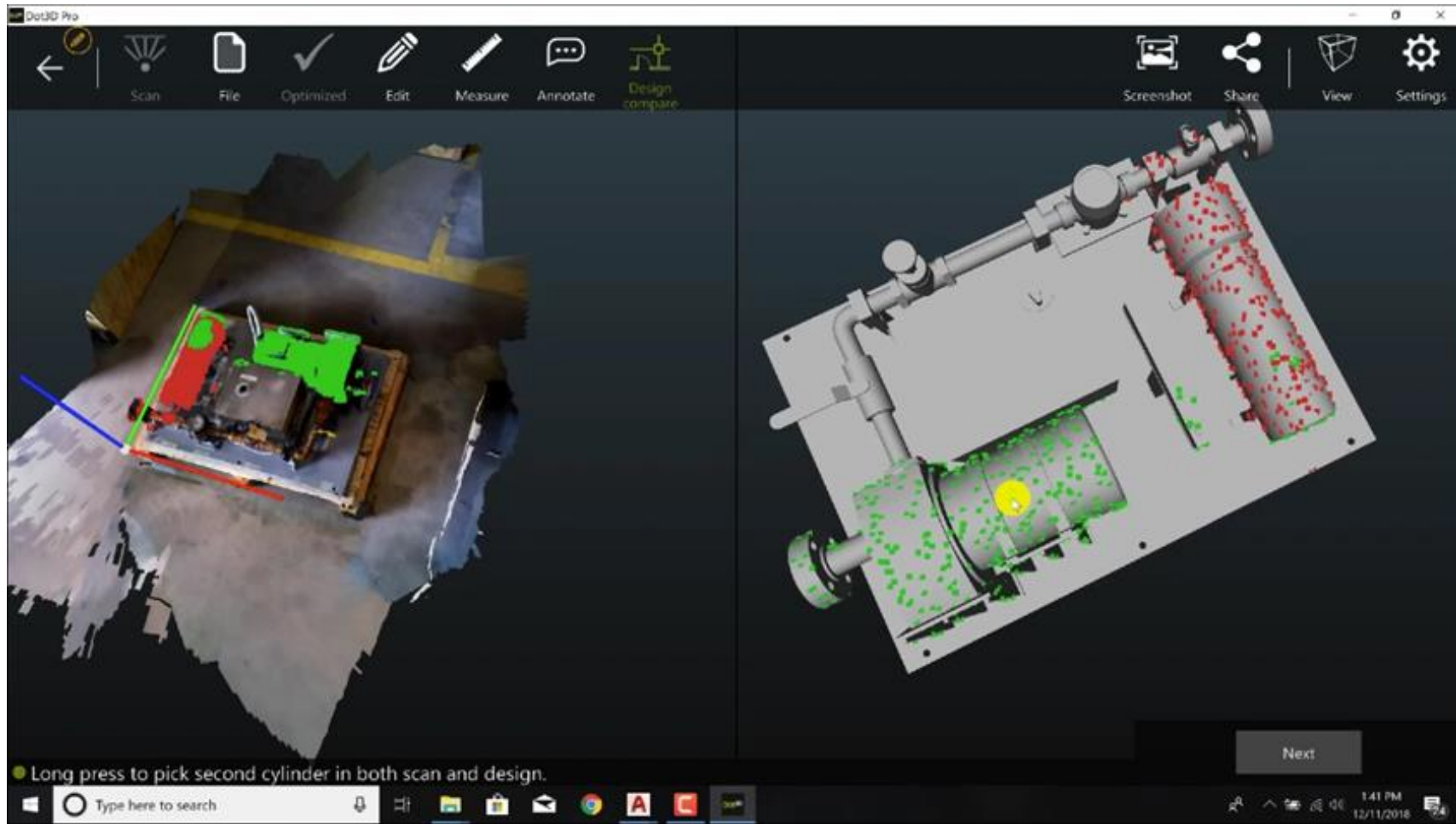


Point Cloud and CAD Model loaded into DotProduct



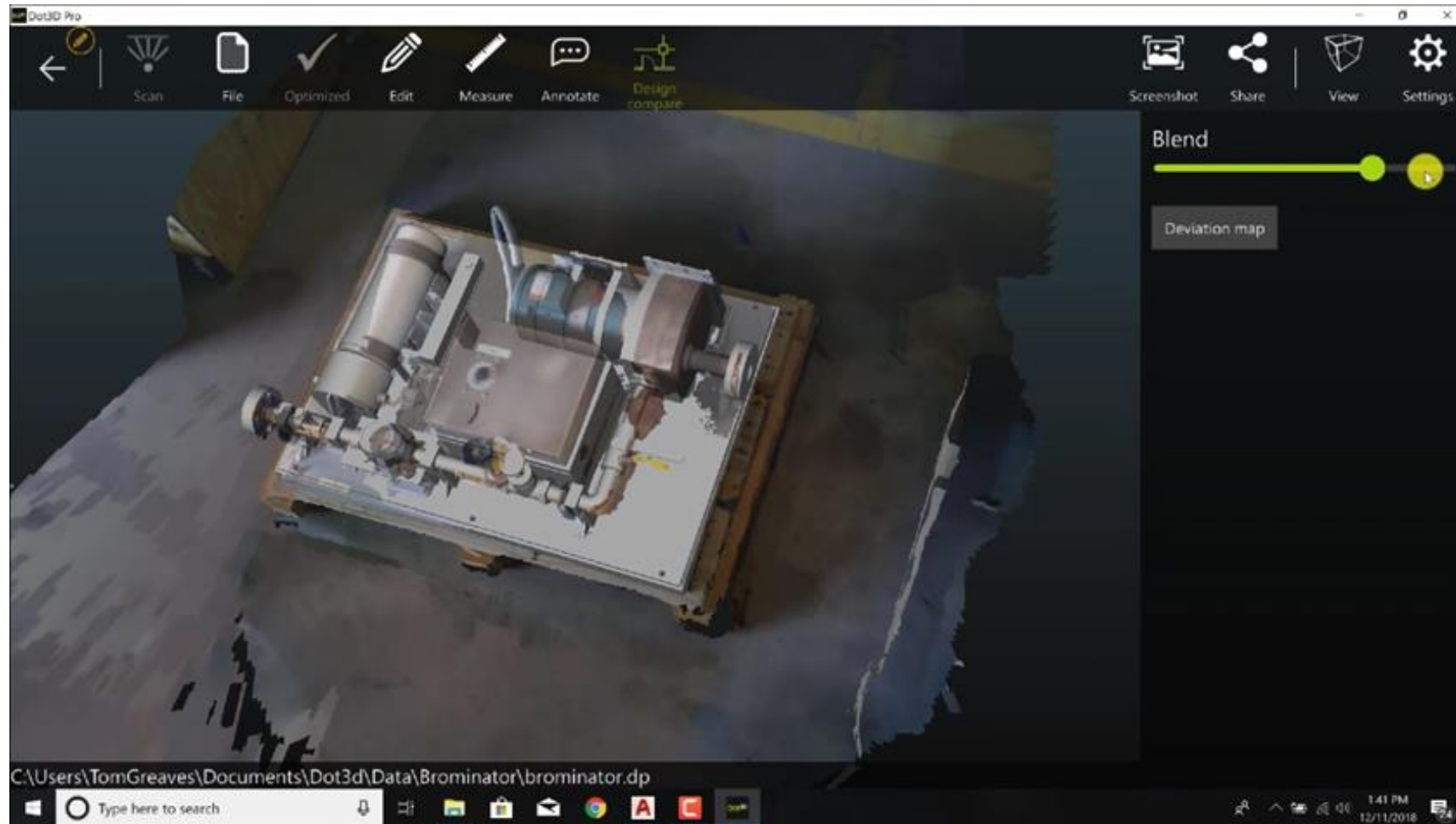


## Alignment Methods to Register Scan + Model



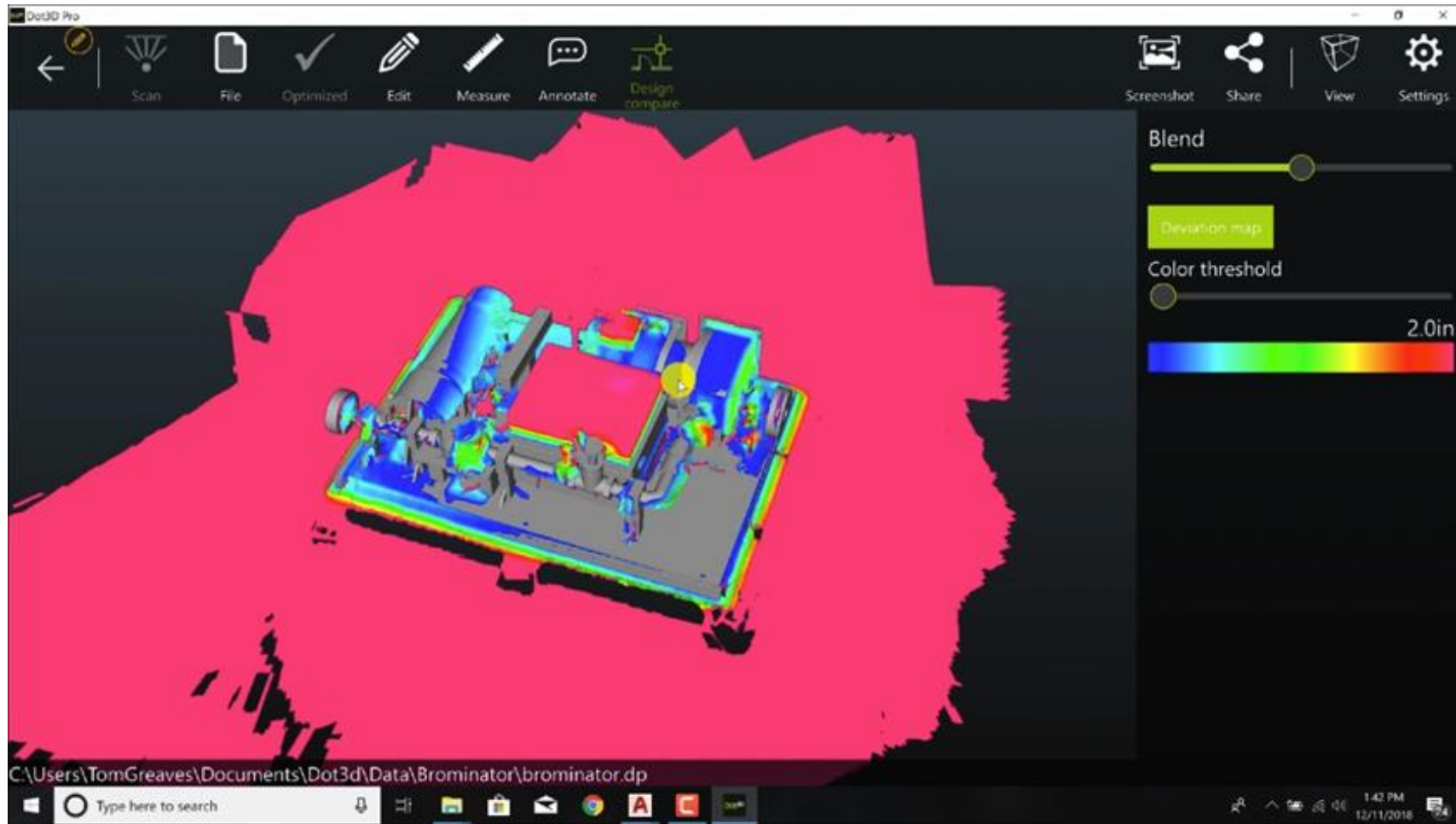
## Using Two Non-Colinear Cylinders



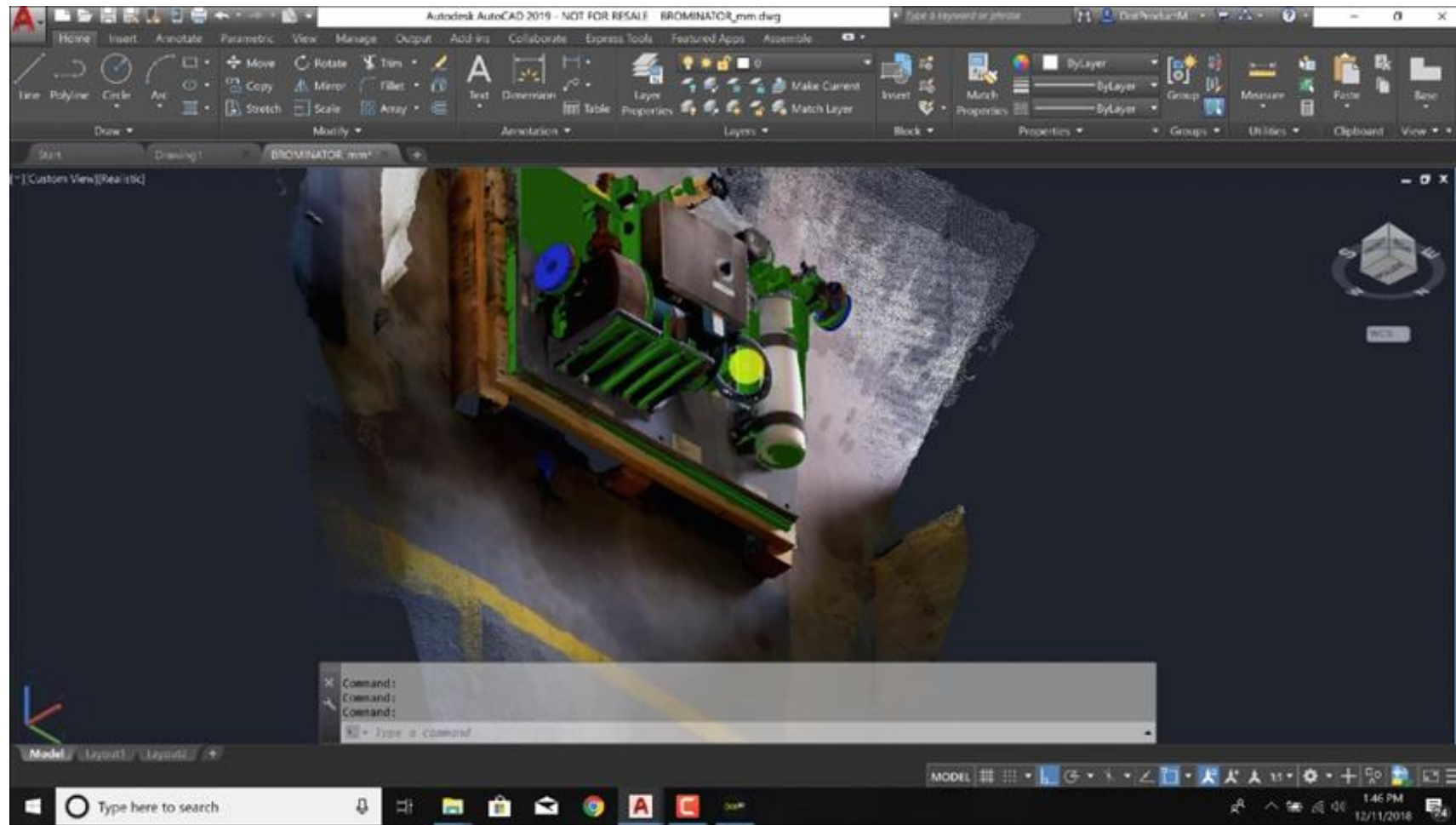


Aligned Scan + CAD Model





## Difference Mapping Scan and Model



Aligned Scan Imported to CAD Environment

# Workshop

**November 29<sup>th</sup>, 2018**

**International Workboat Show**

**New Orleans, LA**



# Workshop



# Workshop



**Dot3D PRO**

Real-time 3D scanning on Android or Windows

AUTODESK | CADDREX | ...

LPM | ... | Trimble

... | ... | ...

Our partners - your workflows.

**Dot3D PRO**

# Workshop



# Workshop



Dot3D  
PRO

Tradesmen  
International



# Implementations

- Bath Iron Works
- Newport News Shipbuilding
- Space and Naval Warfare Systems Command
- Naval Underseas Warfare Center
- Elliott Bay Design Group
- Hepburn and Sons
- BMT Designers and Planners
- Genoa Design International
- Canadian Coast Guard



# Thank You!

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