SOLUTIONS LOGISTICS PATRIOT

The Future: Virtual Reality Training in the Defense Industry

2024 F-15 TCP WWR

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INTRODUCTION



HEADQUARTERS:

- Established 2009
- Warner Robins, GA

CORE COMPETENCIES:

- Logistics Support
- IT/VR/AR Capabilities
- Professional Engineering Support

CERTIFIED:

- (WOSB) Woman Owned Small Business
- (DBE) Disadvantaged
 Business Enterprise
- ISO 9001:2015 Quality Management System

VIRTUAL REALITY PAINT TRAINER



VRPT CAPABILITIES

- Fully functional VR Training Center located at Robins Air Force Base (RAFB), GA
 - Additional VRPTs are at Hill AFB, UT , Little Rock AFB, AR , and Tinker AFB, OK
- Functional Learning Management Systems (LMS) tracks capabilities/skills assessments on individuals and a team.
- Accessibility to associated paint processes/procedures Technical Manuals and OSHA rules/regulations, Differentiate painting techniques and paint deficiencies (orange peel, runs, sags, etc.)
- Current Realistic Assets include Test Panels, C-5 and Global Hawk Aircraft.



Using the VIVE controller, users choose various widgets to augment training



Users can move freely through the virtual hangar



Technology tracks user focus on specific objects or distractions

REALISTIC ASSETS

Virtual Rendering of C-5 Galaxy and Manlift in B59P







Virtual Rendering of Global Hawk in Various Paint Stages

Virtual Rendering of Paint Cart and Gun User can select from various paint products (polycoat, primer, topcoat, etc) each with configurable properties (viscosity, opacity, color, and spray properties)





AIRCRAFT MODULES

C-5 Galaxy















KC-46, C-130, C-17, F-15, A-10, and Depainting

F3 Proprietary Information





KC-135



TRAINING & EXERCISES

Select a Module

- 1. Tutorial for VR Simulator
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- 2. Paint Gun Operation and Adjustments
- 3. Spray Calibration Exercises & Inconsistencies
- 4. Painting the Entire Aircraft and Coatings

Customized Modules/Courses



Accessible Tech Orders, Tech Manuals, Policies, & Procedures



Virtual Test Panel

Ghost Gun Mirrors exact speed/movement of a Fanuc Painting Robot



Training Exercises

PICKWICKS & USER DATA



Visual Guidance Indicator "Pickwick"

Real-time and Historical TE and Mils

Pickwicks help users build consistency in meeting precise thresholds of paint gun speed, distance, and angle.

- Provides both a real-time and historical display of the performance of each stroke (for individuals and teams)
- Measures the painted area's data to proactively display spray distresses (sags, runs, orange peels) and inconsistencies
- LMS records user activity/data and POVs to enable comprehensive training

TEAMWORK & BLENDING

VRPT can manage up to 16 simultaneous users to work individually or collaboratively. The solution can assign multiple specific surfaces to various individuals delineated by paint zones.



Team Painting

Paint Zone Delineation



User01 Painter POV

User02 Lift Driver POV

Multiple users can also "blend" their individual paint jobs in real-time between adjacent areas.



PAINT DEFICIENCIES

VRPT teaches appropriate paint settings, gun adjustments (fan pattern, PSI, etc.) to correct for painting deficiencies.



6 Air Cap horn hole Bad air or paint setting dirty or damaged 2 2 Too much fluid for air Too much air flow 0 0 used 2 2 Too much air for fluid Fluid tip/air cap used dirty/damaged 6 Good Pattern **Bad Spray Patterns and Why**

Wrinkling



Sandpaper Finish



Orange Peel



Runs

VRPT CLASS STATISTICS AND RESULTS

CLASS STATISTICS

- Classes Began 14 August 2023 •
- 175 Personnel Trained as of 7 June 2024 •
- Goal of 180 Personnel Trained by 7 June 2024 ٠
- **400 Painters required training** (AMXG, CMXG, EMXG) ٠
- ٠ **30% turn over** – 120 new painters per year
- **Cost per student** \$1,300.00 ٠
- **TE Improvement** of 30% documented post class •
- System Deployed at Robins, Hill and Tinker AFB, Little ٠ Rock
- Add F-16 and UGH Coating Modules to RAFB Solution ٠
- Classes Resume Q2/Q3 2024

towards

speed of 1.64

fps

towards

targeted

distance of 1.1

feet



STUDENT RESULTS

Initial Assessment PASSED: 4% (7) FAILED: 96% (168)

Post Instruction **PASSED:** 93.1% (163) **FAILED:** 6.9% (12)

STUDENT LMS REPORT					
avg. distance	avg, speed	avg. angle	avg. te		
1.73	1.28	67.94	44.43	<<< initial performance	
1.75	1.32	83.81	58.22	<<< post instruction performance	
-3.17	11.11	71.94	31.04		
% Increased performance	% Increased performance	% Increased performance	% Increased performance		

towards

average target average target optimal transfer

angle of 90

degrees

towards

efficiency (TE)

of 65 (G40)-70

(Electrostatic)

IMPACT TO FLOW DAYS

AC	# Aircraft PDM per year	Lost Flow Days Paint Defects	Cost - \$1M/day	Documented Savings	30 % TE Estimated Post Class Savings
F-15	50	0.5	\$ 25,000,000		\$ 7,500,000
C-130	60	2	\$ 120,000,000		\$ 36,000,000
C-17	28	7	\$ 196,000,000	\$ 19,000,000	\$ 58,800,000
C-5	6	7	\$ 42,000,000		\$ 12,600,000
		Total	\$ 383,000,000	\$ 19,000,000	\$ 114,900,000
	Note: Cost based on \$1M/day PDM				

VRPT COST SAVINGS

PROVEN EFFECTIVENESS C-17 Documented Paint Defects

Tail Number 0188 - 2 paint defects Tail Number 0186 - 0 paint defects Tail Number 0604 - 0 paint defects

Prior to class, C-17 averaged 27 paint defects per aircraft, losing 7 flow days of paint rework

ESTIMATED COST SAVINGS - PAINT

Aircraft	Gallons of Paint - PR/TC	# Aircraft Per Year	Paint Cost per gallon	Cost per year	3	0% TE GAINS POST CLASS SAVINGS
F-15	28	50	300	\$ 420,000	\$	126,000
C-130	105	60	300	\$ 1,890,000	\$	567,000
C-17	190	28	300	\$ 1,596,000	\$	478,800
C-5	360	6	300	\$ 648,000	\$	194,400
			Total	\$ 4,554,000	\$	1,366,200

COST SAVINGS

Lost Flow Days	\$119M
Paint Material	\$1.3M
TOTAL	\$120.3M

Cost of Instruction	\$250K
ROI	47M %

FUTURE

- Add Small Parts Paint to Simulator Flight Controls
- Add Depaint Training (PMB, Hand-Sanding, and AquaMiser) on composite
- Add KC-46, A-10, C-130, C-17, F-15
- Add Navy V-22, CH-53K, UH-1, AH-1, H-60, F-35
- Add Manlift/Scissor Lift Training
- Annual Refresher shorter class focused on certifying personnel on different AC
- SAE AS7489: Aerospace Coating Fundamentals Certified

VRPT DEMONSTRATIONS



For a Live Demonstration, please visit our Booth 409!

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THANK YOU!