



3D Model-Based Work Instruction Authoring Tool for Maintenance

Topic DHP163-002

NAVAIRSYSCOM Phase II.5

Presenters - Chris Root and Edzel Luico

Company Overview

- A Texas-based software company established in 2004 with customer base in North America, Europe, and Japan
- Industries: Defense, Aviation, Healthcare, Pharmaceutical, Power, Oil & Gas
- Strategic Partners: Microsoft Mixed Reality, CAE, and SIMETRI



DOD-Related Work

- ARMY (Ft. Detrick) SBIR Phase I,II,III: AR surgery tools for combat casualties; SBIR Phase I&II: Intelligent Patient Simulation Platform with AI/ML
- AFWERX SBIR Phase II: Escharotomy Training Tool, partnering with SIMETRI
- Uniformed Services University of the Health Sciences (USUHS) Surgery learning, practicing, and test tools on iPad with Apple Pencil simulating medical instruments for fasciotomy, cricothyroidotomy, axillary artery, and lateral canthotomy procedures.
- **...and NAVAIR COMFRC with SBIR Phase II.5: Model Based Work Instructions for Aircraft Maintenance and Training**



3D Model-Based Work Instruction Authoring Tool for Maintenance

COMFRC Advanced Technology and Innovation IPT selected SVS for SBIR Phase II.5 award under the COMFRC Technology Transition Program (T2P) program in 2019

- Leverages and extends SVS's Army SBIR DHP163-002 for similar development efforts in complex medical procedures using 3D models, AR and VR instruction and training.
- NAVAIR Customer Need: Identify necessary hardware and develop a process and software for creating visualization models and digital work instructions
 - Supports Naval model-based enterprise environment and Industry 4.0
 - Improve the effectiveness, productivity and quality in Aircraft Maintenance, Repair, and Overhaul (MRO) environments and improve training methods
- Transition Target: COMFRC Fleet Readiness Centers and NAVAIR Digital Office for integration with Navy Enterprise Product Lifecycle Maintenance
 - MRO and Fleet Support Team engineering and production teams
 - All NAVAIR PEO and PMA products will benefit from widespread adoption for their sustainment activities



www.shutterstock.com - 610356788

Operational Use and Improvement

The Navy is transitioning from a 2D paper-based work environment towards a connected 3D digital environment

- Navy Industrial Optimization Plan is upgrading industrial Fleet Readiness Centers
 - Deploying robust Information technology and enterprise Product Lifecycle Management (PLM) software to store and distribute digital data and manage workflows.
- Software needed for use by the Navy personnel providing MRO and sustainment support

Desired Objectives:

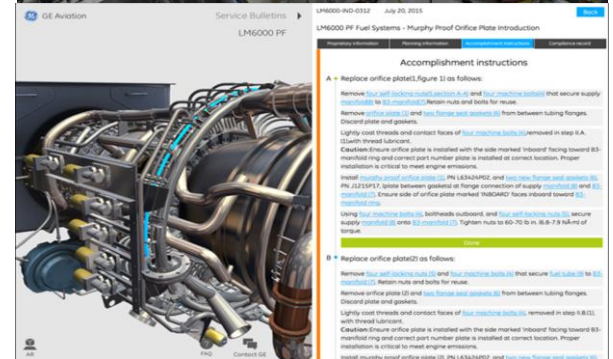
- Editor for in-house creation of work instructions and training materials augmented with imbedded digital content (Animations, 3D Models, Video, JPAs, Audio, photos, text, etc.)
 - Convert existing PDF instructions into digital work instructions format for editing and viewing
- Hardware solutions to rapidly create 3D content with portable hand-held scanning technology and software to decimate large 3D CAD Files and scan point clouds from existing reverse engineering tools
- Work Instruction Viewer app compatible with a variety of IT peripherals (PC, mobile devices, headsets)
- Deploy as standalone package or integrate with enterprise Product Lifecycle Management (PLM)
- Capable of developing and displaying interactive 3D content
- Training and Support



Photo credits: <https://www.navair.navy.mil/news/COMFRC-outlines-infrastructure-optimization-plan-DoD-Maintenance-Symposium/Tue-12102019-1214>



Photo credit: https://www.dcmilitary.com/tester/tenant_profile/seven-milcon-projects-four-states-five-frcs/article_1abcb3f5-1fa6-5780-9863-58e7d28dea54.html



AVARIS Home Page

The dashboard features a dark blue header with the AVARIS logo and a user profile icon. A left sidebar contains navigation icons for Home, Model Decimator, Instruction Manager, Feedback, User Manager, and Device Manager. The main content area is divided into three panels: Latest Notification, Device, and User. Below these is a Work Instruction Overview table.

LATEST NOTIFICATION

Alex Smith has started Heat Exchange.	1 hr
Edzel has signed in.	1 hr
Edzel has signed in.	2 hr
Edzel has signed in.	2 hr
David has signed in.	2 hr
Alex Smith has started Heat Exchange.	3 hr
Alex Smith has started Heat Exchange.	3 hr
Edzel has signed in.	3 hr

DEVICE

Search...	
C515891B-BFC7-4058-B723-0348BB279F80	Online
Alex	Online
Alex	Online
Alex	Online
Alex Smith	Online
Alexsvsdemo	Online
Apple iPad Pro	Online

USER

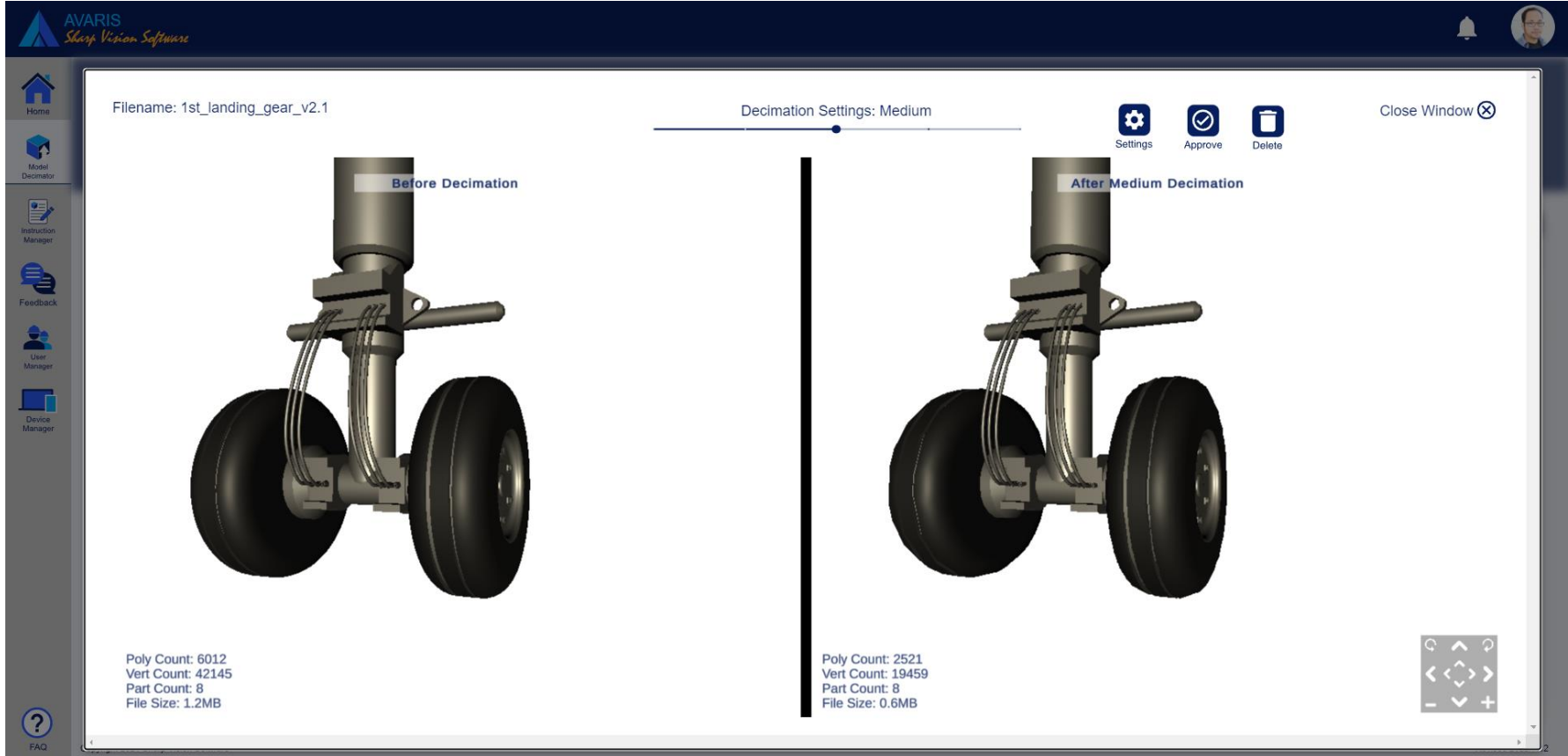
Search...	
Alex	Online
Alex Smith	Online
Beth	Online
Brienne	Offline
ChrisRoot	Online
ChristopherLeslie	Online
Cruz	Online

WORK INSTRUCTION OVERVIEW

Title	Tag	Assignee	Progress
160.76-EG1.pdf	-	NA	N/A
DRST_Option_D_Field_Operation_Guide_R4.pdf	-	NA	N/A
F/A-18 A/B/C/D Local Engineering Specification	#PDFImport #LES	NA	N/A
Fastorq F.A.S.T. Bolt Tightening Sequence	-	Cruz, WinLiu, Edzel, Alex Smith	0%
Heat Exchange	-	Cruz, WinLiu, Edzel, Alex Smith	0%
Heat Exchange Demo	-	NA	N/A
Inspect Compressor Inlet and Inlet Plenum	#MRC-Code 15 #LES #LPS	NA	N/A
Inspect Gas Generator	#Demo	NA	N/A

Copyright 2021 Sharp Vision Software | Revised 2022.7.12

AVARIS Decimation Tool



AVARIS Authoring Tool

The screenshots illustrate the AVARIS software's workflow for creating technical documentation:

- Top Left:** A 'Heat Exchange Demo' screen showing a 3D cutaway of a condenser. It includes a search bar, a table of contents, and detailed text instructions for cleaning the interior surface of the tubes.
- Top Right:** A 'Heat Exchange Demo' screen featuring a video of a technician working on a heat exchanger. It includes a search bar, a table of contents, and detailed text instructions for reassembly and locating the unit.
- Bottom Left:** A 'SVSDemoYork.pdf' document showing technical drawings of a heat exchanger, including a 'Clear Log Dimension Reference' diagram.
- Bottom Right:** A 'Heat Exchange Demo' screen showing a 3D model of a heat exchanger component. It includes a search bar, a table of contents, and detailed text instructions for removal and inspection.

AVARIS Viewer



Heat Exchange

Subject:
Maintenance and Repair for Heat Exchange. Most geothermal fluids, because of their elevated temperature, contain a variety of dissolved chemicals. These chemicals are frequently corrosive toward standard materials of construction. As a result, it is advisable in most cases to isolate the geothermal fluid from the process to which heat is being transferred. The task of heat transfer from the geothermal fluid to a closed process loop is most often handled by a plate heat exchanger. The two most common types used in geothermal applications are: bolted and brazed.

WORK INSTRUCTION LIST

Filter:

Landing Gear Demo v2 demo	New	Assigned: 11/28/2022
LES-NI-F18-31027-92 Rev A	New	Assigned: 8/25/2022
Fastorq F.A.S.T. Bolt Tightening Sequence	ONGOING	Assigned: 8/26/2022
Heat Exchange	ONGOING	Assigned: 8/25/2022

Heat Exchange

Q Search for content...

- 1 REMOVAL FROM MAIN COMPONENT
 - DONE
 - 1.1
 - Locate Heat Exchange from the Main Component.
 - DONE
 - 1.2
 - Remove the bolts, from the heat exchange and carefully remove the unit from the Main Component.
 - DONE
- 2 DISASSEMBLY OF OIL COOLER
 - DONE
 - 2.1
 - Remove the bolts and washers from both the top and bottom of the heat exchange, exposing the oil rods.
 - DONE
- 3 TROUBLESHOOT
 - DONE
 - 3.1
 - A periodic inspection and maintenance program should be followed with any heat exchanger. To ensure continuous satisfactory performance of your Type 300 and Hub-design heat exchanger, the following steps should be taken:

Load Sele





- **Points of Contact**

- Dr. Win Liu, CEO, (443) 527-7889
 - win.liu@sharpvisionsoftware.com
- Edzel Luico, Director, SW Development, (832)444-5481
 - edzel.luico@sharpvisionsoftware.com
- Chris Root, DoD consultant, (619) 750-2390
 - chris.root@sharpvisionsoftware.com



Sharp Vision Software
11767 Katy Freeway, Suite 711
Houston, Texas 77079
www.sharpvisionsoftware.com