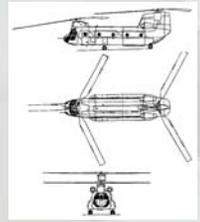




Implementing IUID

On the H47 Chinook Tandem Rotorcraft



Presented by:



Integrated Defense Systems (IDS)

Precision Engagement & Mobility System

Rotorcraft Division

Philadelphia

J. David Saulnier

Sr. Materials, Process & Physics Engineer - ATF





The Philly Approach

↪ Communicate & Educate

☞ New Requirements to Most Suppliers

↪ Divide & Conquer

☞ Labels are the Low Hanging Fruit

↪ Do Up Front Work

☞ Pay Me Now is Less Expensive than Pay Me Later



Educated Supplier REDUCES Waste & COST



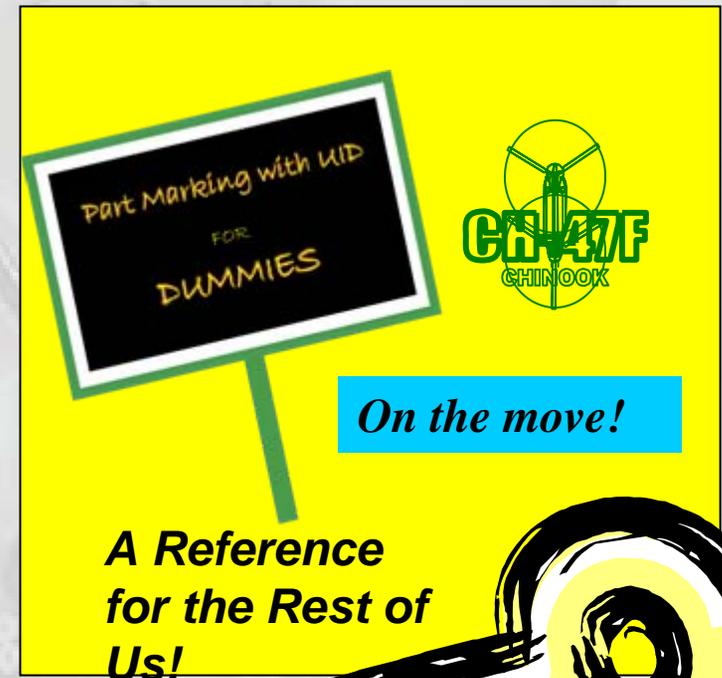
HOW TO Presentation Technical Interchange Meetings

↪ Communicate & Educate (~1 Day)

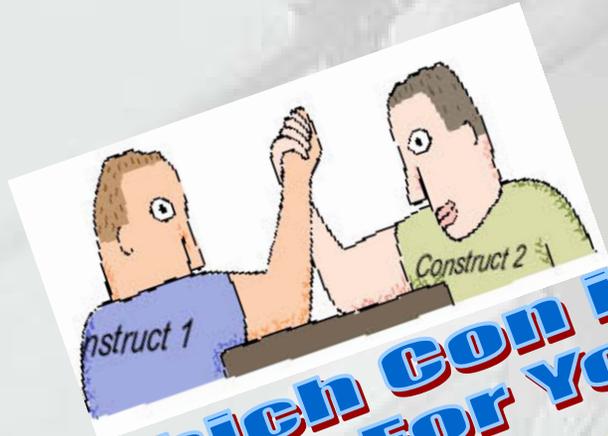
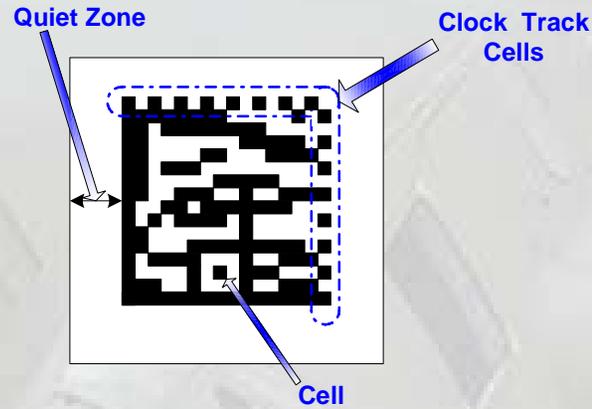
- ☞ New Requirements
- ☞ Expectations
- ☞ Lessons Learned

↪ Regional & On Site TIMs

- ☞ Attendance
 - Supplier **Various** Positions
 - Quality Reps
 - DoD Reps



AT Supplier TIMS - Go Over Basics



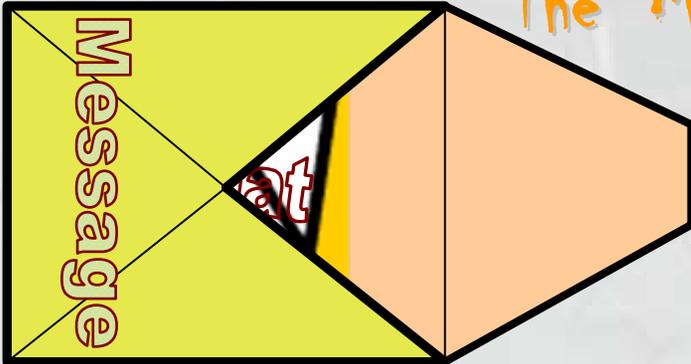
**Which CON IS
RIGHT FOR YOU**



**What's In
the Matrix**



The "Miss-tresses" of Part Marking



(Besides the Basics) Supplier TIM's - Go Over . . .

↪ Why, What, How to IUID Mark

↪ Expectations

↪ Requirements

↪ Lessons Learned

↪ Coming Attractions

↪ Data Submittal

↪ Contractual Issues



Divide & Conquer



↪ D210-13613-1

☞ UID Requirements for *Labels & Nameplates*

↪ BACN 13A

☞ Library of Standard *Labels*

↪ D210-13613-2

☞ UID Requirements for *Direct Part Marking*

↪ D145-10539-1

☞ UID Label Guide for *Legacy* CH-47 Hardware

Labels & Nameplates

↪ D210-13613-1 (**Pay** me Now OR **Pay** me Later*)

☞ Only One Quality System

☞ Submittal of Serialization Plan

➤ AS9100 Requirement

❖ ~50% Rejection Rate for Significant Findings

☞ Pre-Production Approval of Label (PPA)

➤ Label for Validation and Verification

➤ Verification Report

➤ Cert Package for Label

❖ ~ 75% Rejection Rate

⇒ 60% of the 75% due to Validation

Later = \$



* “... over the top in asking for what we asked for, but our production line is clean of bad marks !”

Leverage Approach

Reduce Cost Of Approving Suppliers

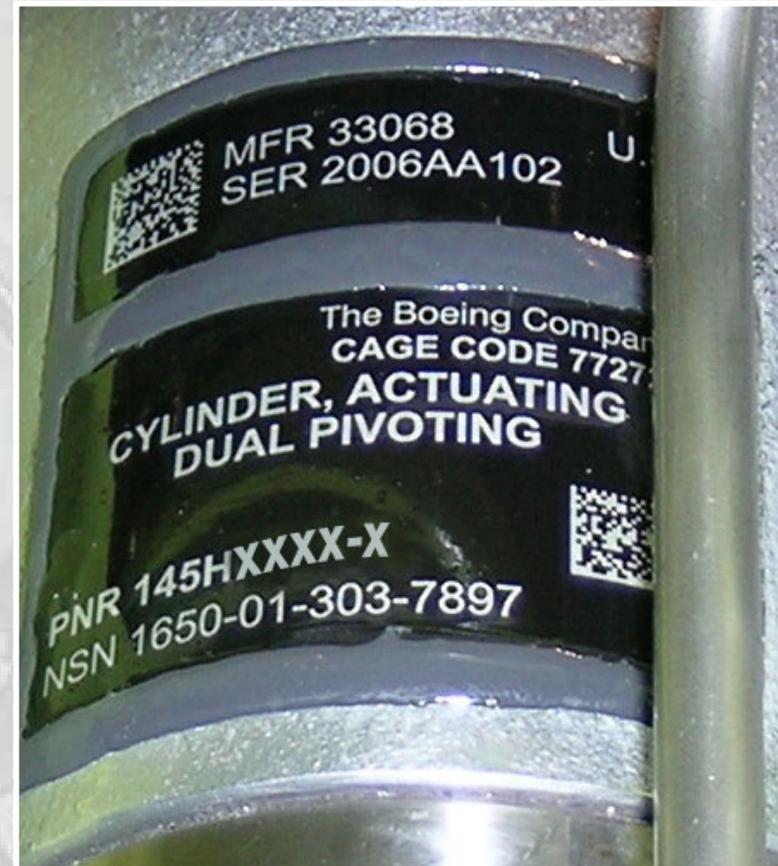
- ↪ Specifications may Look Different BUT . . .
 - ☞ Many Boeing Sites Used D210-13613-1 as “Boiler-Plate”.
- ↪ Suppliers Philly Approved are “SQID” Tracked
 - ☞ Approved for Other Sites
 - ☞ CARGO PM (Direct Buys)



Labels & Nameplates

2 Label Format

- ↪ Construct 1 And With 2 Labels = Easy to Purchase
- ↪ IUID Matrix Upper Top Left
 - ☞ Easier to Scan
 - ☞ Less confusion for Mechanics & Maintainers



One Label Format



↪ Easier for In-House Capability

↪ IUID Matrix Upper Top Left

☞ Easier to Scan

☞ Less Confusion for Mechanics & Maintainers

Standard Labels BACN13A

↪ Cost Effective Method

- ☞ Variable Values for Fields Assigned by Database
 - No Fat Fingering – Minimizes ERRORS
- ☞ Minimize Design Engineering Time
 - Pick from Library vs Design
- ☞ Minimizes Inventory
 - Rotor Bin Item – Bulk Purchase
- ☞ Same Label for Various Programs
 - At various Divisions
- ☞ Implement a Change
 - One Document vs 100's



BACN13A Standard UID Labels

TABLE I LABEL SIZE

APPENDIX	Length (inches)	Width (inches)
A	3.00	2.25
B	2.00	2.00
C	2.00	1.12
D	1.50	1.25
E	2.50	0.50
F	2.50	1.00
G	4.00	1.50

Pick Label Size From
Table 1

MATERIALS:

- A) Aluminum Sheet, 1100 Temper H-14 Aluminum Alloy per AMS-QQ-A-250/1, Thickness 0.020 +/- .0015 inch
- B) Aluminum Sheet, 2024 Temper T3 Aluminum Alloy per AMS-QQ-A-250/4, Thickness 0.020 +/- .0015 inch
- C) Aluminum Foil, 1100 Aluminum Alloy per BAC5875 Thickness .005 +/- .0005 excluding backing material
- D) Corrosion-Resistant Steel Sheet Type 321 (UNS 31600) Anneal Condition per ASTM A 666 - Thickness .018 +/- .003 inch

FINISH:

For Aluminum Alloy

No Code:

Anodize per MIL-A-8625 TYPE II CLASS II Color: Black per Fed STD 595, Black # 37038.

Code P

Chemical Conversion Coat (Alodine) per MIL-C-5541 and apply one coat of MIL-PRF-23377 primer followed by a MIL-C-46168 polyurethane top coat, Color No. 37038 flat black per Fed STD 595.

Pick
Material
and
Finish
from List

UID Standard LASER Etched Labels BACN13A



**THEN Pick Format Layout
& Dash No.**

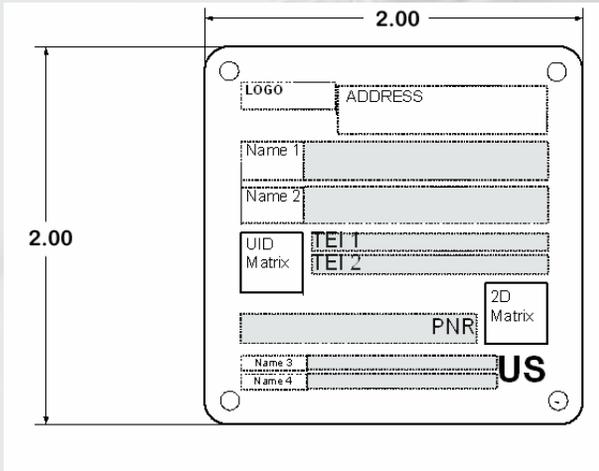


Plate Dash No.	-1	-2	-3
LOGO	Boeing	Boeing	
ADDRESS	IDS Philadelphia, PA FN1	IDS Philadelphia, PA FN1	
Name 1	FN2	FN2	
Field 1	Part Name	Part Name	
Name 2	CONT	CONT	
Field 2	Contract Number	Contract Number	
TEI 1	MFR	SPL	
TEI 2	SER	UCN	
Name 3 (FN3)	NSN	NSN	
Field 3	National Stock Number FN3	National Stock Number FN3	
Name 4	FN2	S/N	
Field 4	FN2	Legacy Serial Number	
US	FN4	FN4	

- Material, Finish, Thickness
- Size, Portrait / Landscape
- Layout of Fields
- D210-13613-1

- Minimize Inventory*
- Common Visual Appearance*
- Easily Incorporates Legacy*

Footnotes:

FN1; Address to be three lines, first two lines use Helvetica font, last line Arial font as follows:
Integrated Defense Systems
Philadelphia, PA

CAGE Code: 77272

FN2: Leave field blank

FN3: If part does not have a National Stock Number assigned, leave blank

FN4: The notation "US" denotes Government ownership for items procured by United States Government agencies and should be shown on this label unless otherwise directed (i.e. shop work order)

Corrosion Testing on Labels

↪ CO₂ LASER / Black Anodize

☞ 1100 & 2024 Aluminum Material

↪ > 3,000 Hours of Salt Fog

☞ All Samples Passed 336 Hr Req'm't

↪ Label Condition

☞ Bare

➤ Some Labels Failed after 477 Hr

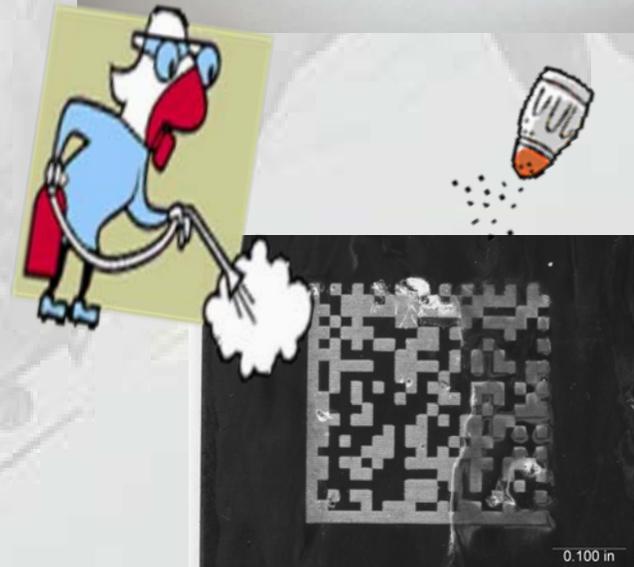
☞ Chemical Conversion Coated

➤ Some Developed Blisters

➤ Slight Deterioration of Modulation

☞ Clear Coat

➤ All Survived 3,000 Hours



Direct Part Marking

↙ D210-13613-2 DPM Spec

☞ Flows IUID Procedures

☞ **No Detriment To Parts**

☞ Pre-Production Approval

☞ Permanent Marks

➤ Operating Environment

➤ Overhaul Practice



Assure No Detriment to Part

↪ Intrusive & Non-Intrusive Marking Methods

☞ Non-Intrusive

- Permanent
- ❖ Overcoat



↪ Intrusive

☞ Effect on Fatigue

- Literature Search
- Marked Samples
- Fatigue Testing



Literature Search



↪ NASA

☞ NASA-STD-6002

☞ NASA-HDBK-6003

↪ Joint Marking Qualification Working Grop (JMQWG)

☞ Share Data / Testing / Information

- Members of Aerospace Industry
- University of Alabama
- Government Representatives

↪ **LINK:** <https://acc.dau.mil/CommunityBrowser.aspx?id=30743>

JMQWG Website

Acquisition Community Connection
Where the DoD AT&L Workforce Meets to Share Knowledge

DAU Resources | Home | Contact Us | Privacy Policy | ACC Tutorial

Defense Acquisition University

SEARCH

You are here: Unique Identification... > Engineering > JMQWG Marking...

Sign In

User Name:

Password:

Sign In

[Request an Account](#)
[Benefit of Membership](#)
[Forgot My Password or Login](#)

Community Explorer

- Unique Identification (UID)
 - IUID in Action
 - Policy & References
 - Program Managers Plan
 - Contracting
 - Engineering
 - JMQWG Marking Qualification Data**
 - JMQWG - Dev Site
 - New IUID Marking Technology Ideas
 - Industry Implementation
 - Solution Providers

JMQWG Marking Qualification Data

Topic

Activity Ranking: [How is ranking calculated?](#)

User Reviews:

Main View | Discussions | What's New | Activity

112 contributions at this topic | [Search Knowledge in this Community](#)

A Joint Marking Qualification Working Group (JMQWG) has been established under the sponsorship of GEIA to coordinate a "consortium approach" towards performing, publishing and sharing non-proprietary 2D Data Matrix marking qualification test and report data.

To use this site most effectively, take the following actions, in order (put cursor on the statements in order to launch the learning material):

(Step A) [Read the Generic Marking Guide document,](#)
(Step B) [read the IUID Decision Tree Flowchart, and](#)
(Step C) [review the GEIA JMQWG Master Matrix.](#)

If you perform marking qual testing, please take additional

(Step D) [and prepare a Test Data Summary Sheet and share your summary data and detailed test report with Industry/Government.](#)

JMQWG / University of Alabama

Requests

Matrix Search

	Laser								
	Laser	Laser Induced Surface Improvement (LISI)	Laser Engrave		Laser Etch	Laser Bond	Laser Coloring	Laser Engineered Net Shaping (LENS)	Gas Assisted Laser Etch (GA)
			Laser Engrave	FO...					
Aluminum	X	X	X	X	X	X	X	X	X
Steel	X	X	X	X	X	X	X	X	X
Metals	X				X				
Non-Metals		X		X	X	X	X	X	X
Painted					X				
Titanium		X		X	X	X	X	X	X
Copper		X		X	X	X	X	X	X
Nickel		X		X	X	X	X	X	X
Refrac Metals					X				
Magnesium						X			
Reactive and Refra...		X		X	X	X	X	X	X
Brass						X			

Rows: Materials Columns: Marking Meth...
Legend: X = Some data exists at this intersection

[Get the latest Java Plug-in here.](#)



JMQWG / University of Alabama Results

Requests

Matrix Search

ing Methods

- Laser
- Laser Induced
- Laser Engrave
 - FOBA
 - Laser Etch
 - Laser Bond
 - Laser Coloring
 - Laser Engineer
 - Gas Assisted L
 - Laser Paint Re
 - Lasershot Peen
 - Laser Cut ink S
- Other
 - RVSI
 - Case
 - Forged
 - Mold
 - Hot Stamp
 - Impression Sta
 - Rubber Stamp
 - Dot Peen
 - Fabric Embroid
 - Steel Stamp
 - Vibropeen
 - Fiber Data Ins
 - Casting

Materials

- Aluminum
- Steel
- Metals
- Non-Metals
- Painted
- Titanium
- Copper
- Nickel
- Refrac Metals
- Magnesium
- Reactive and
 - Brass
 - Beryllium
 - None

Objects

- Tag
- Helicopter
- Ammunition
- None

Clear Selection Clear Selection Clear Selection

Your search produced 18 results.

Document ID	00000000051
Title	Physical Testing of LMM-6000 Laser Marks
Actual Document	00000000051.pdf
Publication Date	14 August 2006
Keywords	None
Standards	None
Certifications	None
Summary	Physical Testing of LMM-6000 Laser Marks 00000000051.pdf
Organizations	None

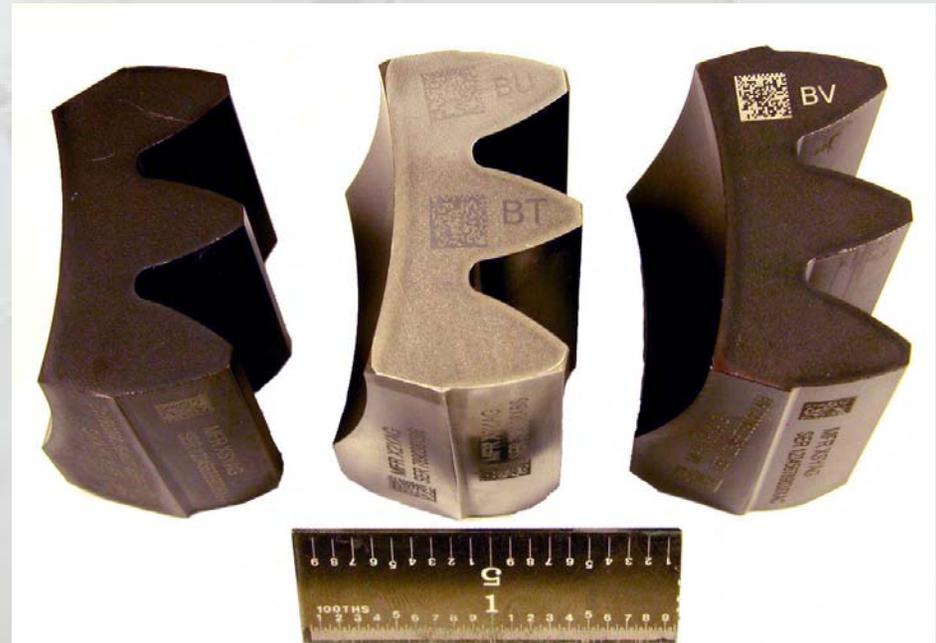
Document ID	19980331021
Title	Wear and Corrosion Testing of Coated Laser Marks on Anodized Aluminum
Actual Document	19980331021.pdf
Publication Date	31 March 1998
Keywords	None
Standards	None

[Get the latest Java Plug-in here.](#)

Direct Part Marking Study

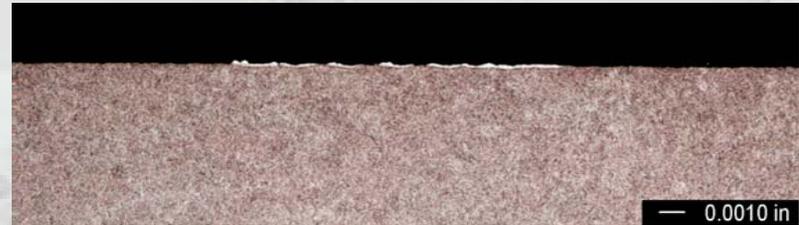
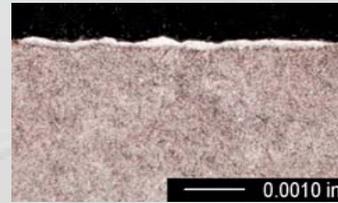
Initial Screening

**Marking on tooth profile – Represents a
Carburized & Shot Peened Surface – NOT
Intended to Mark Production Part on Tooth
Profile.**

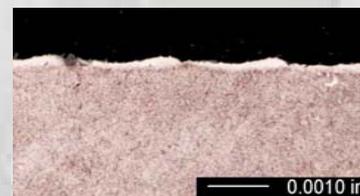
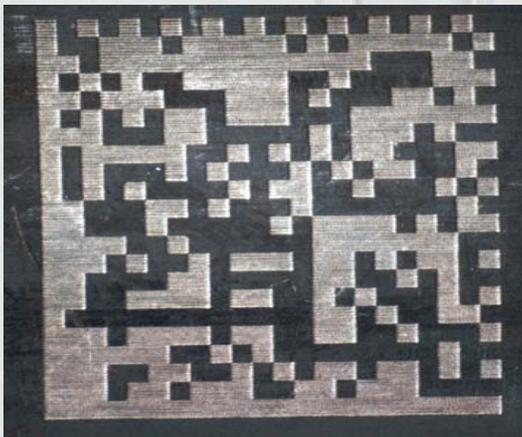


YAG LASER Marks on Selective Carburized and Harden BMS7-223 Material

Direct Part Marking Study - Initial Screening- LASER Etch



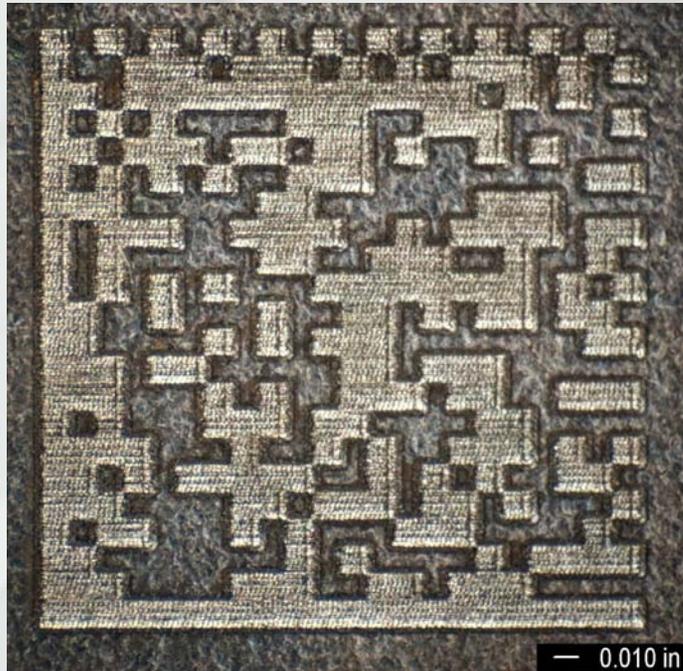
X2CASE – YAG LASER - X2CASE-SP-BO-P2-P10-S10-Q10-X12.0. Depth of HAZ - 0.0002"



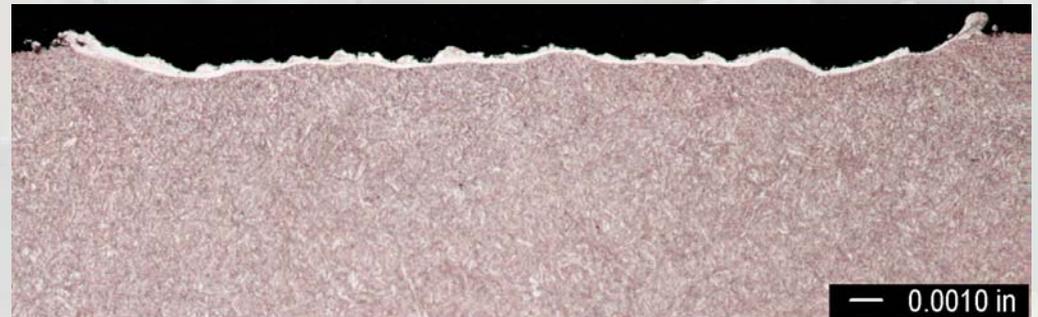
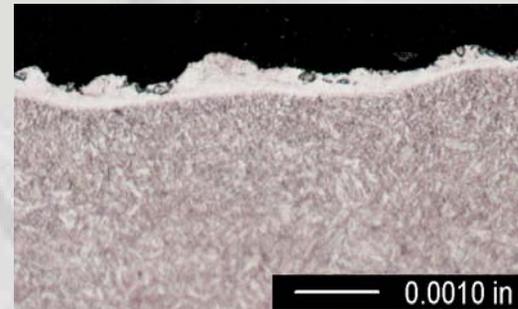
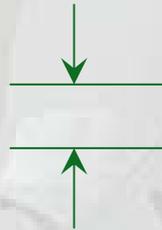
X2CASE – YAG LASER - X2CASE-SP-BO-P2-P10-S10-Q10-X17.6. Depth of HAZ - 0.0004"

Direct Part Marking Study - Initial Screening

LASER Engrave



0.0007"



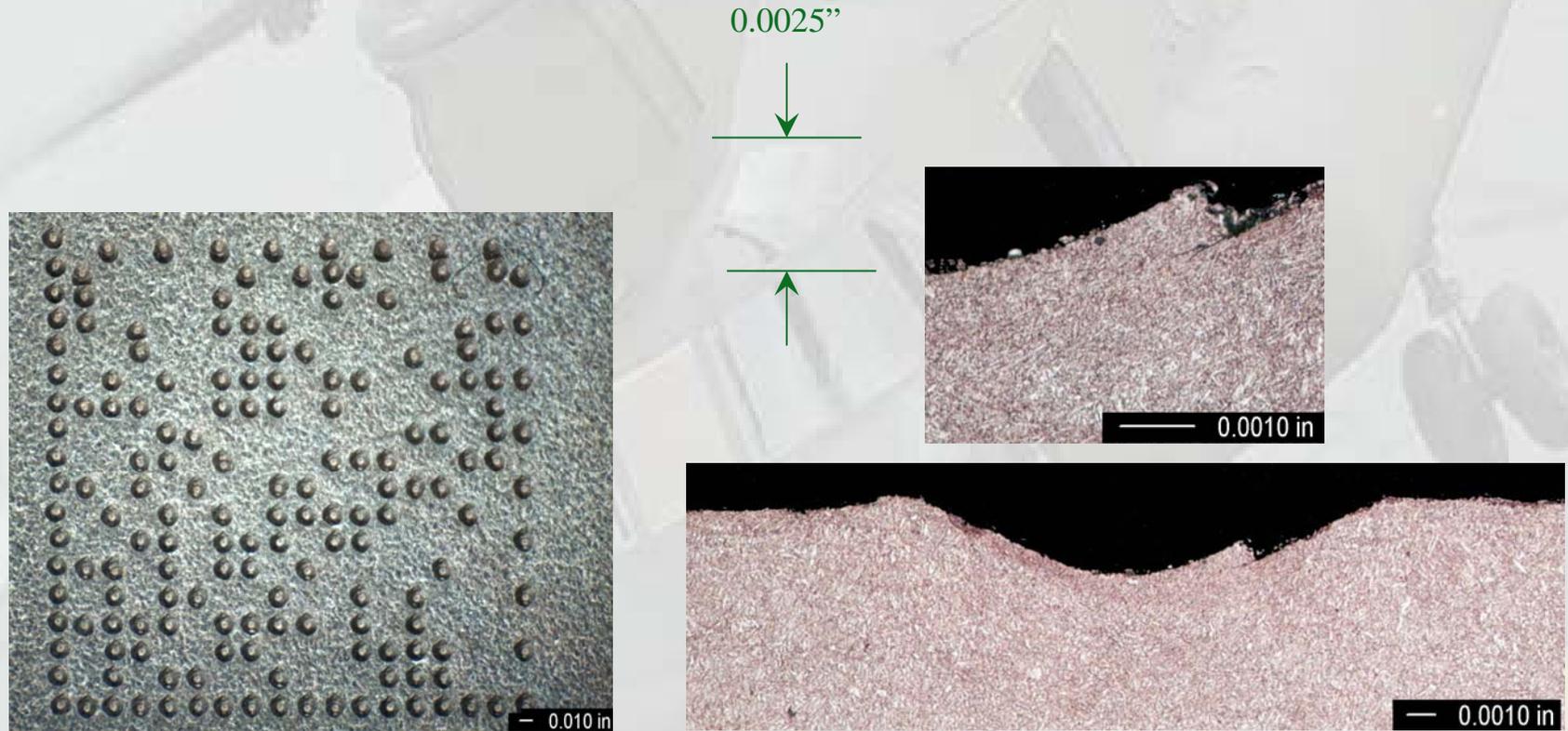
Sample 4340

YAG LASER

4340-SP-BO-P2-P18-S2.5-Q3-X12.0 & 3 pass: P10-S10-Q10-X12.0-2 pass Depth of HAZ -0.0007"

Direct Part Marking Study - Initial Screening

Dot Peen



CN-Sample 4340 – Dot Peen -4340-SP-BO-H 0.238 - Lap 0.001 inch.

Fatigue Testing

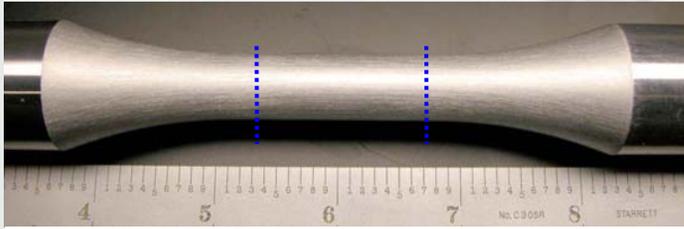


Figure 1. Test Specimen-Lines represent approximate gage length.

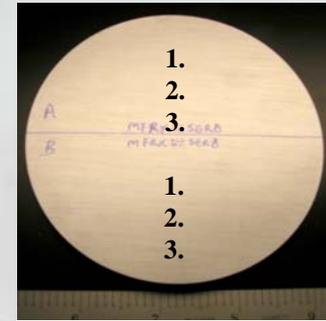
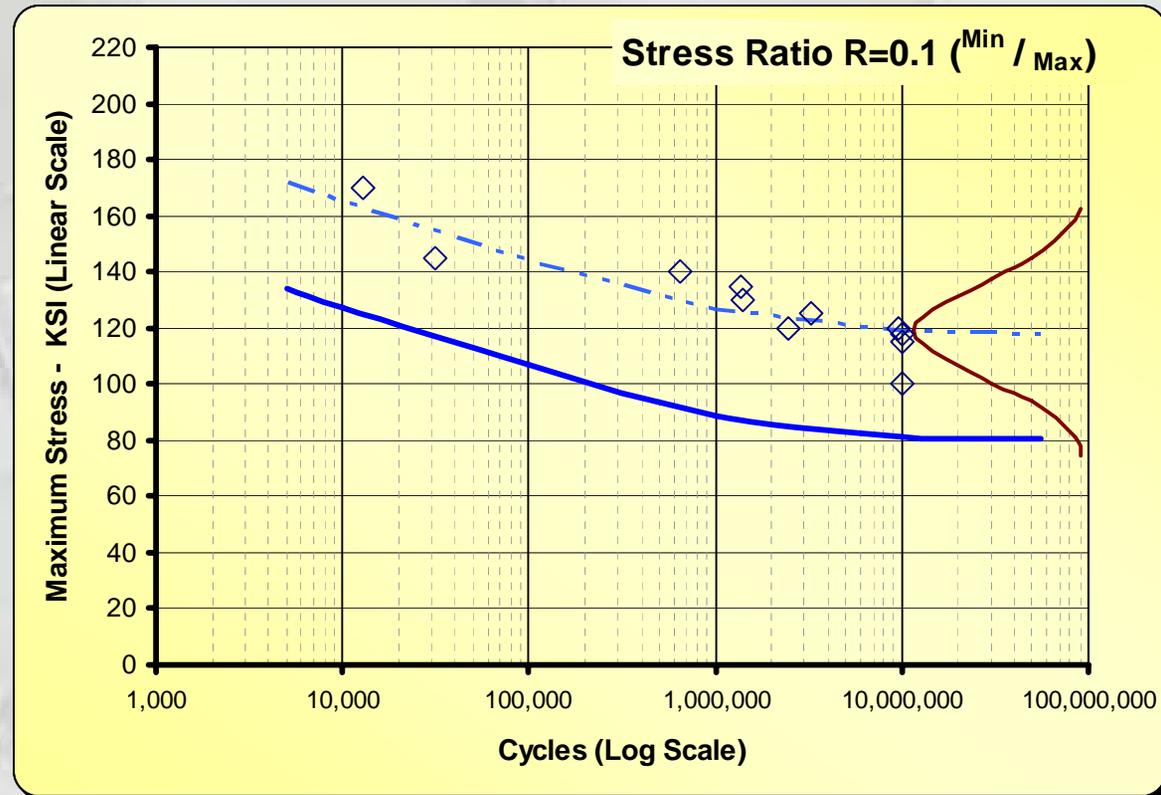


Figure 2. Test Disc

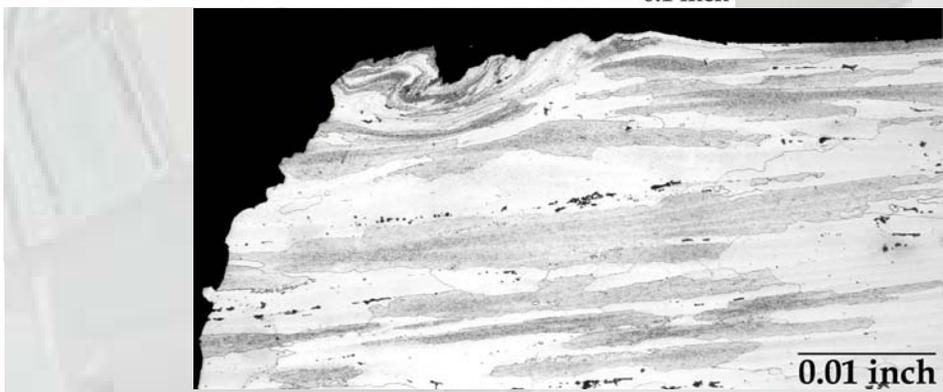
Fatigue Testing

- Compare Various Marking Types to Baseline
- Compare Various Processing Effects
 - Shot Peening
 - Coatings
 - Heat Treat



Metallurgical Evaluation

Fractured Fatigue Vibro-scribe Sample



“Base - Line”

Metallurgical Evaluation

Fractured Fatigue LASER Etch Sample



Dot Peen Mark After Paint Strip Test

↪ 3 Material Tested

☞ 4340 Steel

☞ 301 CRES

☞ 7075 Al

↪ Prime & Top Coated

↪ 2 Strip Methods

☞ Chemically

☞ Plastic Bead



Legacy Marking

Label on Legacy Part



Legacy Label



New UID Label Design

↪ Aid with Writing Directions – DMWR

☞ D145-10539-1 - Guide for DMWR Authors & Suppliers

↪ Using SPL / UCN

☞ Maintaining Part's Serial Number as Serial Number

↪ Encoding Legacy Information in PNR Matrix

↪ Educating Supplier of Legacy Requirement

☞ Supplier's Process is Reflected in DMWR

☞ Requesting Sample for Validation

FOR IUID Marking Requirements



The Chinook Is Marked



- ↪ Labels & Nameplates
- ↪ Direct Part Mark
 - ☞ Non-Intrusive
 - ☞ Intrusive
- ↪ Legacy Hardware



Philly's Accomplishments



↪ **25** CH-47 A/C Delivered With IUID Labels

☞ Scan **2,000** DoD Compliant IUID Labels

↪ **50** Suppliers Qualified for IUID Labels & Nameplates

↪ **3** Suppliers Qualified for IUID Direct Part Marking (DPM)

↪ **12,000** Legacy Parts were Registered



Data as of 1 November 2007

Summary

We can conquer
this Monster !

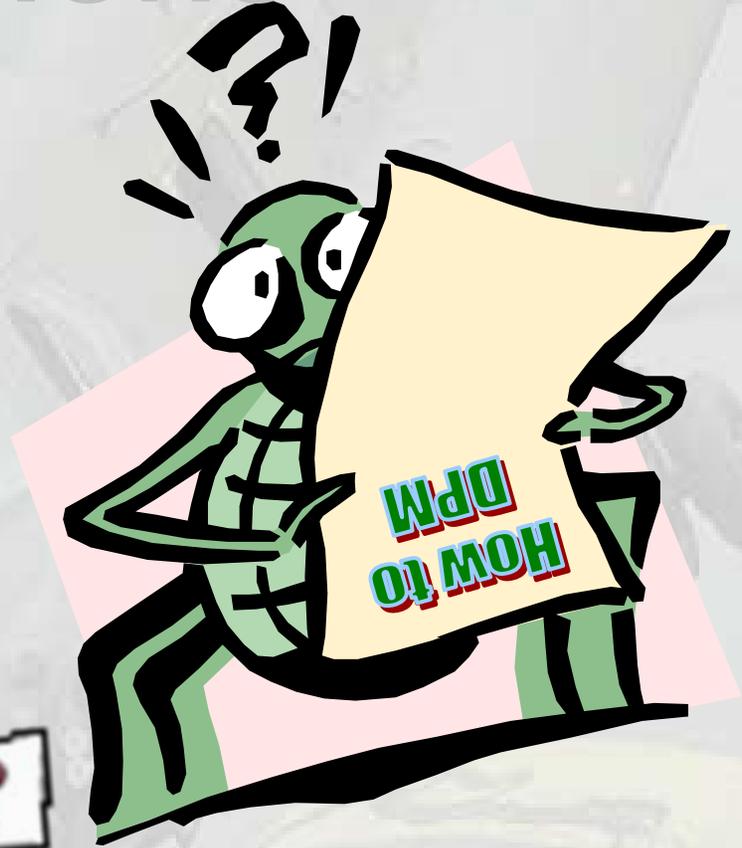
Yea, Intrusively



- ↪ **Divide & Conquer (Labels, Direct, Legacy)**
- ↪ **Educate Suppliers (Establish & Maintain Communication)**
- ↪ **Do Work Up Front (Establish a Plan)**
- ↪ **The Part Marking Monster CAN BE Conquered**
- ↪ **BUT . . .**

QUESTIONS

?



?

?