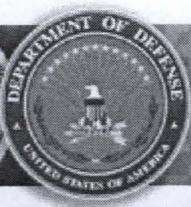


Abstract

UID...Now That's Gonna Leave A Mark

Since 1975 bar codes on products at the retail counter have been accepted as the standard for entering product identity for price determination. Since the beginning of the 21st century, the Data Matrix symbol has become accepted as the bar code format that is marked directly on a part, assembly or product that is durable enough to identify that item for its lifetime. NASA began the studies for direct part marking Data Matrix symbols on parts during the Return to Flight activities after the Challenger Accident. Over the 20 year period that has elapsed since Challenger, a mountain of studies, analyses and focused problem solutions developed by and for NASA have brought about world changing results. NASA Technical Standard 6002 and NASA Handbook 6003 for Direct Part Marking Data Matrix Symbols on Aerospace Parts have formed the basis for most other standards on part marking internationally. NASA and its commercial partners have developed numerous products and methods that addressed the difficulties of collecting part identification in aerospace operations. These products enabled the marking of Data Matrix symbols in virtually every situation and the reading of symbols at great distances, severe angles, under paint and in the dark without a light. Even unmarkable delicate parts now have a process to apply a chemical mixture, recently trademarked as Nanocodes, that can be converted to Data Matrix information through software. The accompanying intellectual property is protected by ten patents, several of which are licensed. Direct marking Data Matrix on NASA parts dramatically decreases data entry errors and the number of parts that go through their life cycle unmarked, two major threats to sound configuration management and flight safety. NASA is said to only have people and stuff with information connecting them. Data Matrix is one of the most significant improvements since Challenger to the safety and reliability of that connection.



UID & eBusiness Forum

Implementation Strategies for Programs & Suppliers

SPACE

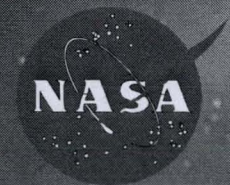
UID...Now That's Gonna Leave A Mark

*UID & eBusiness Forum
Huntsville, AL
April 8, 2008*

Fred Schramm

**National Aeronautics and Space
Administration**

**Marshall Space
Flight Center**

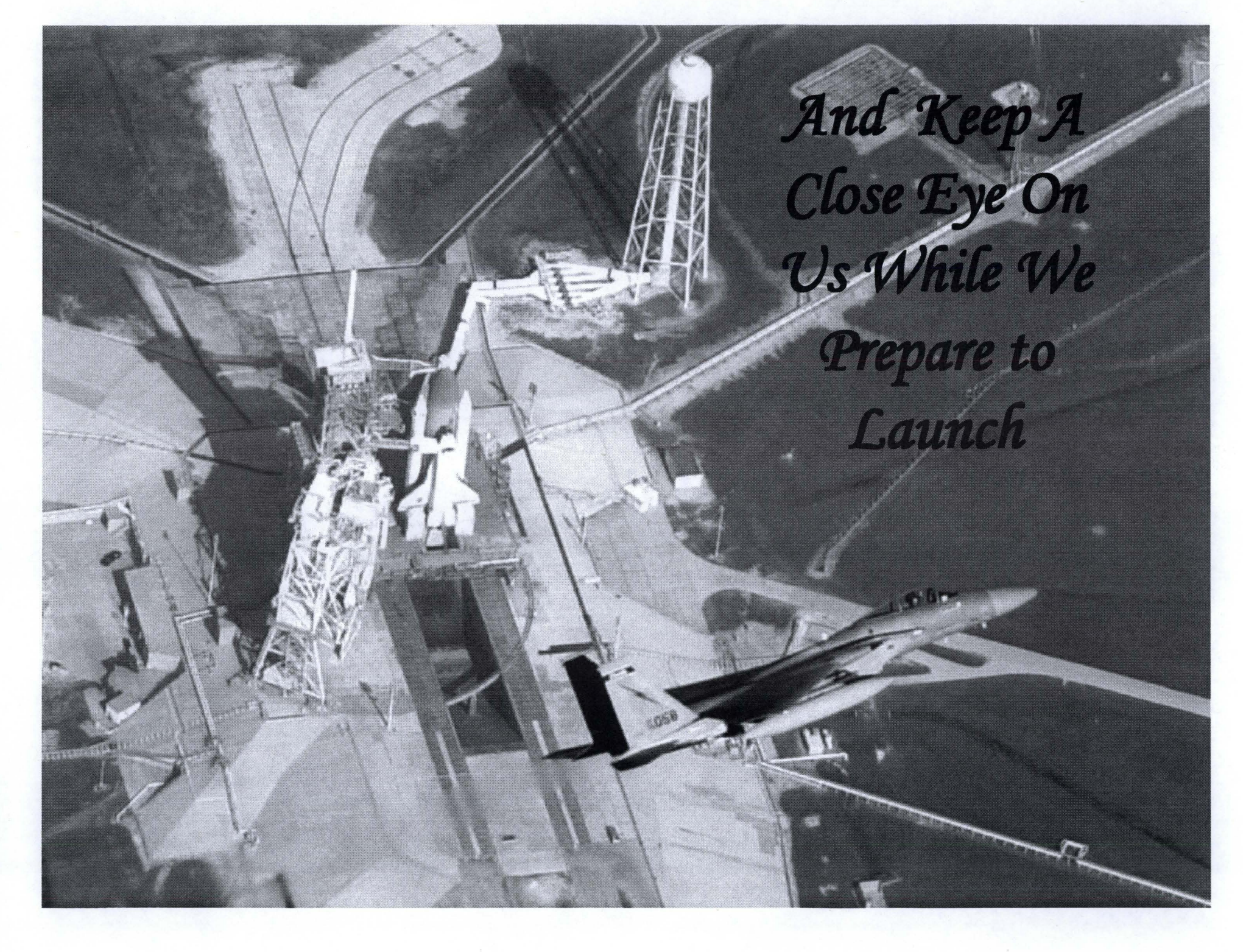




NASA Thanks Those Who

Protect Our Freedom

Global, Homeland, Hometown

An aerial, black and white photograph of a space launch complex. In the center, a space shuttle is mounted on a mobile launcher platform (MLP) and is being moved by a crawler-transporter along a set of tracks. To the right, a fighter jet is parked on a tarmac. In the background, a tall, lattice-structured tower stands prominently. The surrounding area includes various support buildings, roads, and parking lots.

*And Keep A
Close Eye On
Us While We
Prepare to
Launch*

*While We Tip Our Wings
Goodbye
To Each Other*





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Implementation Strategies for Programs & Suppliers

Today's World....More Things Being Tracked

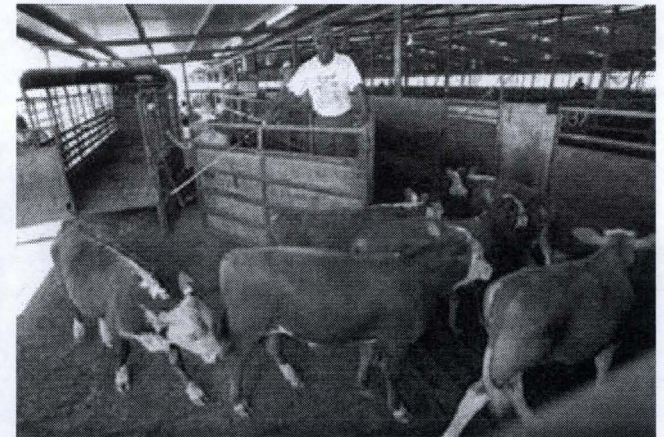
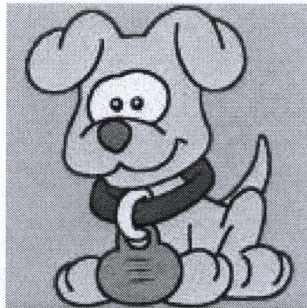
.....For Safety

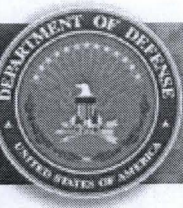
.....And Because We Can



United States Department of Agriculture

NEW NATIONAL ANIMAL ID SYSTEM WILL GUARD AGAINST MAD COW DISEASE AND ANIMAL HEALTH PROBLEMS



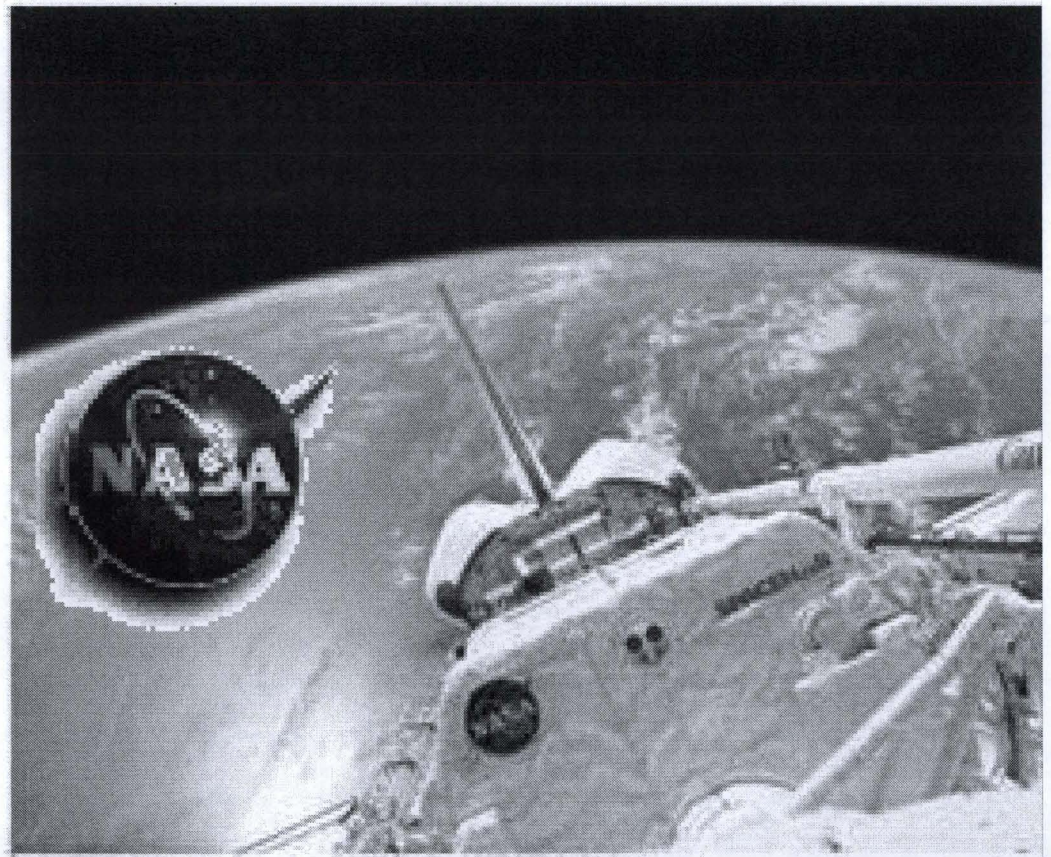
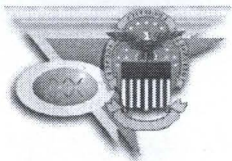


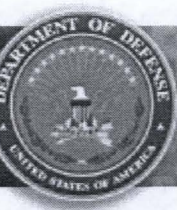
UID & eBusiness Forum

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Different Organizations Track Products for Different Reasons

Readiness UID

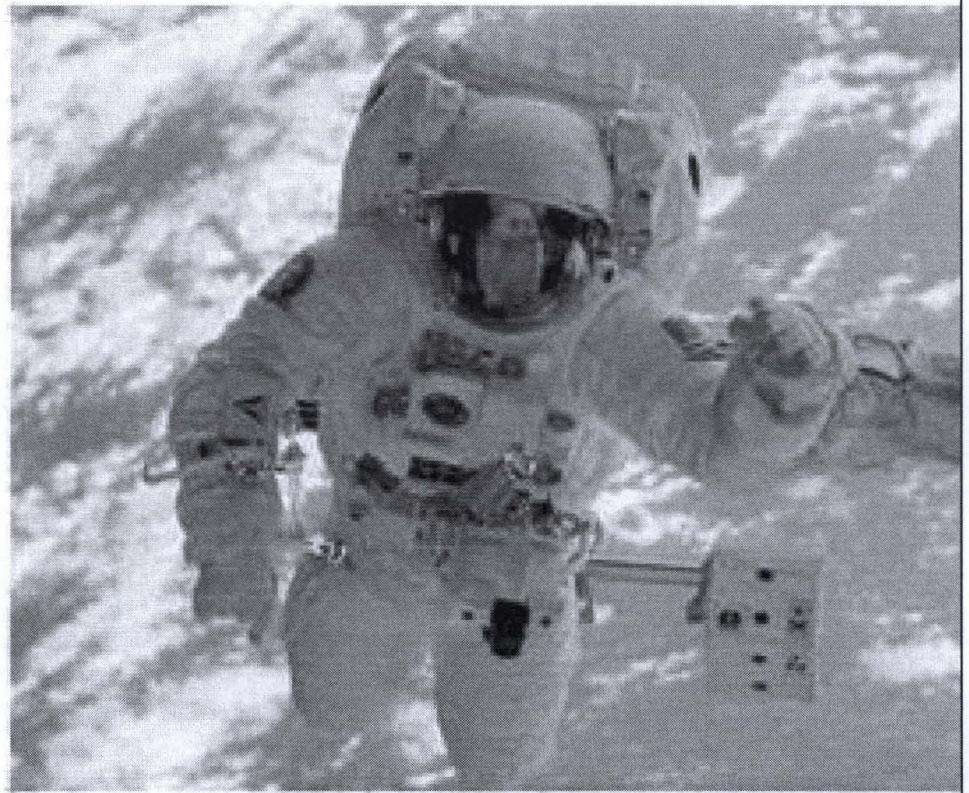
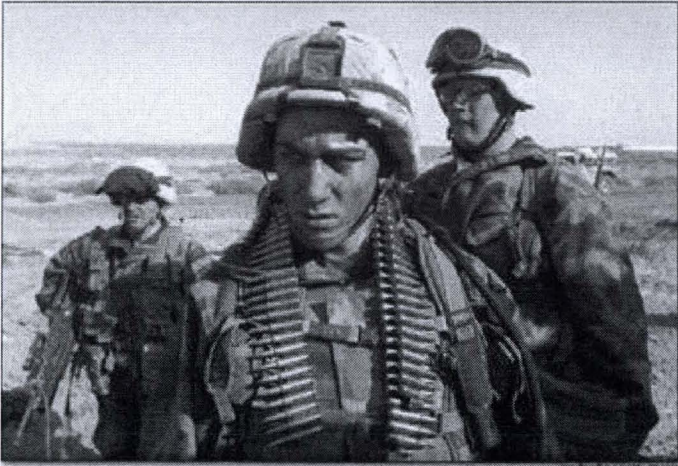
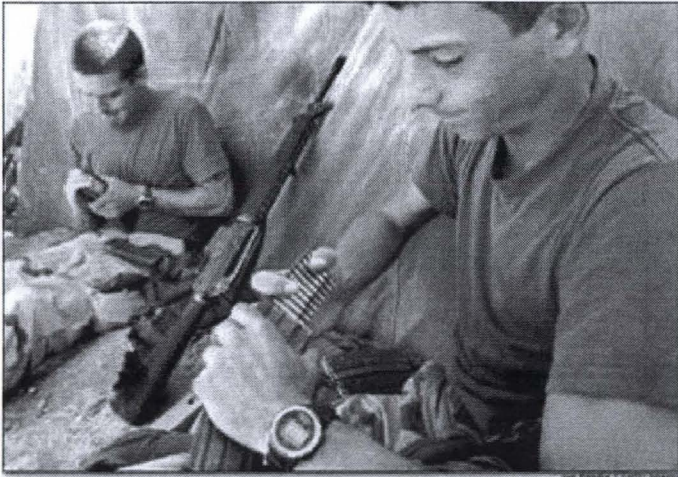




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UID... Tracking for a Reason



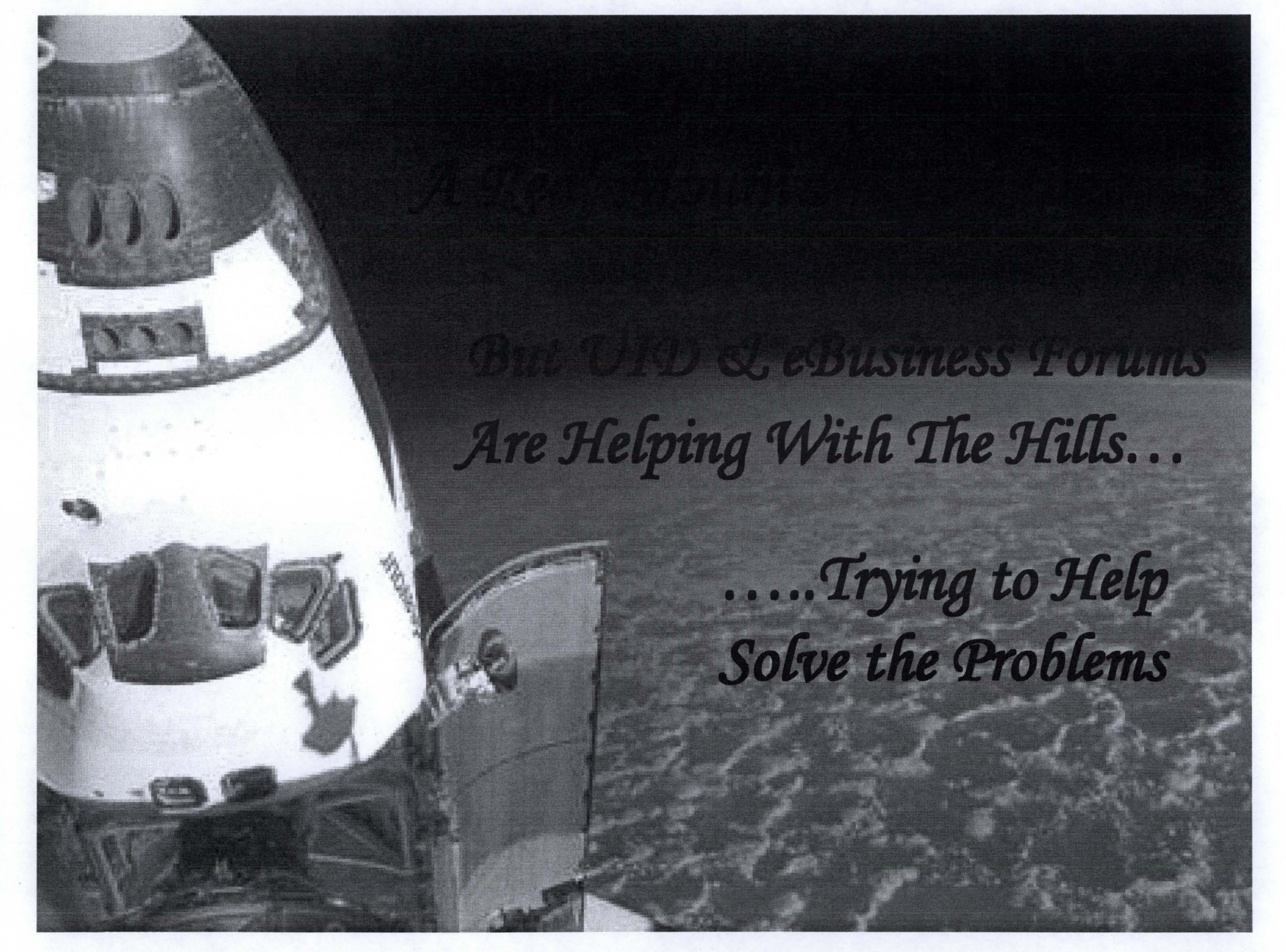
2008

ARLINGTON

HUNTSVILLE

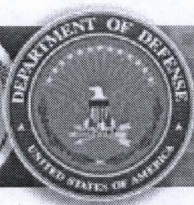
SACRAMENTO

2008

A black and white photograph of the Space Shuttle Columbia in orbit. The shuttle is on the left side of the frame, angled upwards. The Earth's surface is visible in the background, showing a pattern of clouds and landmasses. The shuttle's nose and windows are clearly visible.

*But VFD & eBusiness Forums
Are Helping With The Hills...*

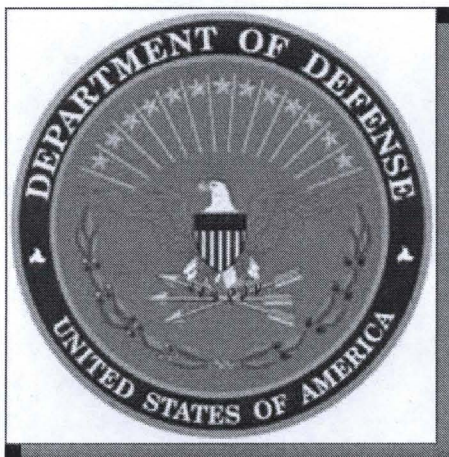
*.....Trying to Help
Solve the Problems*



UID & eBusiness Forum

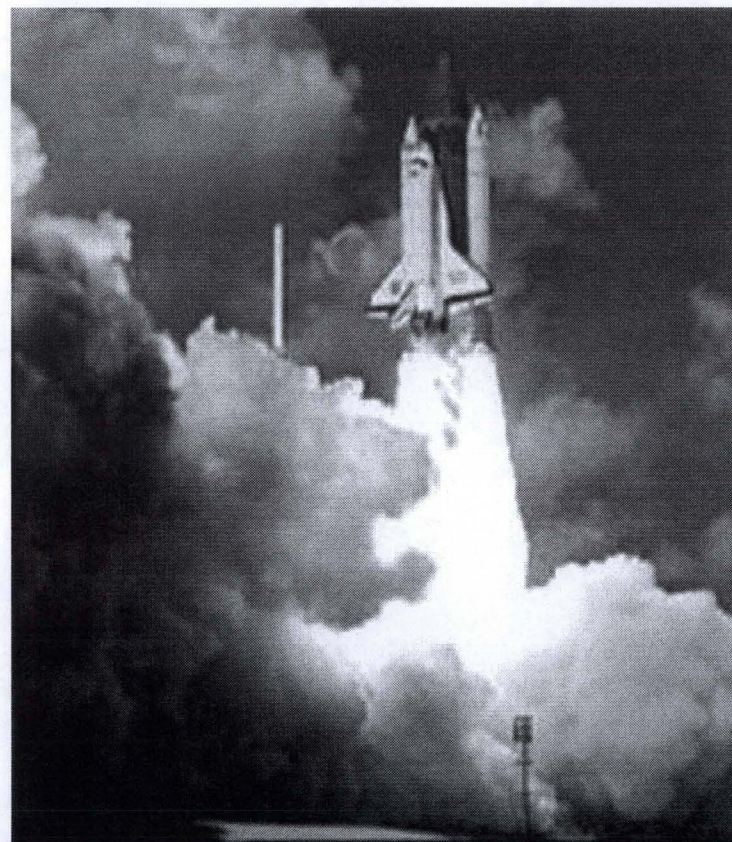
Implementation Strategies for Programs & Suppliers

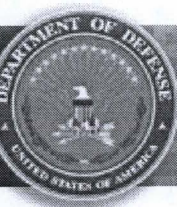
Requirements to Track Products Start with Identification



*Part Numbers and Serial Numbers
Identify One Part From the Other*

*CAGE Numbers Identify One
Supplier from the Other*





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Implementation Strategies for Programs & Suppliers

Items that Require Identity Capture... UID or Not—Mark by the Standards



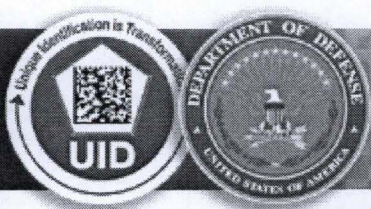
MIL STD 130...
Labels, Tags,
Nameplates for DoD
and NASA

MIL STD 130...
Direct Part Marking for
DoD

NASA STD 6002
Direct Part Marking for
NASA



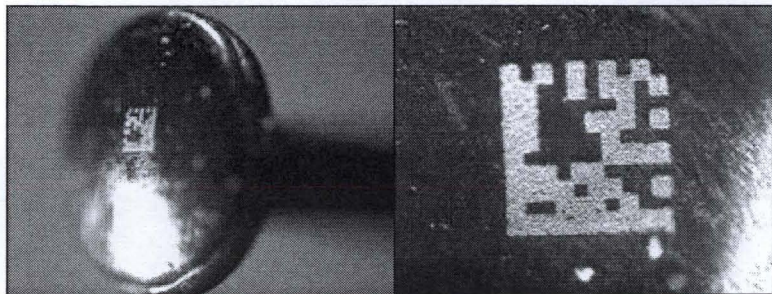
If space is limited or permanence required... Use 2D



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UID... Direct Part Marking



NASA's Primary Emphasis

....Item-Level Traceability Requires UID

....MIL STD 130/NASA STD 6002C

use same symbol format

Know the Pedigree

....Know who made it

....Know who marked it

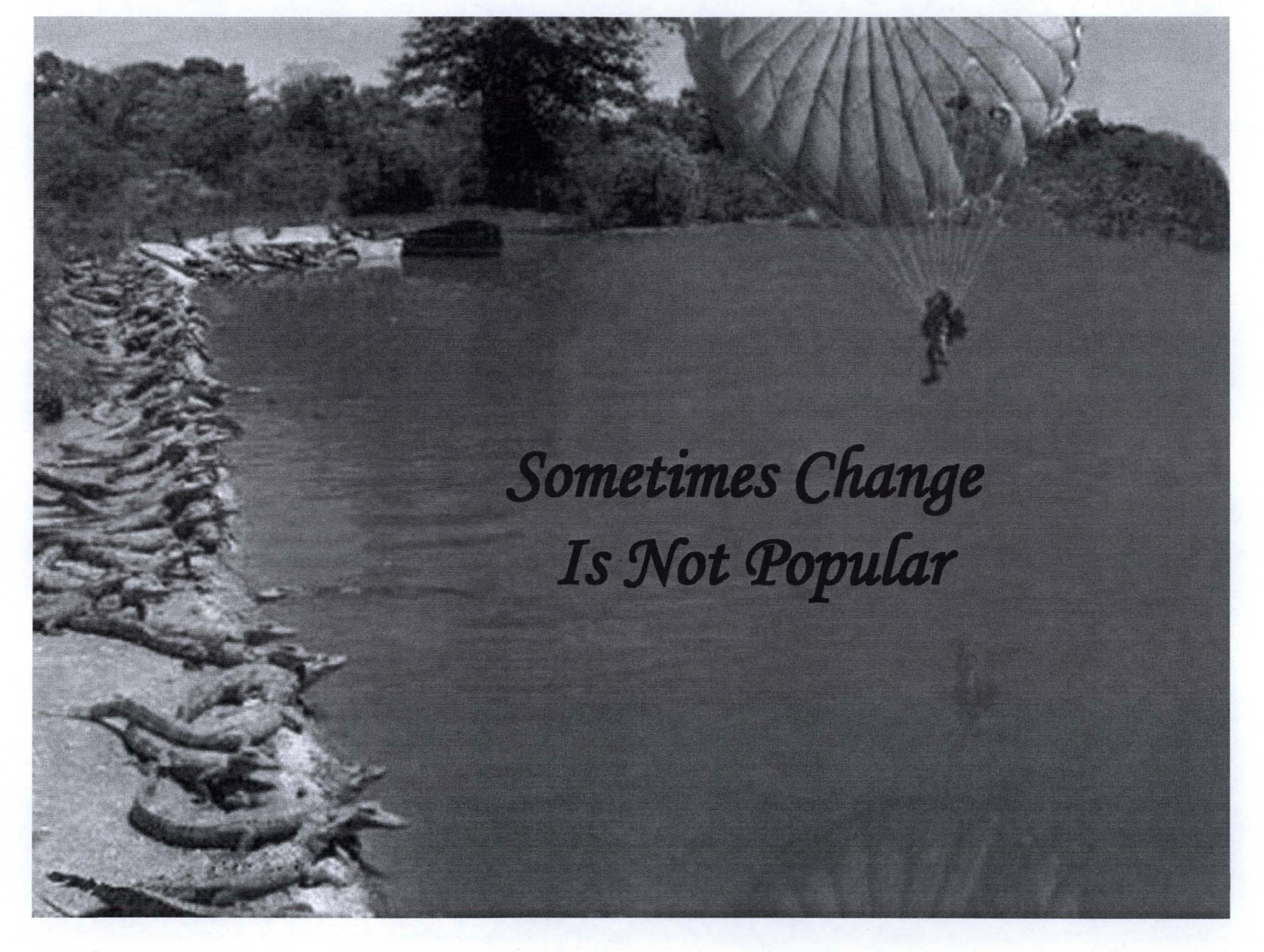
....Know who stands behind it

A properly engineered and applied mark is a:

FLAWLESS IMPERFECTION

NASA Materials and Processes Community Of Practice

http://maptis.nasa.gov/NASA_MP_COP.html

A black and white photograph showing a person parachuting over a body of water. The parachute is large and billowing, with the person suspended below it. The water is dark and calm. On the left side, a rocky or sandy shore is lined with many crocodiles, some resting on the ground and others partially in the water. The background shows a line of trees and a clear sky. The text "Sometimes Change Is Not Popular" is overlaid in the center of the image in a stylized, cursive font.

*Sometimes Change
Is Not Popular*

*UID Is Not As Hard As Breaking
the Sound Barrier*



*And You Do
That Every Day*

Ares I and V Launch Vehicles Built on Proven Systems

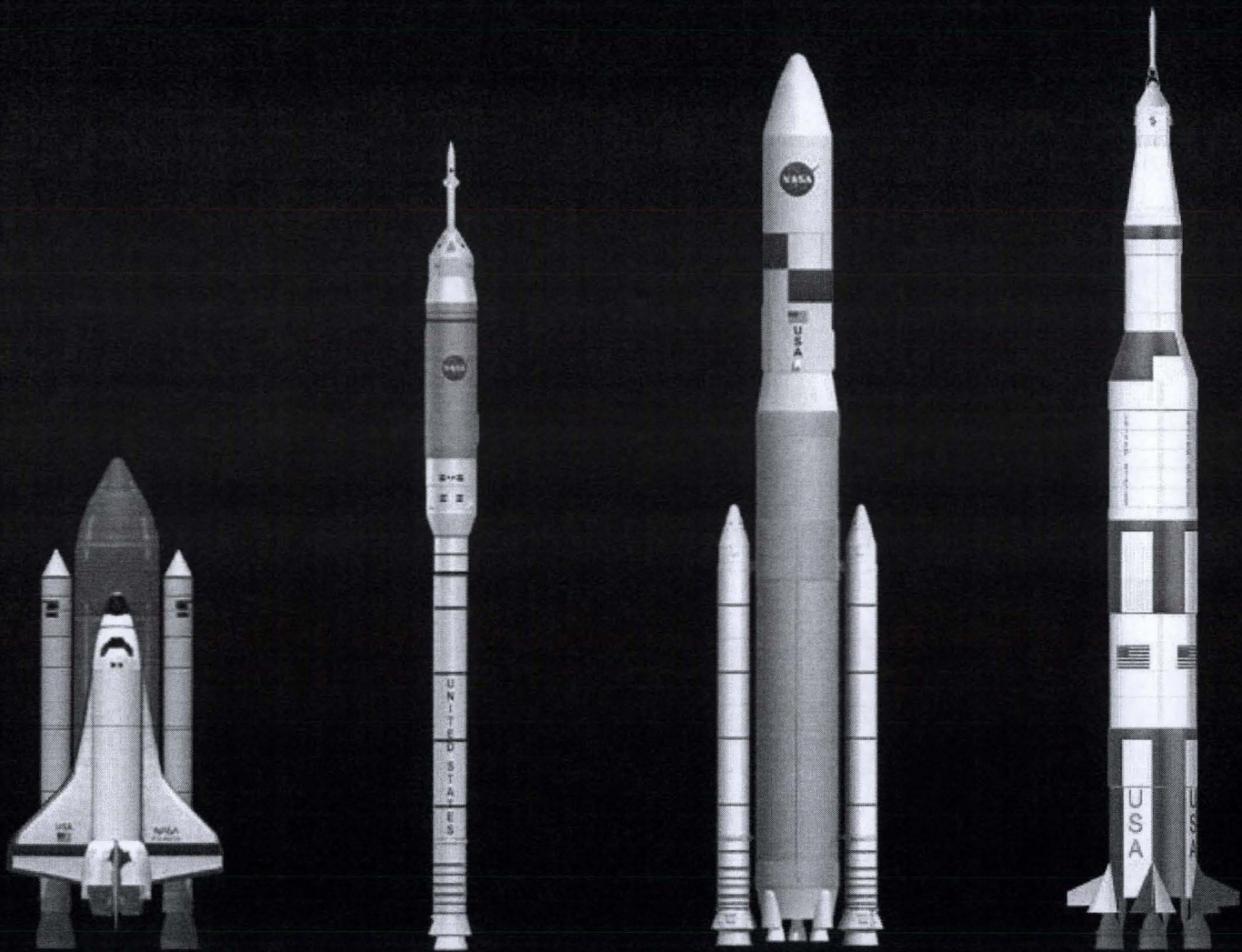
*Ares I
Crew Launch
Vehicle*

**New
Problems**

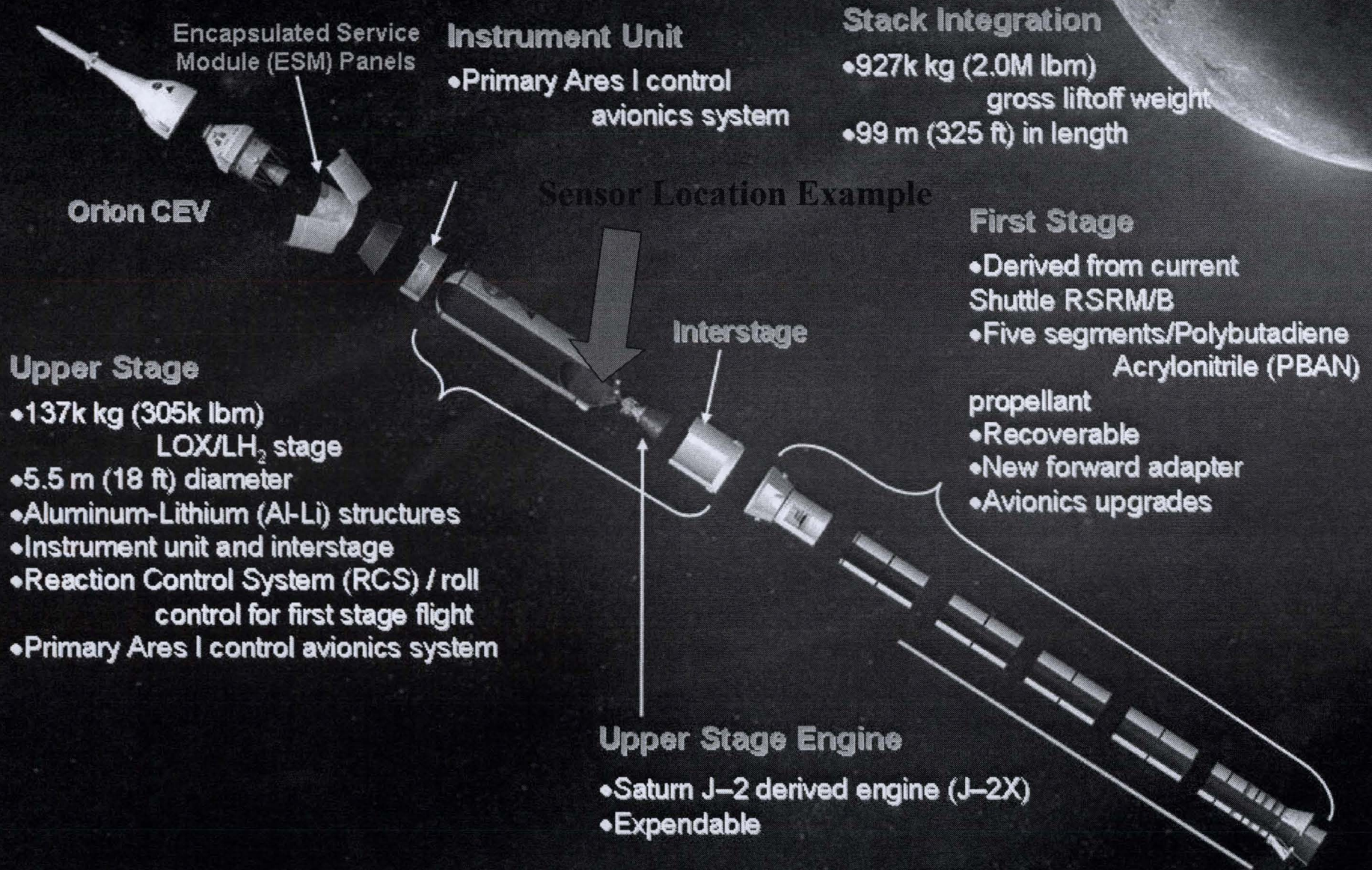
**New
Opportunities**

Marshall launching a new era of space exploration



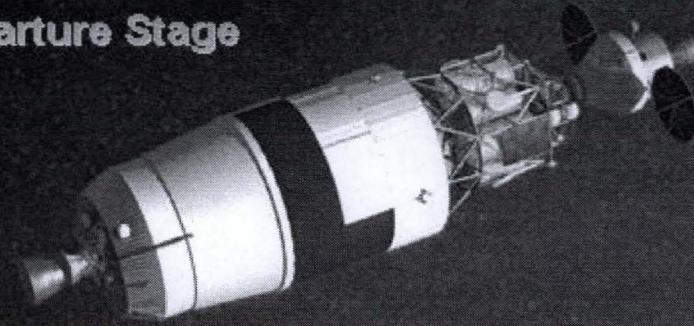


Ares I Elements

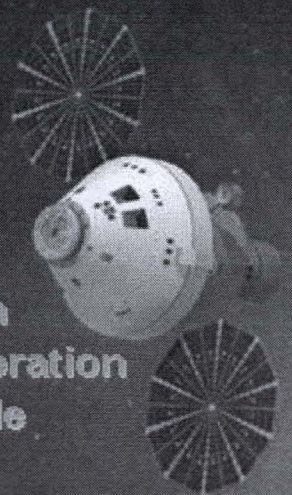


The Exploration Fleet

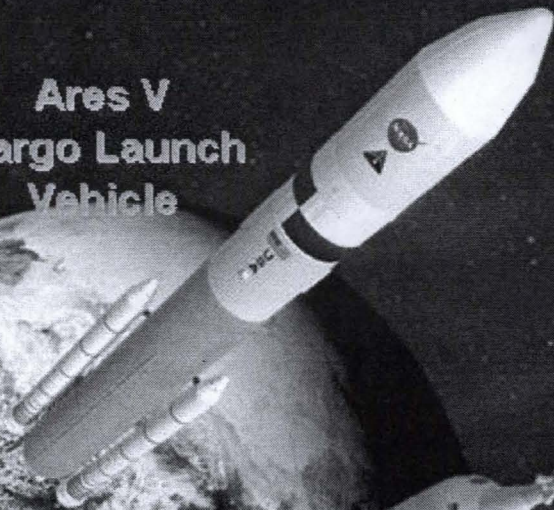
Earth Departure Stage



Orion
Crew Exploration
Vehicle



Ares V
Cargo Launch
Vehicle



Ares I
Crew Launch
Vehicle



Altair
Lunar
Lander





There Are Many Places To Explore.

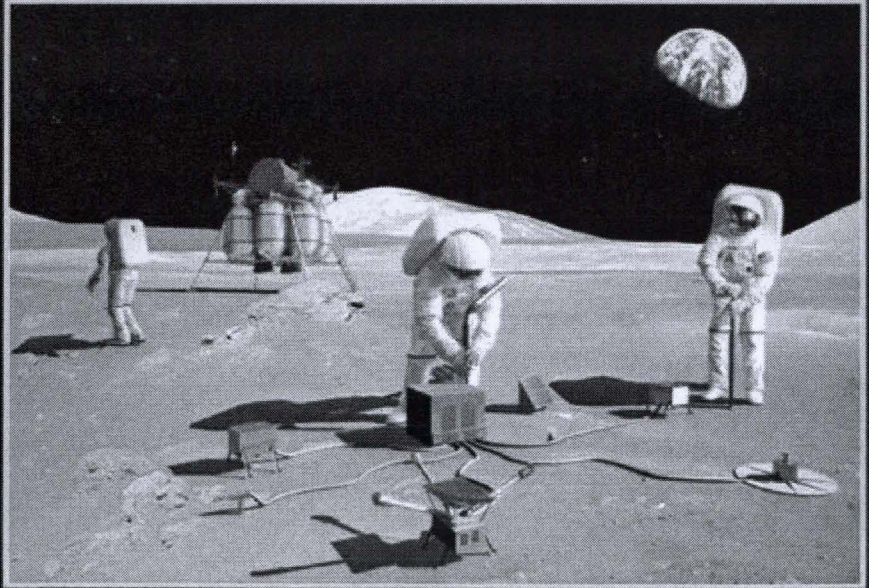
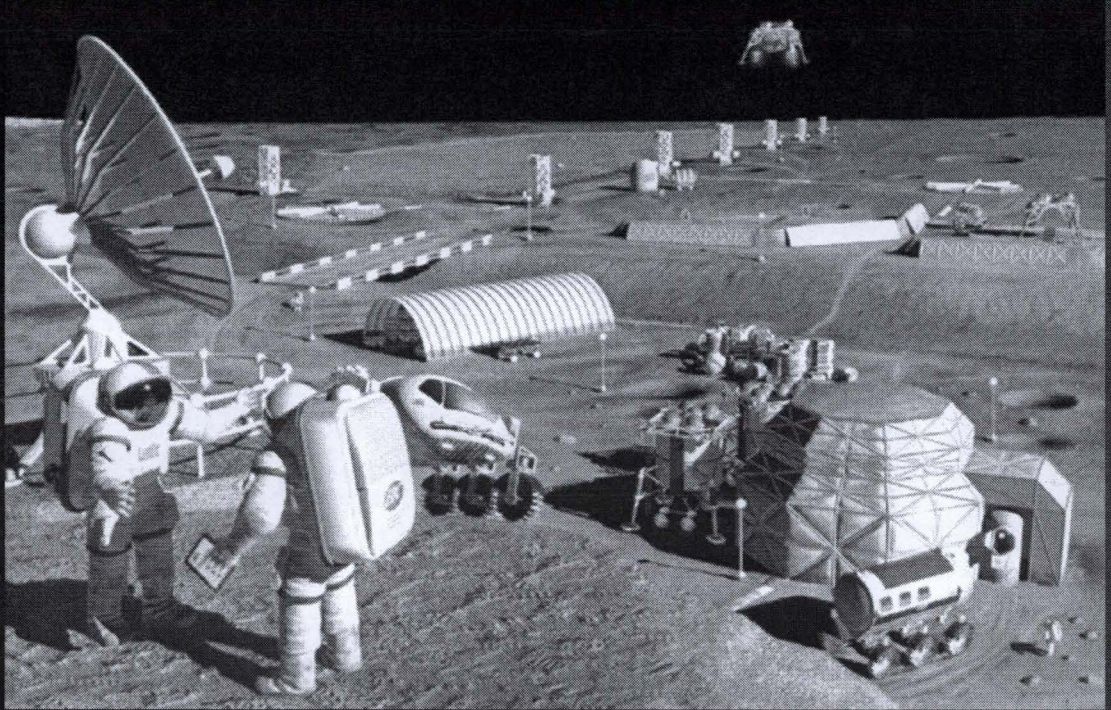


- ◆ Luna
- Surveyor
- Apollo
- + Possible landing sites

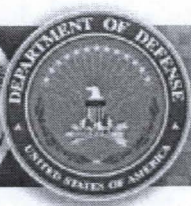
Near Side

Far Side

...or make it there...







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Implementation Strategies for Programs & Suppliers

Jungle, Sand or Space... UID Presents Some Direct Part Marking and Reading Problems

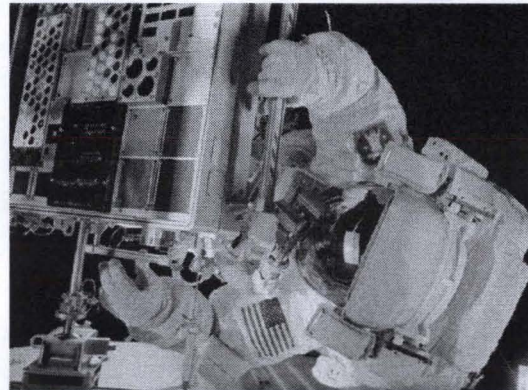
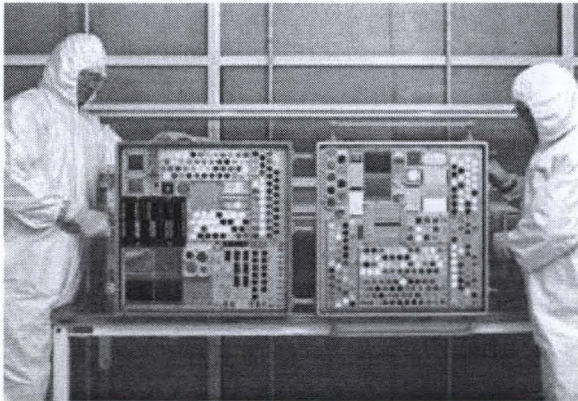
Engineered Solutions



UID & eBusiness Forum

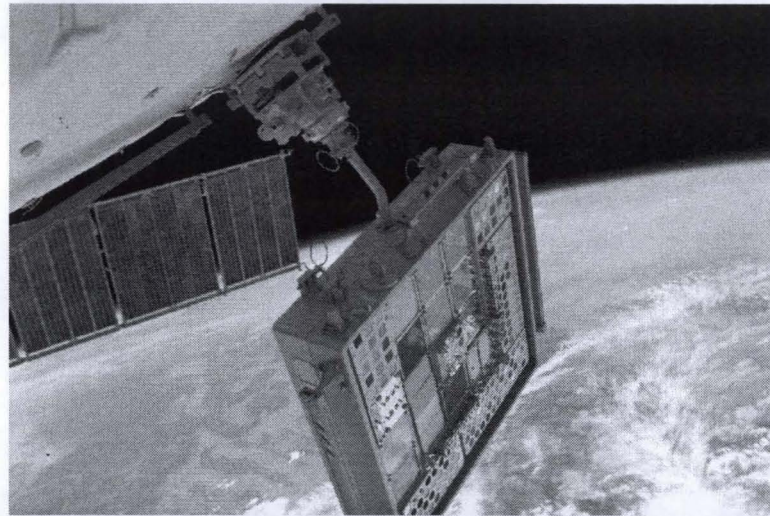
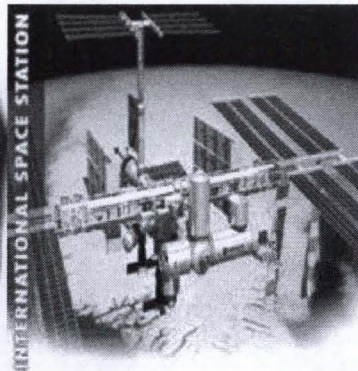
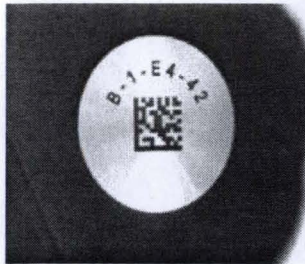
Implementation Strategies for Programs & Suppliers

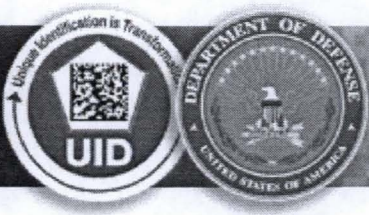
Materials-International Space Station-Experiment **Marking Development for Long Term Space Exposure**



**MISSE 1&2 and 3&4
Results Will Be In
NASA STD 6002
by 2010**

**Exposes Samples to Space
For A Year**





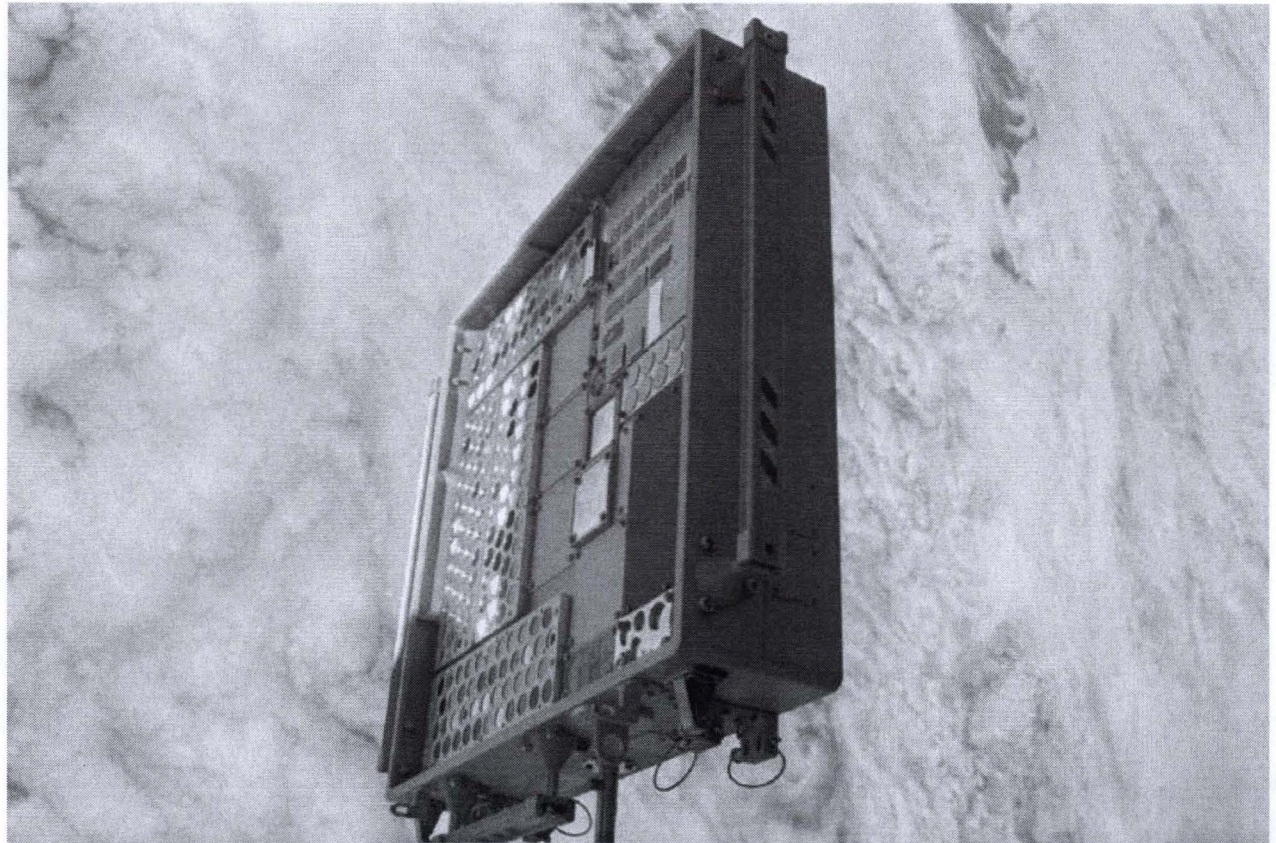
Tests for Long Term Exposure to Space (MISSE 6)

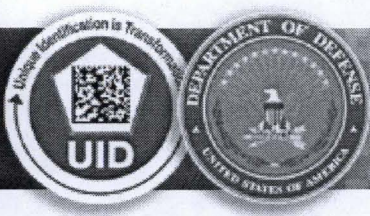
Carries laser bonded
Data Matrix samples

Carries Nanocodes™ in
various coatings and one
dot peened into coupon

Carries one paper RFID
tag and one encased in
plastic—attached to face
of tray

Launched aboard
Endeavor March 2008

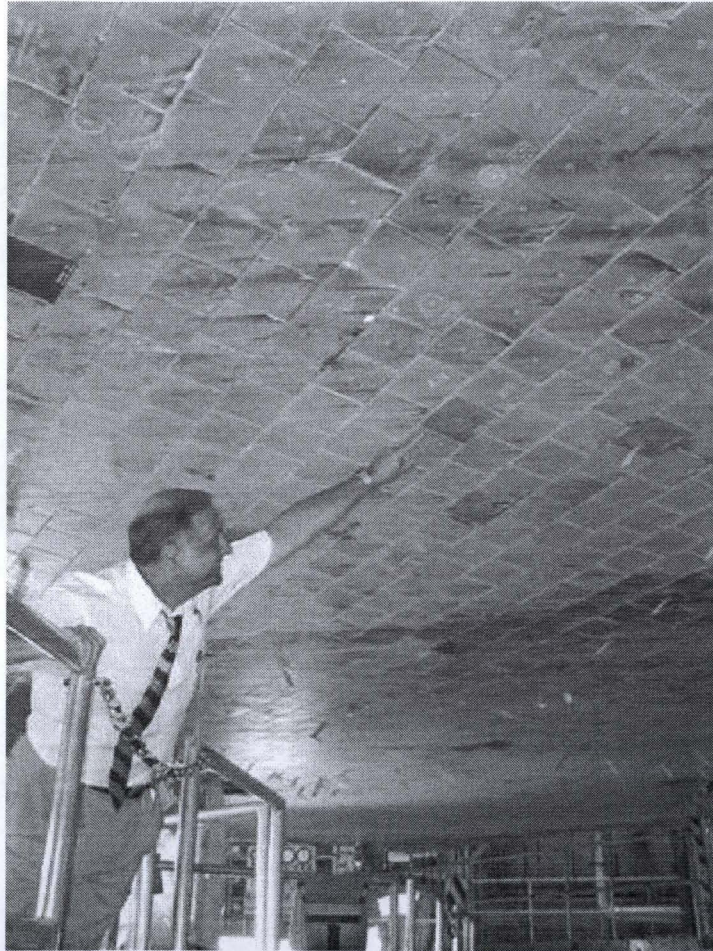




UID & eBusiness Forum

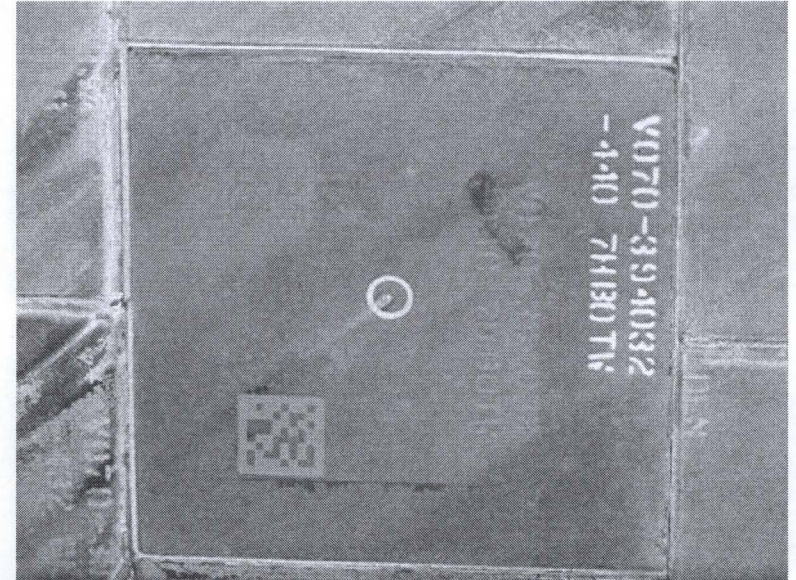
Implementation Strategies for Programs & Suppliers

Tests for Repeated Exposure to Extremes

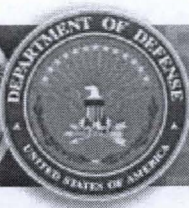


Thermal
Protection
System--
3 Marked
Shuttle Tile
Remain

19 Times in
Space
on OV-103
(Discovery)



Looking Good
And
Readable

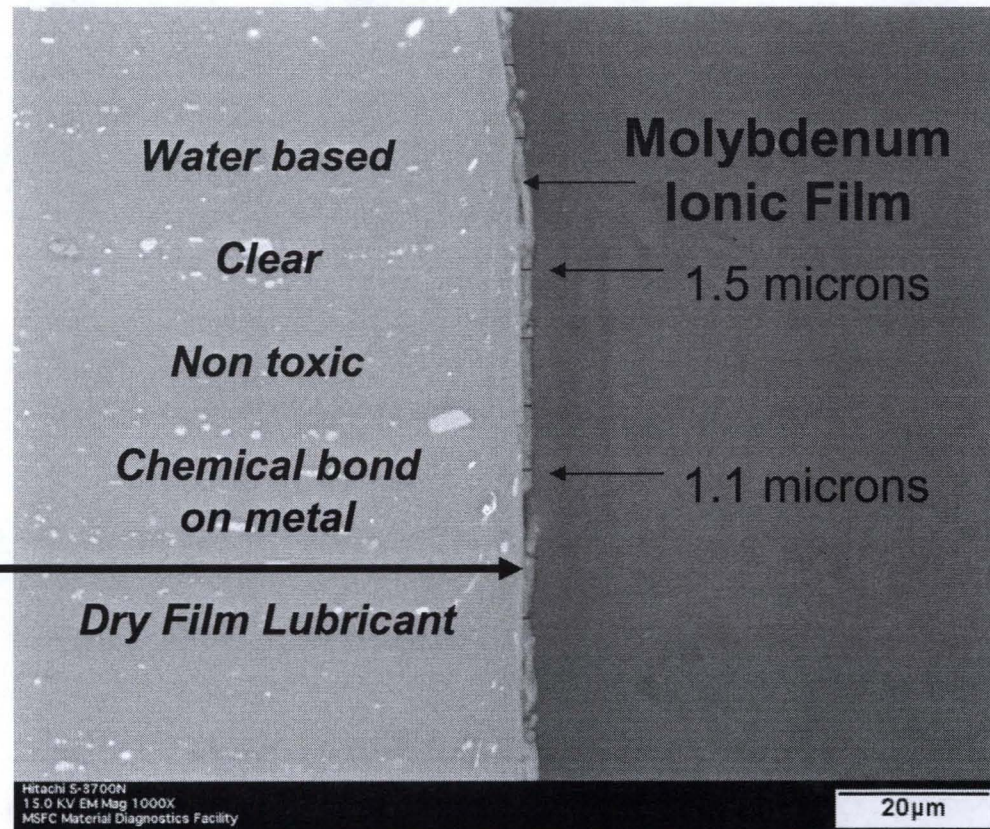
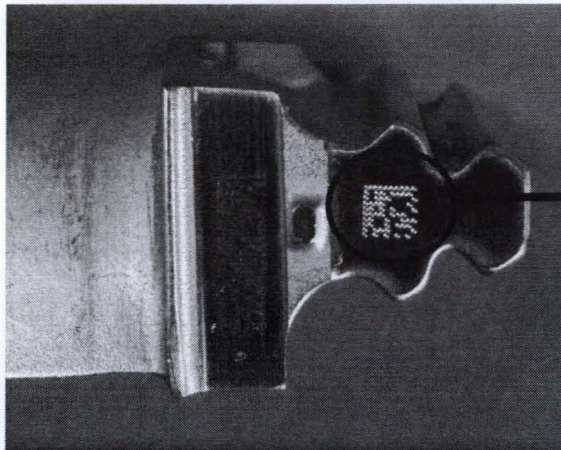


UID & eBusiness Forum

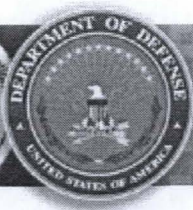
Implementation Strategies for Programs & Suppliers

Visible Mark Protection Remedy... Ares I Infusion Spinoff

Ionic Dry Films Nanoclusters



Mo_c04_1000xm.tif

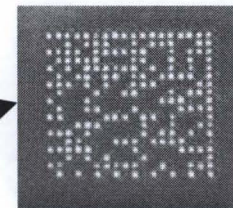
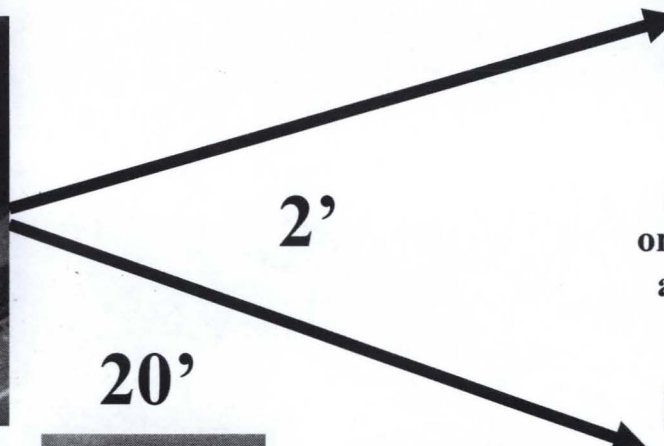
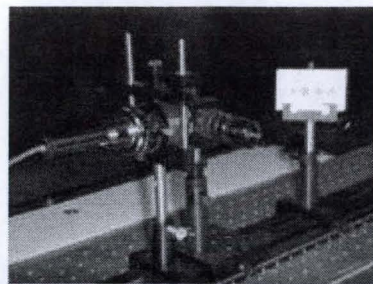
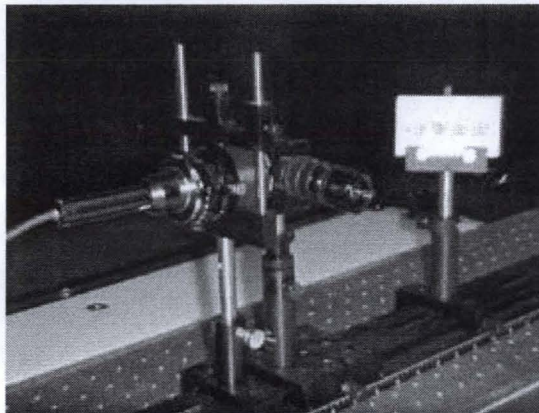


UID & eBusiness Forum

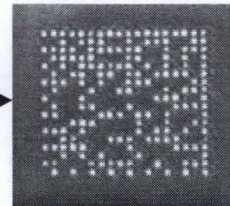
Implementation Strategies for Programs & Suppliers

Distance Reading Remedy... Space Station Technology Spinoff

NASA Optical Scanner For Visible Marks



No contrast mark
on smooth aluminum
at 30 degree angle

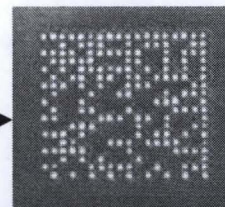


2'

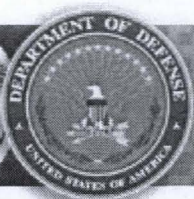
20'



60'



Shiny screwdriver



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Implementation Strategies for Programs & Suppliers

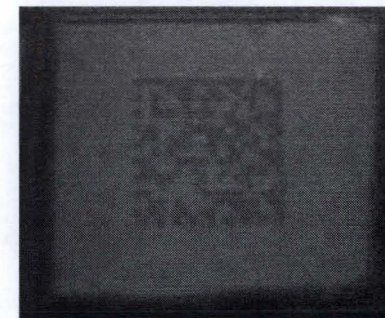
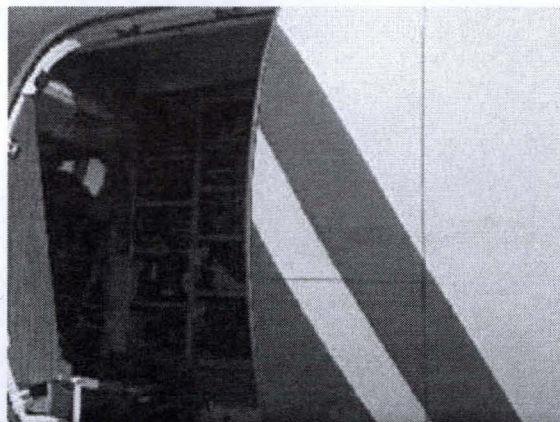
Painted Part Remedy... Space Shuttle Technology Spinoff

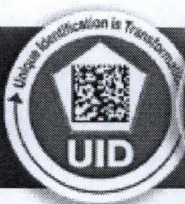
*Mark survived
24+ months of
Coast Guard duty*



*Magnetic
Scanner*

*Mark decoded
through 6
layers of paint*





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Implementation Strategies for Programs & Suppliers

UID...Encounters the Unmarkable Part Ares I Infusion Spinoff

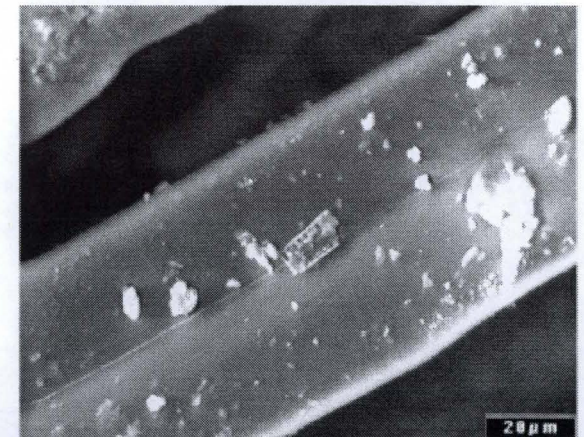
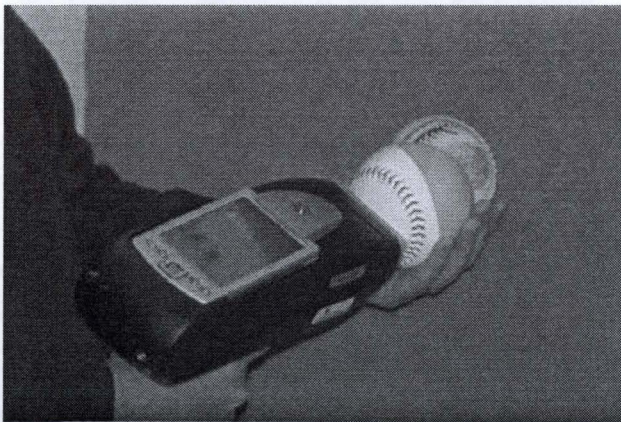
NanocodesTM = the mark (a chemical bar code)

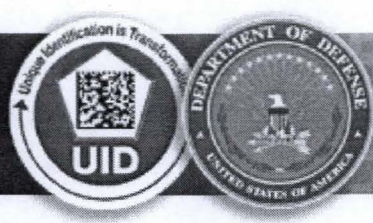
	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr		
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
Fr	Ra	Ac	Rf	Hs	Sg	Ns	Hs	Mt	Uun	Uuu							
	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu			
	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr			

=> **Conversion** <=>



X-ray Fluorescence Software converts to ASCII

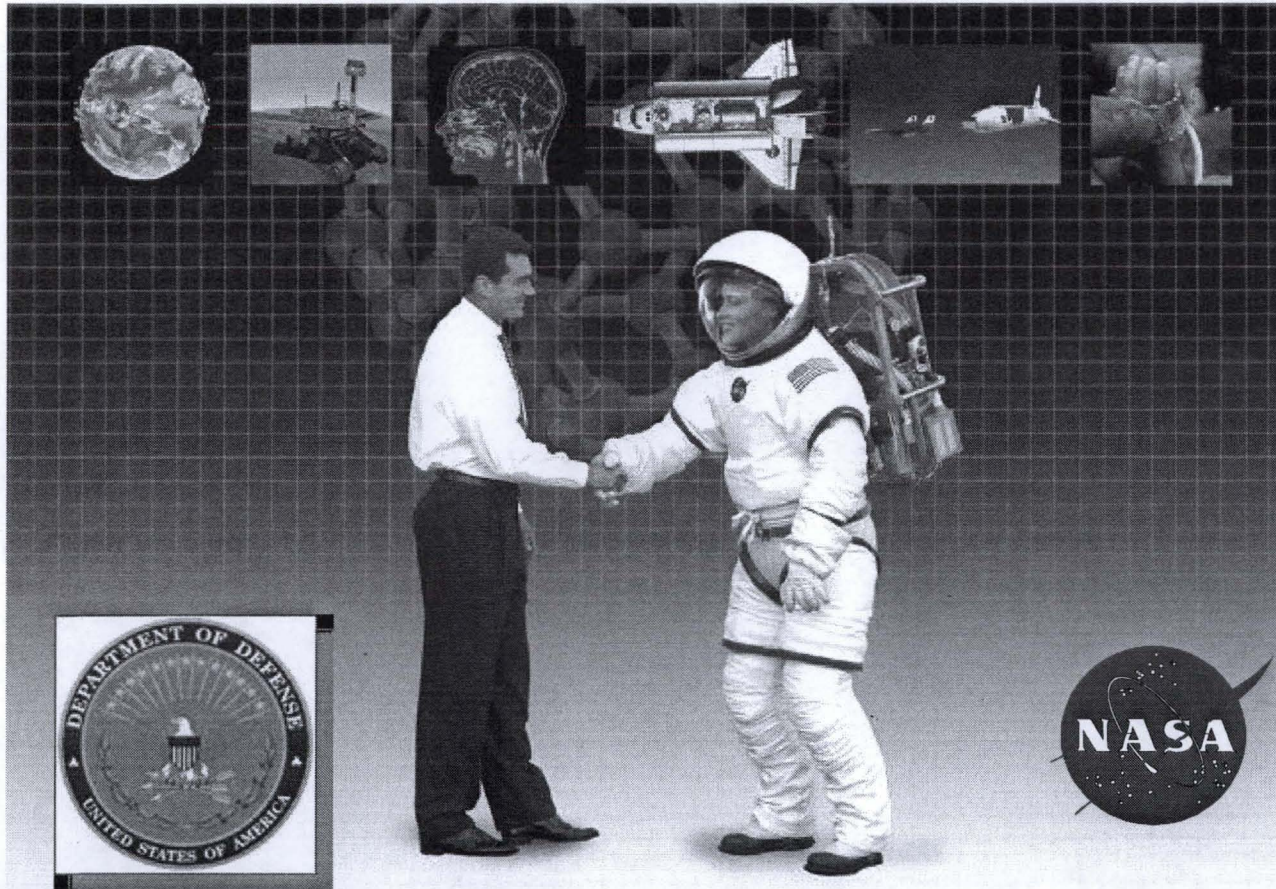




UID&eBusiness Forum

Implementation Strategies for Programs & Suppliers

UID...A System That Starts With Part Identification



*And Succeeds
When People
Work
Together*

2008

ARLINGTON

• HUNTSVILLE

• SACRAMENTO

2008