



## 2005 Department of Defense

## Maintenance Symposium & Exhibition

### Aircraft Repair and Supply Center

Unique Identifier (UID)  
2D Barcoding Project



U.S. Department of Homeland Security

United States  
Coast Guard









NASA

Takes

2D Datamatrix

To

Outer Space

Exploration



**DEPT OF DEFENSE**



**USCG**



**NASA MARSHALL  
SPACE CENTER**

**Partners in the  
future development  
of “UID”**



**ARSC**

**MARCH 2005**



# United States Coast Guard

## Aircraft Repair And Supply Center

2D Barcoding

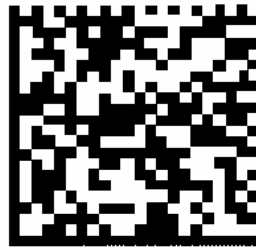


UID Programs

**Background :** \*Started June 1996

**\*June 1997 Phase I: Installed 2D Barcoding labels on 500 HH-65 Flight Safety Critical Aircraft Parts (FSCAP)**

**\*June 1998: Integration of the USCG “AMMIS” computer program for logistics with the project’s software “Hardbody”.**



## **2D Barcoding UID Programs (cont'd)**

**\* December 2002: Phase II included the “Permanent Direct Part Marking” of an additional 500 FSCAP items from the HH-60J, HC-130J and HU-25 aircraft.**

**\*February 2005: Signing of the MOU between NASA, DoD/OSD, and the USCG ARSC**



# 2D BARCODING



## *Program Benefits*

- **Tamper – resistance; prevents duplication.**
- **Will provide more solid evidence of criminal conduct thus ensuring a better chance of prosecution and conviction.**
- **Automatically capture and update historical data for any given part.**
- **Eliminate human error when capturing part identification.**
- **Has the ability to provide readable markings on very small parts, and internal engine and gearbox parts.**
- **Portable data readers (don't have to remove part from aircraft to review history)**
- **Accumulate part history in a central or national database.**



# 2D BARCODING

*Additional Benefits Include:*

- **Improve inventory / logistics management**
- **Improve ability to trace parts**
- **Improve flight and aviation maintenance**
- **Improve operations efficiency which in turn will reduce overall cost and improve scheduling**





## MILESTONES

**The program has been marked by a number of technical firsts. These included but are not limited to the following:**

- **The first use of a fully integrated mobile marking cart in the field**
- **The first use of a hand held laser to mark products in the field**
- **The first use of the laser bonding process to mark FSCAPs.**
- **The first use of color additives in conjunction with deep electro-chemical etch and laser coating removal processes to improve marking contrast.**
- **The first read through paint markings applied to commercial products.**



# Marking Processes

Approved marking processes (as-defined by NASA-STD-6002 & MIL-STD-130 - Draft)

- **Decals**
- **Dot Peen**
- **Electro-Chemical Coloring**
- **Micro-Milling**
- **Ink Jet**
- **Laser Coat & Discolor**
- **Laser Coat & Remove Process**
- **Stencil (ink and paint)**
- **Gas Assisted Laser Etch**
- **Deep Dot Peening (>.004-inch deep)**
- **Laser Bonding**
- **Laser Engineered Net Shaping (LENS)**
- **Laser Engraving**
- **Laser Inducted Surface Improvement (LISI)**

## Types of Parts that were Marked

- Airframe and structural components
- Gear boxes and rotor components



# New Technology Applications

The Dataline team shall arrange for the demonstration of new AIT technologies.

- Mobile Marking Carts
- Portable Vacuum Arc Vapor Deposition Marker
- Read-through-paint (RTP) Readers
- Strain Measurement System

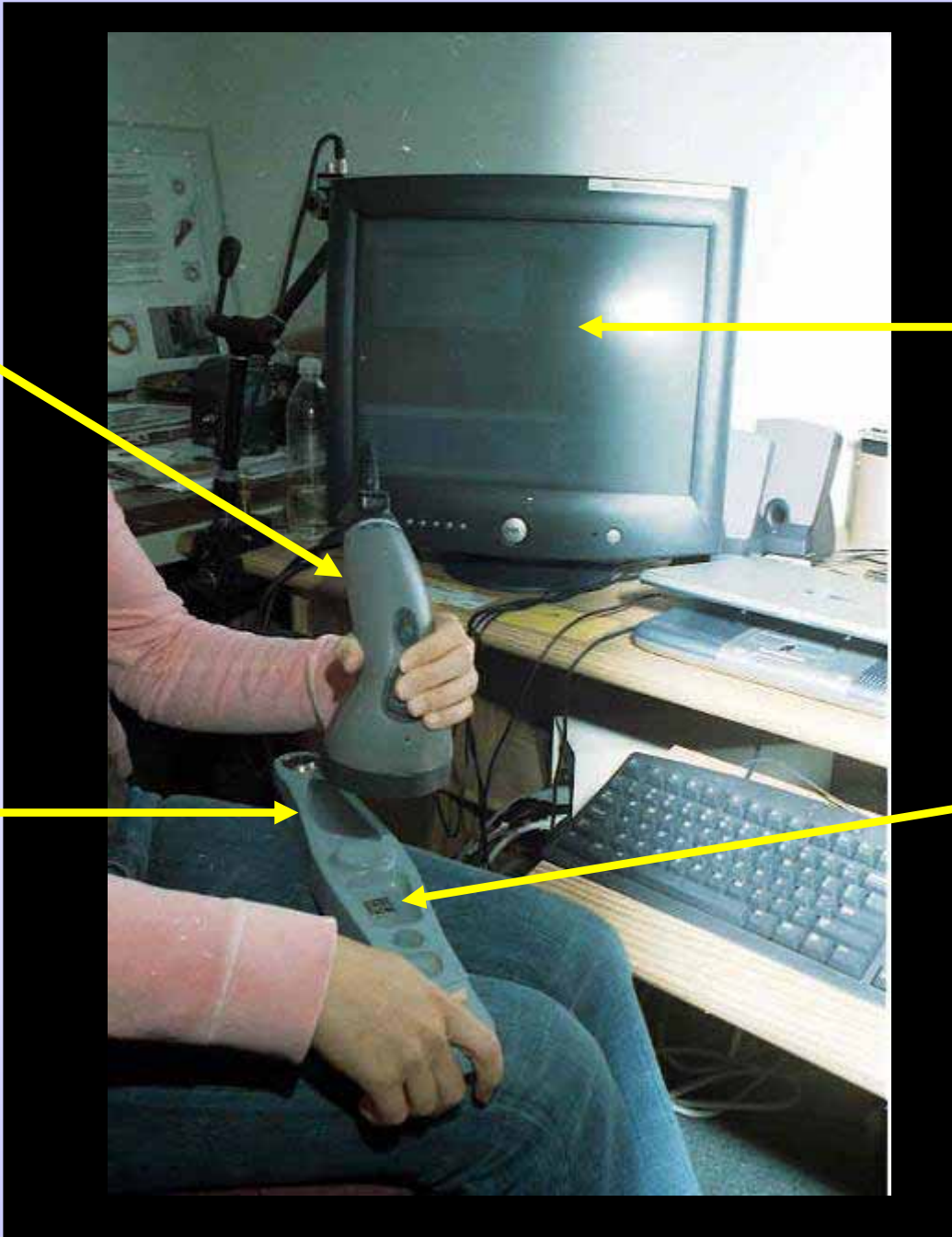


MXi  
Reader

Mark  
Verification  
Data

USCG  
FSCAP  
Part

2D  
Datamatrix  
Barcode





# **Development of The Interface of Datamatrix Recognition and US Coast Guard Management Systems**

During the research and development phases of 2D Datamatrix Barcoding; the US Coast Guard tested and successfully developed the ability to interface that data with its existing management systems.

A total of 26 actual man hours was expended in order to complete the task of creating a language bridge that does allow the datamatrix hardware and software to successfully interface with the current software packages that the Coast Guard is using.

SIGNIFICANT COMPONENT HISTORY REPORT  
(REPLACES AFTO FORM 95)

PAGE: 1  
DATE: 01/13/2005

\*\*\*\*\*

\*\*\*\*\*  
GENERAL INFORMATION SUMMARY  
\*\*\*\*\*

COMPONENT NAME: HU25 AIRFRAME  
PART NUMBER: HU-25C+  
CBI NUMBER: 25-5300-001  
REPORT DATE RANGE: ALL HISTORY

SERIAL NUMBER: 2141  
ACCEPTANCE DATE: 12/29/1983  
MANUFACTURER: FALCON JET CORP  
CURRENT STATUS: RFI INSTALLED

TSN HRS: 11419  
TSO HRS:

\*\*\*\*\*

ACTION DATE	ACTION APPLIED TO COMPONENT	OPERATING ACTIVITY
-------------	-----------------------------	--------------------

\*\*\*\*\*  
COMPONENT HISTORY RECORD  
\*\*\*\*\*

12/29/1983	AIRCRAFT ACCEPTED THIS DATE WITH 188 HRS TSN.	FALCON JET
12/30/1983	LEFT AOA 23.5, RIGHT AOA 22.7	AR & SC
03/13/1987	REMARKS: 101010 PREPARE AIRCRAFT FOR STORAGE IAW 000.6A HU25 AIRFRAME 2303 HRS TSN; 0 HRS TSO;	ATC MOBILE
03/15/1988	AIRCRAFT/AIRFRAME SUSPENDED FROM CMS ON THIS DATE.	
07/24/1988	AIRCRAFT MODIFIED IAW E-SYSTEMS DRAWING 4178-0000, UNDER CONTRACT F33600-86-G-0078.	E-SYSTEMS, INC.

07/29/1988 AIRCRAFT/AIRFRAME INSUPERSEDED FROM CMS ON THIS DATE

# DECISION MAKING TOOLS

## Significant Component History Report

The Coast Guard's SCHR has a responsibility in its own right. The information gathered and stored in this data base provides engineering, maintenance, and logistical data that is accessed by all users and provides the following tools for decision making:

1. Serialized cradle to grave tracking
2. Time management
3. Scheduled maintenance
4. Repair History
5. Repair Vendors
6. Manufacturer Information

ds93000012 ALLDATA MAY 26, 200  
 1680-01-158-9653 Rpb1: R 1-AIRFRAMES FIELD 2 SRqty: 0 EA LL: 13  
 ISU: 23 MAY 2005 REC: 04 MAR 2005 LDT: 23 MAY 2005 Forecast: 14 APR 2002  
 Scrap Rate: 0.00 MGMT: AAC: C AMC: 1 AMSC: C SRL: T QA: R WO: 6558  
 SOS: B17 SMIC: MTC: 2 SHELF: 0 CRIT CD: FltCrit: C A/C: HH60J  
 IM:JC COG: SMR:PAODD NIMSC:5 DEMILC:B SUB IND: MTBF: 0.00 MTBR: 0.00

DMD	CURR	1ST	2ND	3RD	4TH	5TH	6TH	7TH	8TH
TOT	5	10	4	4	6	5	4	2	3
REP	0	1	1	0	0	2	1	0	0

Nomenclature                      LOC              Unit Price              Part Number                      MFGCD    HAZ  
**WALKING BEAM ASSY**              E1103H              \$1,540.00              70400-08104-048                      78286

RFI	RD	RB	OGA+	EX	PRnoOB	PROB	BO
Due Ins:	0	19	2	0	0	0	0

Unit Assets/QIT:              4/              5                                      Rrdr Pt              39

Non-RFI Stock:	NIIN	BAL-F	LOC-F	BAL-L	LOC-L	BAL-S	LOC-S	Part Number
	011589653	11	F0701I	0	F0701I	0		70400-08104-048

Help (F2)    Return (F3)    PageTwo (Shift F3)    BODetail (Shift F4)    >

# **DECISION MAKING TOOLS**

## **Aviation Materiel Management Information System**

**The Coast Guard's Aviation Materiel Management System (AMMIS) is a logistics tool designed to support the item managers and all satellite supply units in a collaborative effort to provide accountability in a one shot data file. All Coast Guard personnel have viewing access and individuals have specific privileges that enable them to manage the stock. The following information provides the tools for decision making:**

- 1. Nomenclature; part number; national stock number**
- 2. Quantities at central supply and satellite supply units**
- 3. Forecasting information for uses and demands**
- 4. Criticality codes**
- 5. Aircraft types**
- 6. Source of supply**
- 7. Unit costs**
- 8. Other logistic management information**



**USCG FSCAP DPM DATA SHEET****Part 1: Part Identification**

FSC: 1615	NIIN: 012212613	Assy No.: 70103-08103-047	Assy. S/N: 00031
Nomenclature: PRESSURE PLATE ASSY			
Aircraft Type: HH60J		Aircraft Manufacturer: Sikorsky	

**Part 2: Part Attributes**

Material Family (supplied by USCG): Reactive & Refractory Metals		
Material Type (supplied by USCG): Ti Gr 6AL, 4V		
UNS Number: R56400	Hardness: 331 Brinell, 36R Rockwell	Thickness: ½-inch
Machinability:	Melting Temperature Range: 3000F	
Coatings (supplied by USCG):		
Surface Roughness (ANSI/ASME B46.1): 20	Microfinish Comparator Used: ANSI C-9	
Grey Scale Value: N/A	Color: Blue-Gray – Fed Std 16329	
Geometry: Flat	Available Marking Area: 2-inch x ¾-inch	
Corrosion Protection Method Used (supplied by USCG): None		



Photograph of Part



Photograph of Current Part ID Marking

**Part 3: Marking**

Current Marking Method(S): Ink marker & vibro-peen with clear coat applied to stripped area
---

**Part 4: Operational Environments** (supplied by USCG)

Abrasion:	Chemical Exposure: (Oil, Fuel & Hydraulic Fluid):	UV Exposure:	Salt (Spray, Splash & Emersion): Yes
-----------	---	--------------	--------------------------------------

**This slide depicts the form that has been developed specifically for this project. Not only does it establish all of the pertinent data for each part; but also shows an actual photo of the part and will also show the location of the datamatrix bar code.**



## 2D Barcoding Current Update



During the period of Feb – Mar 2005 the US Coast Guard continued its efforts to study and gain ground in the 2D Symbology Technologies. During Phase II of the project some 500 parts were permanently marked with several methods of marking. As the Coast Guard continues to put forth efforts to lead the way in current technologies, they continue to study and document the facts discovered during these testing phases.

Recently evaluated were 52 aircraft parts that were assigned at ARSC. These parts had been removed from aircraft for maintenance (Non-RFI), returned from overhaul (RFI), or currently installed on aircraft in for maintenance (PDM).

The types of parts that were evaluated were mechanical, hydraulic, avionics, engine / gearbox. The types of markings that were evaluated were Laser Etch, Laser Bonding, Rastoring, Dot Peen, and tamper resistant labels.



# 2D BARCODING



## The following notes are an overview of evaluation results:

All laser etching marks remain Grade “A”

- All dot peen read Grade “A” once the new paint was removed
- Rastoring showed signs of degrading from the overhaul process but still received a Grade “B”. Degrading occurred in the “Contrast” element of the evaluation.
- Laser bonding showed Grade “A” with a remarkable trait: The parts that are in a heavy hydraulic environment indicated 0 degradation for the label and adhesive. These parts have been installed and flown 97 and 102 hrs respectively.
- Tamper resistant labels in the avionics remained intact (2 parts thru overhaul) and a remarkable note is that we applied the same label to several main and tail rotor blades. Two main rotor blades were available for this evaluation. These blades have over 90 flight hours and the labels remain in place and grade “A” readable. The labels are located in the cuff area of the blade and are exposed to all elements of flight.

\* Note that all of the evaluated parts have flown between 90 and 162 hours



# *UID Identification*



## **Recommendation from DHS:**

DHS: 7009

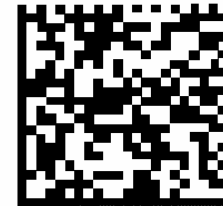
USCG: 4329

TSA: 2387

Serialized numbers in the que: example B479832Q3

Example of Marking UID:

USCG PART: 7009 4329 B479832Q3





# *UID Identification*

Recommendation from DoD / OSD

## **Construct #1**

Issuing Agency Code: D

Enterprise Identifier (MFR Cage): 0CVA5

Serial Number: 786950

Example: **D 0 C V A 5 7 8 6 9 5 0**

D	0	C	V	A	5	7	8	6	9	5	0
IAC		EID				Serial Number					







# *UID Identification*

Recommendation from DoD / OSD

## **Construct #2**

Issuing Agency Code (IAC): UN

Enterprise Identifier (MFR Cage): 194532636

Orig. Part Number: 1234

Serial Number: 786950

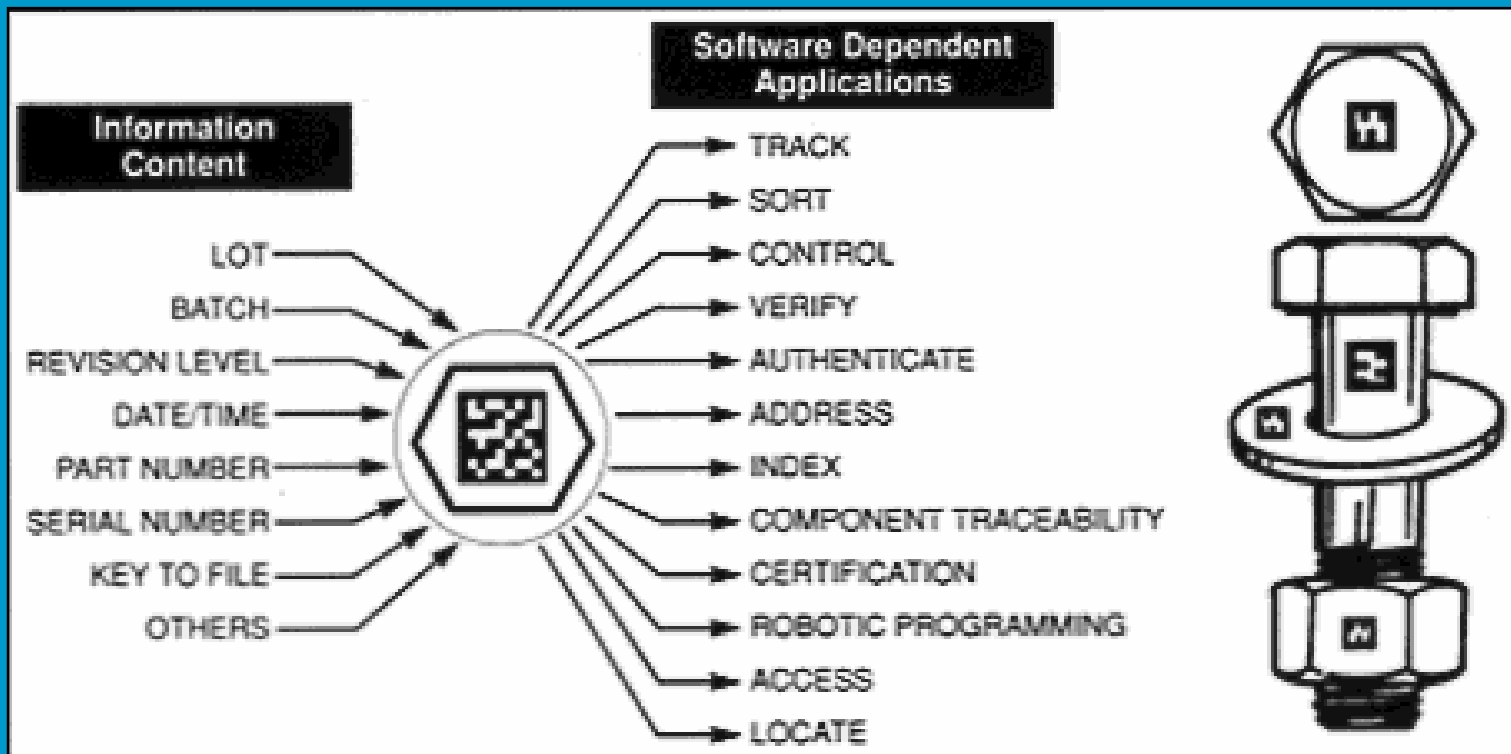
Example: UN1945326361234786950

UN	194532636	1234	786950
IAC	EID	ORIG PART NUMBER	SERIAL NUMBER



# What's in the future?

- 2D Barcode project



# Points of Contact

## *US Coast Guard UID / 2D Barcoding Project:*

Mr. Terry Boyce

Voice Tel: 252-335-6508

Fax: 252-334-5292

Cell: 252-312-7865

**E-mail: [Terry.W.Boyce@uscg.mil](mailto:Terry.W.Boyce@uscg.mil)**

Mr. Dan Beals

Voice Tel: 252-334-5418

Fax: 252-334-5292

**E-mail: [Daniel.W.Beals@uscg.mil](mailto:Daniel.W.Beals@uscg.mil)**