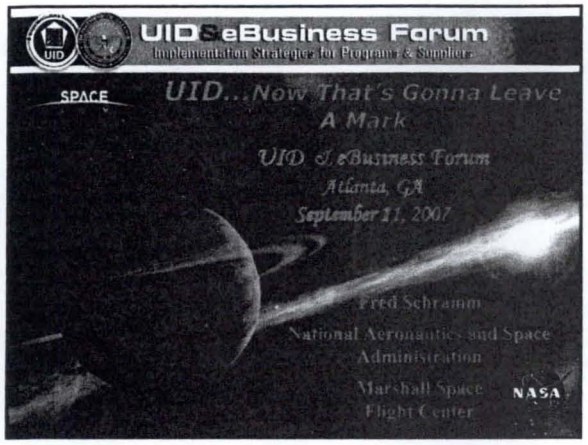
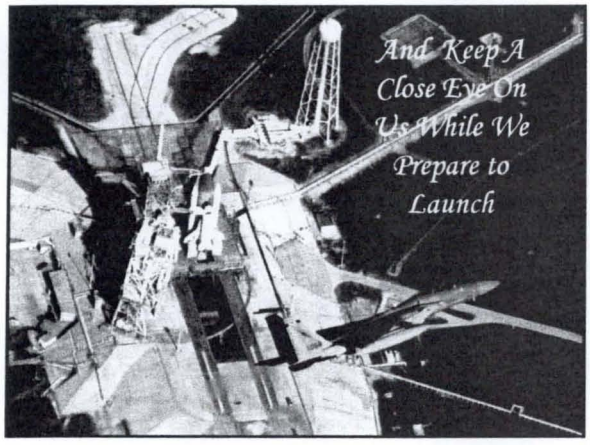
MSFC-499-Abstract

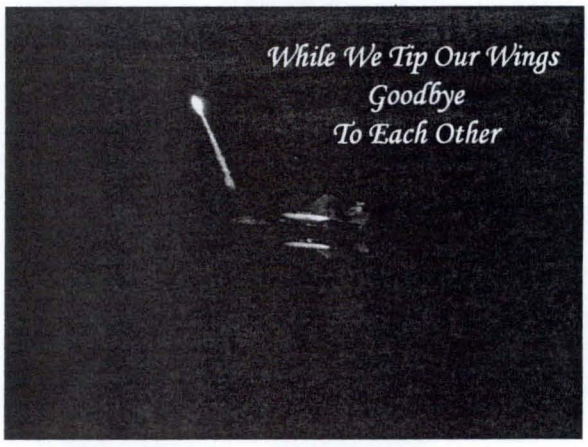
Abstract
UID...Now That's Gonna Leave A Mark

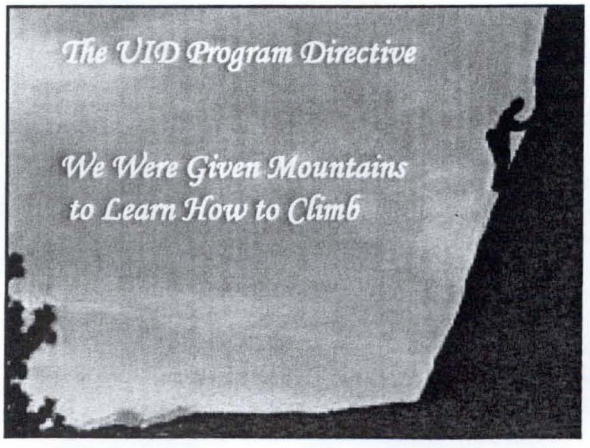
Since 1975 bar codes on products at the retail counter have been accepted as the standard for entering product identity for price determination. Since the beginning of the 21st century, the Data Matrix symbol has become accepted as the bar code format that is marked directly on a part, assembly or product 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.

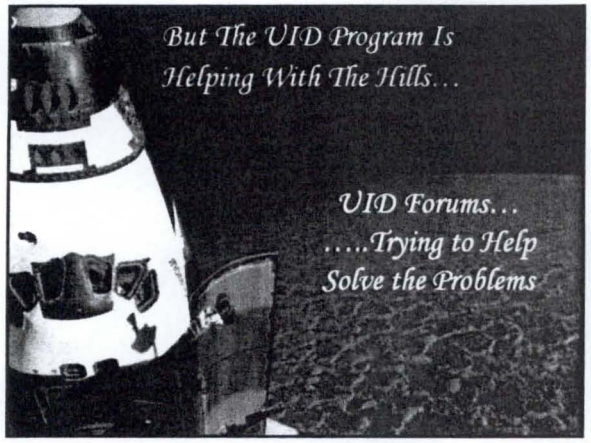
MSFC-499-Presentation

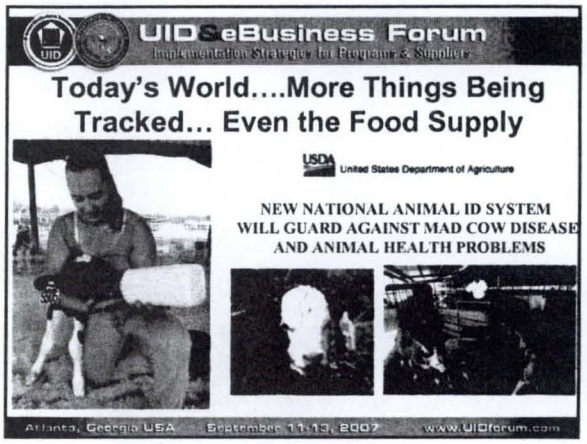


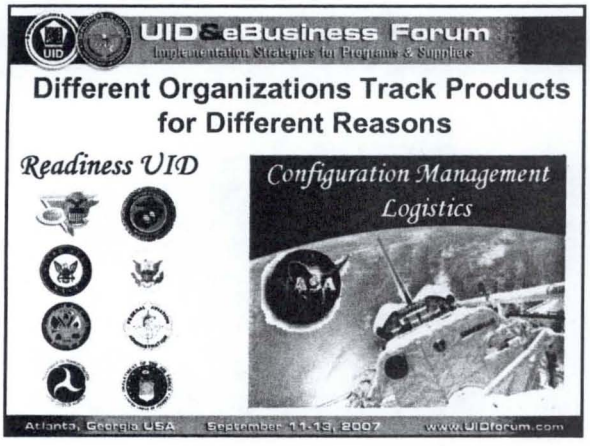







But The UID Program Is
Helping With The Hills…
UID Forums…
….Trying to Help
Solve the Problems


UID eBusiness Forum
Implementation Strategies for Programs & Suppliers
Today's World….More Things Being Tracked… Even the Food Supply
USDA United States Department of Agriculture
NEW NATIONAL ANIMAL ID SYSTEM
WILL GUARD AGAINST MAD COW DISEASE
AND ANIMAL HEALTH PROBLEMS
Atlanta, Georgia USA September 11-13, 2007 www.UIDforum.com


UID eBusiness Forum
Implementation Strategies for Programs & Suppliers
Different Organizations Track Products for Different Reasons
Readiness UID
Configuration Management
Logistics
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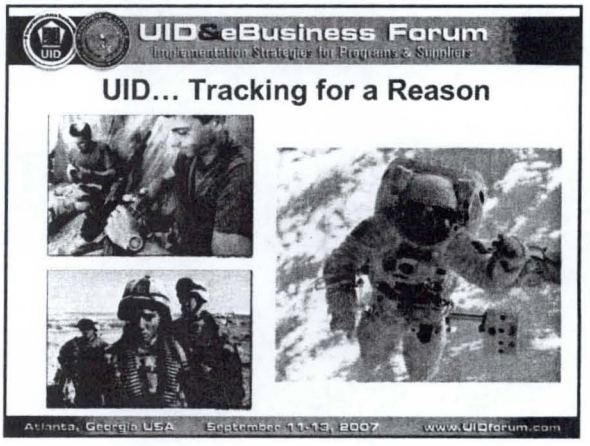
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Implementation Strategies for Programs & Suppliers
UID… Tracking for a Reason
Atlanta, Georgia USA September 11-13, 2007 www.UIDforum.com


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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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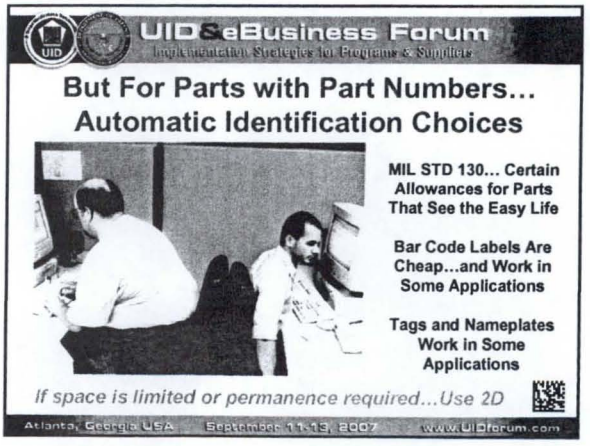
UID eBusiness Forum
Implementation Strategies for Programs & Suppliers
But For Parts with Part Numbers… Automatic Identification Choices
MIL STD 130… Certain Allowances for Parts That See the Easy Life
Bar Code Labels Are Cheap…and Work in Some Applications
Tags and Nameplates Work in Some Applications
If space is limited or permanence required…Use 2D
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Implementation Strategies for Programs & Suppliers

Our Symbol Content Is Growing Closer

MIL STD 130M Section 5.2.2.5 National Aeronautics and Space Administration (NASA)

NASA aerospace marking standards shall be implemented only for those DoD actions directly supporting NASA programs. When specified in the contract or order, manufacturers that implement the NASA aerospace marking standards shall mark items in accordance with NASA-STD-6002 as applicable. However, syntax and semantics for the Data Matrix symbols must comply with 5.2.4 and 5.2.5. Detailed how-to guidance for implementing NASA-STD-6002 requirements is provided in NASA-HDBK-6003.

NASA STD 6002C Section 4.1.3.2 Current Symbol Data Structure

Manufacturers that implement the NASA aerospace direct part marking standard shall use marking process requirements in accordance with NASA STD 6002 and syntax and semantics for the Data Matrix symbol content in compliance with MIL STD 130 sections 5.2.4 and 5.2.5. Detailed how-to guidance for implementing NASA-STD-6002 requirements is provided in NASA-HDBK-6003. Data Matrix symbols that are subsequently covered with paint, foam, or other protective coatings shall have the same symbol content requirements as symbols that remain visible throughout their life cycles.

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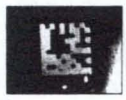
UID... Direct Part Marking

NASA's Primary Emphasis
....Item-Level Traceability
....Track the Piece



Left: 10x10 matrix symbol on the head of a straight pin

Know the Pedigree
....Know who made it
....Know who marked it
....Know who stands behind it

Below: 10x10 matrix symbol on the side of a turbine blade

A properly engineered and applied mark is a:
FLAWLESS IMPERFECTION

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

NASA Materials and Processes Community Of Practice

Registered User Login

WARNING
This is a United States Government computer. This system is for the use of authorized users only. By accessing and using the computer system you are consenting to system monitoring, including the monitoring of keystrokes. Unauthorized use of, or access to this computer system may subject you to disciplinary action and criminal prosecution.

To apply for access to this site, click here: Application for Access

System Requirements: Internet Explorer 6.0 or Netscape 7.1 on a Windows XP operating system with a resolution no less than 1024x768.

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Implementation Strategies for Programs & Suppliers

UID... Direct Part Marking and Reading

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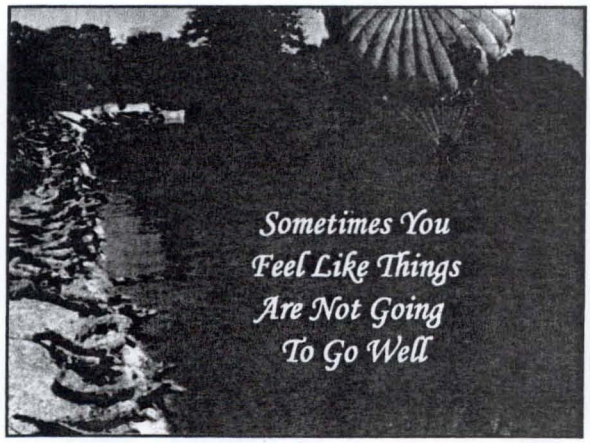

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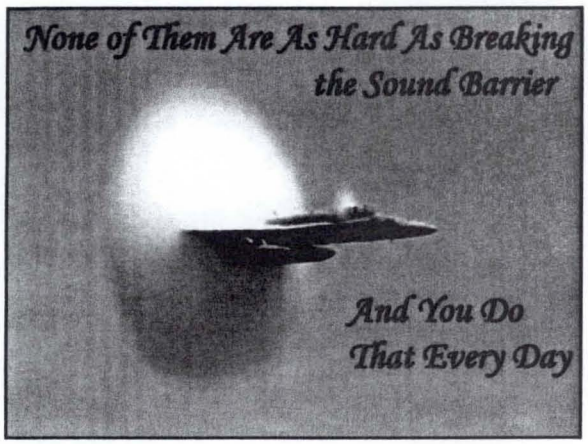
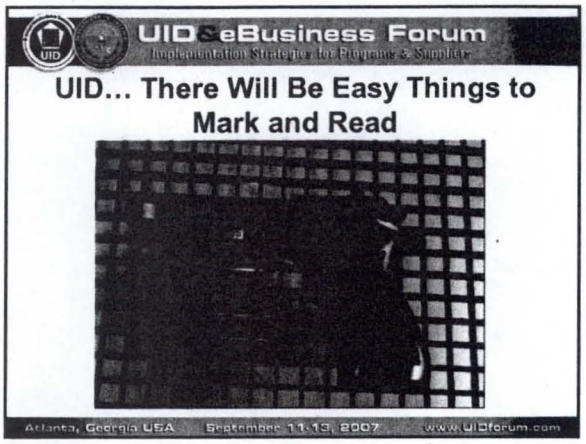
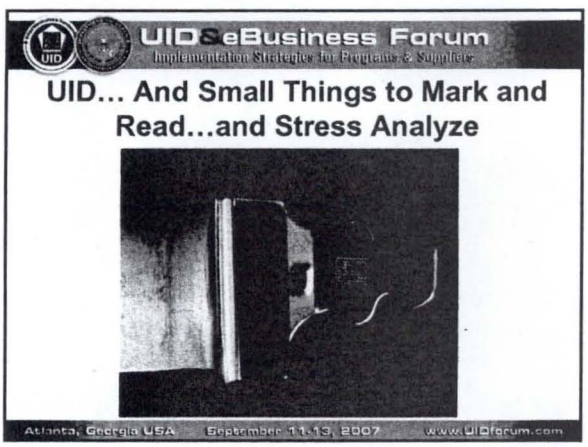
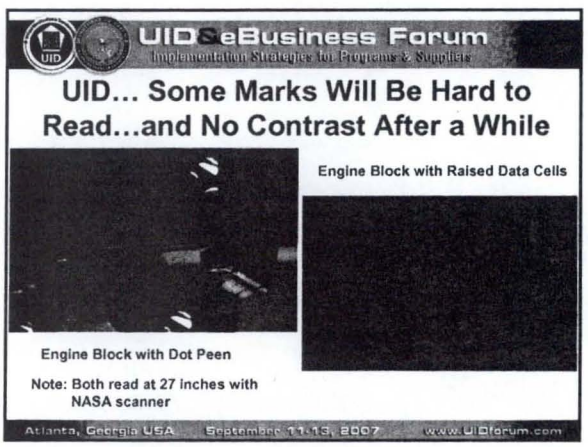
Implementation Strategies for Programs & Suppliers

- No Contrast Marks
- Curved, Shiny, Rough, Rusted Surfaces
- Reads Needed at Distances
- Symbols Covered with Paint
- Items That Can Not Be Marked at All


None of Them Are As Hard As Breaking the Sound Barrier
And You Do That Every Day


UID&eBusiness Forum
Implementation Strategies for Programs & Suppliers
UID... There Will Be Easy Things to Mark and Read
Atlanta, Georgia USA September 11-13, 2007 www.UIDforum.com


UID&eBusiness Forum
Implementation Strategies for Programs & Suppliers
UID... And Small Things to Mark and Read...and Stress Analyze
Atlanta, Georgia USA September 11-13, 2007 www.UIDforum.com


UID&eBusiness Forum
Implementation Strategies for Programs & Suppliers
UID... Some Marks Will Be Hard to Read...and No Contrast After a While
Engine Block with Raised Data Cells
Engine Block with Dot Peen
Note: Both read at 27 inches with NASA scanner
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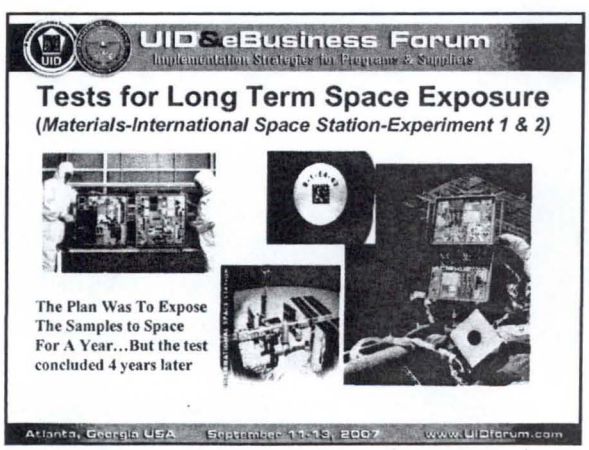
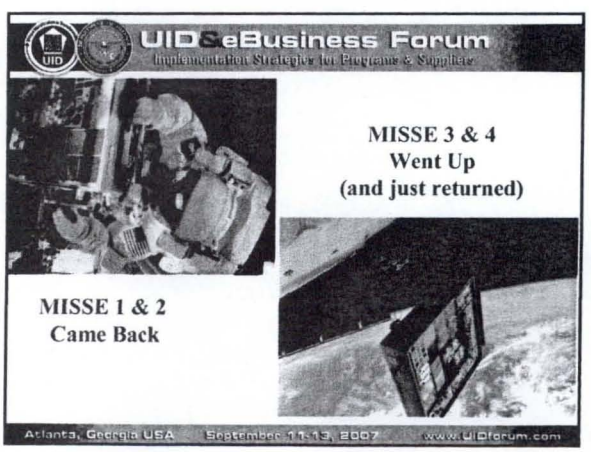

UID&eBusiness Forum
Implementation Strategies for Programs & Suppliers
Tests for Long Term Space Exposure
(Materials-International Space Station-Experiment 1 & 2)
The Plan Was To Expose The Samples to Space For A Year...But the test concluded 4 years later
Atlanta, Georgia USA September 11-13, 2007 www.UIDforum.com


UID&eBusiness Forum
Implementation Strategies for Programs & Suppliers
MISSE 3 & 4 Went Up (and just returned)
MISSE 1 & 2 Came Back
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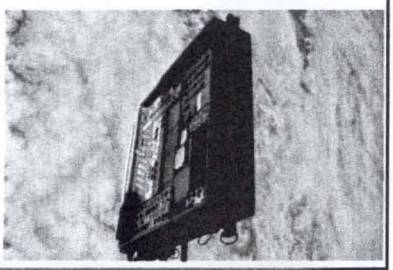
Tests for Long Term Exposure to Space (MISSE 6)

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

Scheduled to launch aboard Endeavor, early 2008



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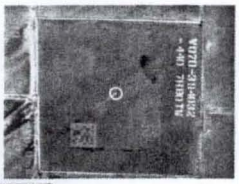
Tests for Repeated Exposure to Extremes

Thermal Protection System Tile

18 Times in Space on OV-103 (Discovery)



Looked Good And Readable

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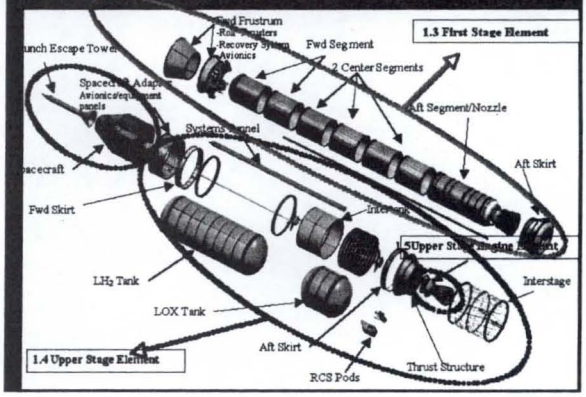
Ares I and V Launch Vehicles Built on Proven Systems

New Problems

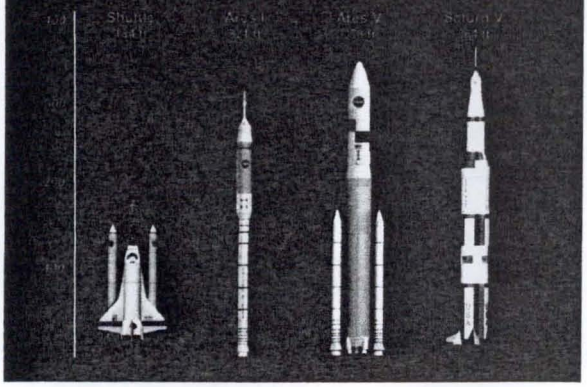
New Opportunities

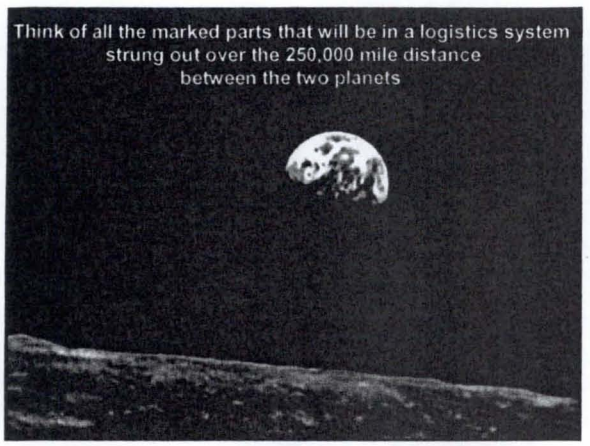
Marshall launching a new era of space exploration

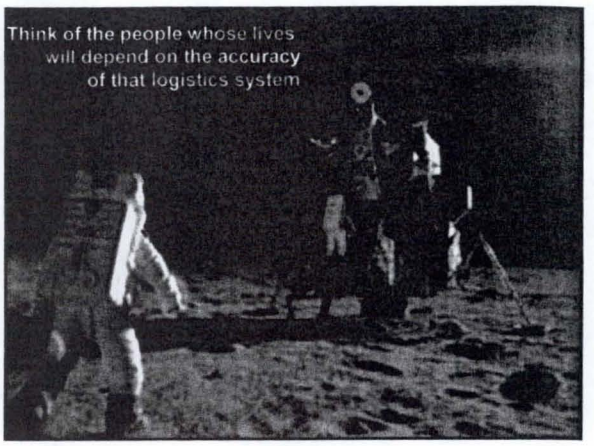
Crew Launch Vehicle for Constellation



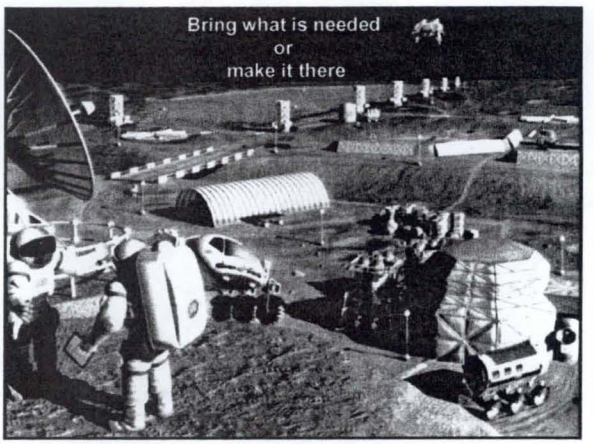
Launch Vehicle Comparison



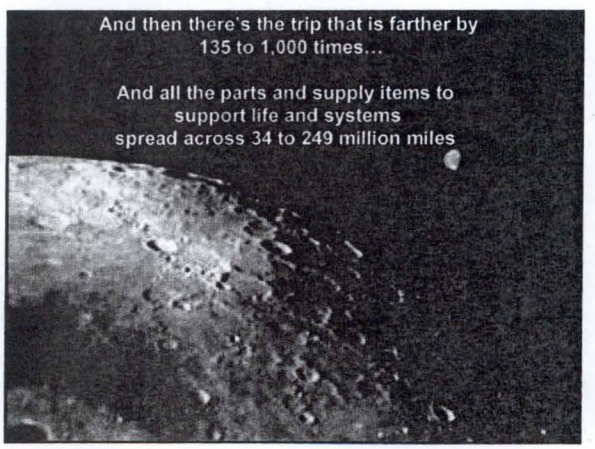

Think of all the marked parts that will be in a logistics system
strung out over the 250,000 mile distance
between the two planets

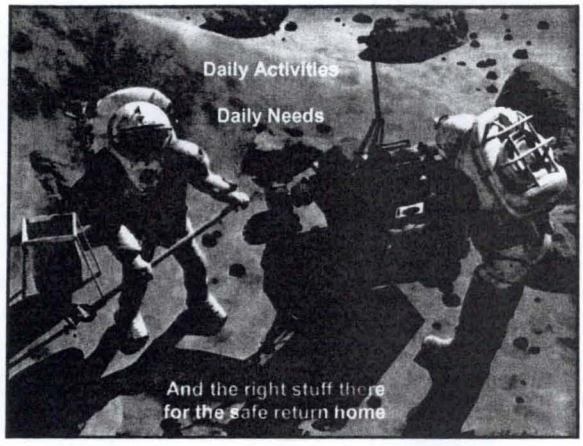

Think of the people whose lives
will depend on the accuracy
of that logistics system

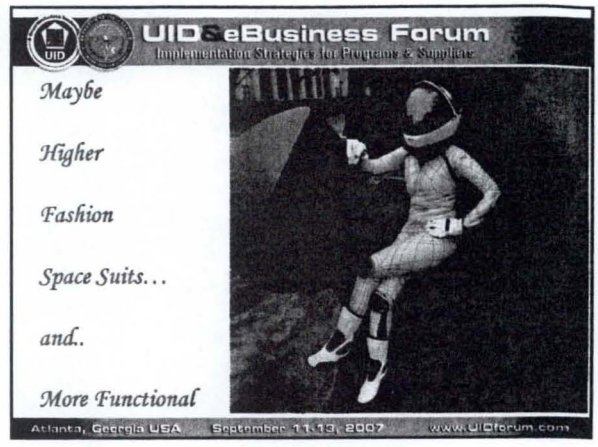

Daily Activities
Daily Needs


Bring what is needed
or
make it there


And always make sure the
right stuff is there
for the safe return home


And then there's the trip that is farther by
135 to 1,000 times...
And all the parts and supply items to
support life and systems
spread across 34 to 249 million miles


Daily Activities
Daily Needs
And the right stuff there
for the safe return home


UID eBusiness Forum
Implementation Strategies for Programs & Suppliers
Maybe
Higher
Fashion
Space Suits...
and..
More Functional
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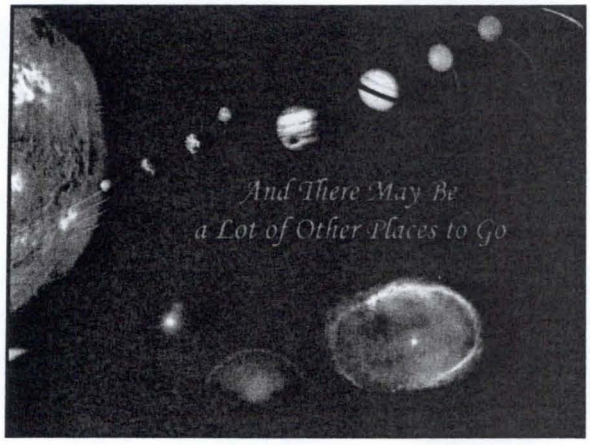
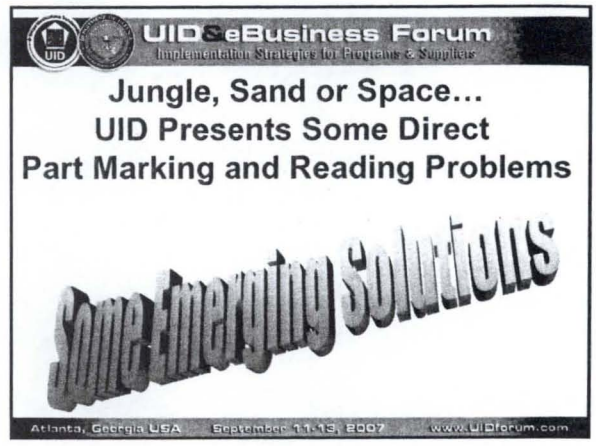
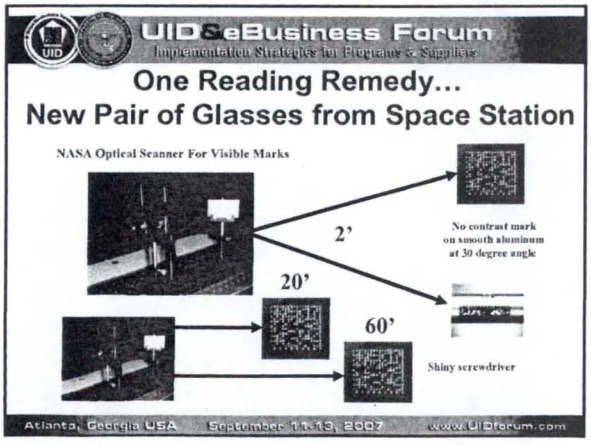
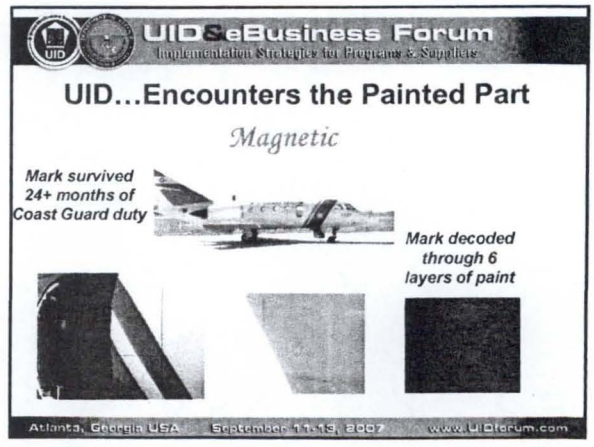

And There May Be
a Lot of Other Places to Go


UID eBusiness Forum
Implementation Strategies for Programs & Suppliers
Jungle, Sand or Space...
UID Presents Some Direct
Part Marking and Reading Problems
Some Emerging Solutions
Atlanta, Georgia USA September 11-13, 2007 www.UIDforum.com


UID eBusiness Forum
Implementation Strategies for Programs & Suppliers
One Reading Remedy...
New Pair of Glasses from Space Station
NASA Optical Scanner For Visible Marks
2'
20'
60'
No contrast mark
on smooth aluminum
at 30 degree angle
Shiny screwdriver
Atlanta, Georgia USA September 11-13, 2007 www.UIDforum.com


UID eBusiness Forum
Implementation Strategies for Programs & Suppliers
UID...Encounters the Painted Part
Magnetic
Mark survived
24+ months of
Coast Guard duty
Mark decoded
through 6
layers of paint
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UID...Encounters the Painted Part

Ultrasonic

Reads through 6 layers of coatings
Detects density and surface height changes

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UID...Encounters the Unmarkable Part

Nanocodes™ = the mark (a chemical bar code)

=> Conversion <=

X-ray fluorescence is the reader

Matches to the Supplier Code

Software converts to ASCII

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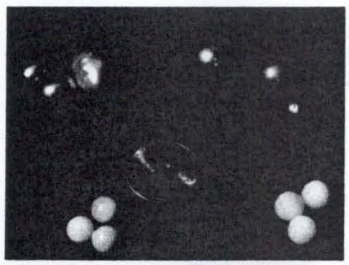
UID...Encounters the Unmarkable Part

Nanocodes™

How would you do it ???

Bar code a cultured pearl…
on the seed…
without a surface change…
plant it in an oyster

Then read the bar code two years later when the pearl is formed….



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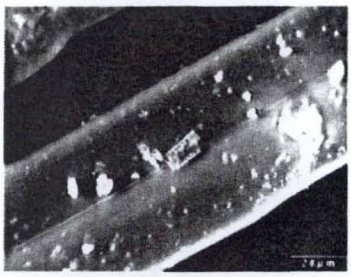
Implementation Strategies for Programs & Suppliers

Nanocodes™

How would you bar code a carpet fiber ???



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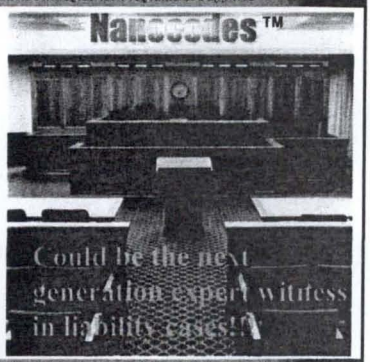
Nanocodes™

How does an OEM prove that the part that failed was not made by the OEM?

The Nanocode is read to authenticates the product

CAGE Code.....5 Element Tag or internal UID

Converted format is transparent to IT systems



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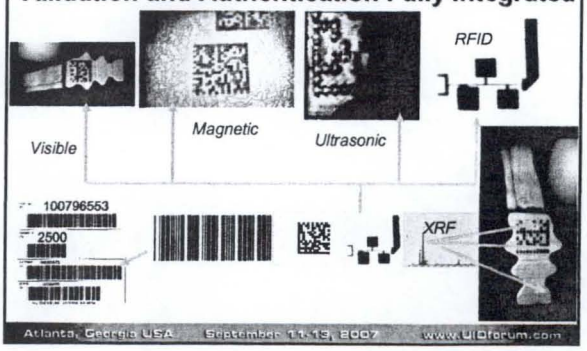
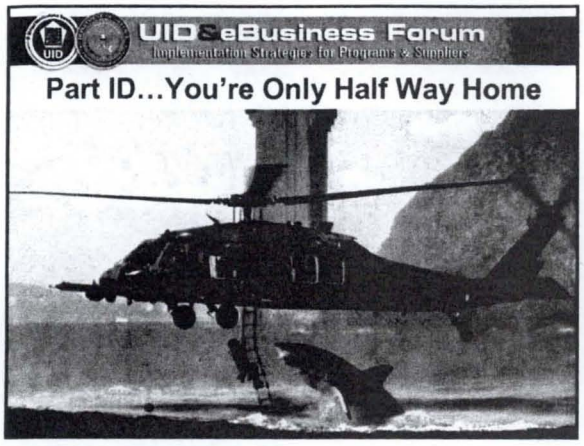
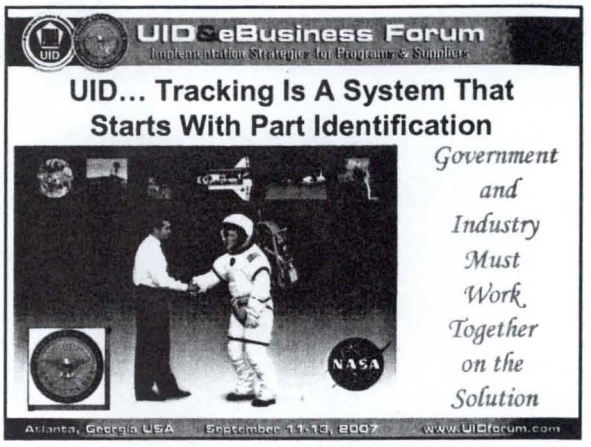
Validation and Authentication Fully Integrated




UID eBusiness Forum
Implementation Strategies for Programs & Suppliers
Part ID...You're Only Half Way Home


UID eBusiness Forum
Implementation Strategies for Programs & Suppliers
UID... Tracking Is A System That Starts With Part Identification
Government and Industry Must Work Together on the Solution
NASA
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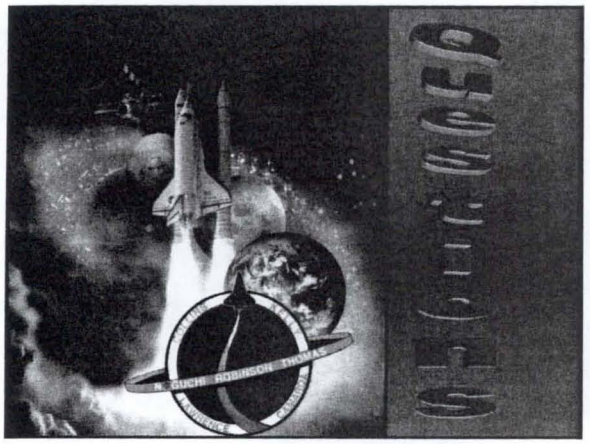
N. RICHIE ROBINSON THOMAS