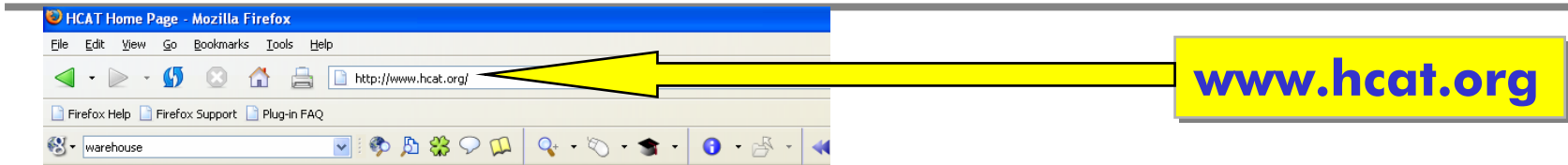


Data Warehousing and Implementation Assessment



HCAT Program Review
Greensboro, NC
March, 2005

The Web Site



www.hcat.org



For information on the next HCAT meeting, [click here](#)

- [HCAT Member Workspace](#) - This site contains detailed information on all HCAT projects, data, reports and meetings
- [About HCAT](#) - Team objectives, members, background
- [Reports & Joint Test Protocols](#)
- [Publications & Presentations](#)
- [Aircraft Systems Being Validated](#) - Landing gear, gas turbine engines, propeller hubs, hydraulics, helicopter rotor heads
- [Related Web Sites](#) - Other sources of Hard Chrome information
- [Contact HCAT](#)
- [HCAT Team Members](#) - List of major organizations involved in HCAT

to check out our new collaboration website

To reach the data warehouse you click **HERE** or **HERE** Goes to www.materialoptions.co



Updated January 24, 2005

HCAT data site – www.materialoptions.com

Username:
hcat@hcat.org

Password:
hello.hcat

Or:
hcatguest/hcat

Some people have their own usernames with more extensive rights

Agitez votre baguette magique pour changer la langue!

HELP!! Instructions on doing the most common tasks

HCAT main page

Words are links to the most-used areas

New: Reports and JTPs Open to public

This area is not passworded

Username and password takes you here

work2gether™ Home Logout Help

Search

rowanweb (HCAT USER) ←

Projects and partners

HCAT
HARD CHROME ALTERNATIVES TEAM

Hard Chrome Alternatives Team

Edit Details New List Search View

Team information sharing website.

HCAT
HARD CHROME ALTERNATIVES TEAM

ESTCP
Environmental Security Technology Certification Program

SERDP
Strategic Environmental Research and Development Program

This much-improved web site is designed to make it easier for team members to share data, to see what data is available, and to join in discussions. For detailed instructions on how to use this site [click here](#).
To download a file: Right-click in the clear space to the right of the filename and choose Save. You can also right-click the filename itself and choose Save Target As, but this method will not work with zip files.

Type	Name	Size	Modified	Version
Folder	Alloy Data <i>Basic steel data on 300M, 4340, Aermet 100</i>	1 Ob.	2004/10/23 08:54	
Folder	Basic Project Information <i>Description of HCAT Program</i>	2 Ob.	2003/06/27 09:39	
Folder	Commercial Chrome Replacement Programs <i>Delta Airlines flight testing</i>	1 Ob.	2003/06/27 09:41	
Folder	Cost Analysis <i>Cost Analysis for HVOF substitution</i>	3 Ob.	2004/10/11 09:52	
Folder	Current Issues - integrity spalling <i>Issues with coating integrity</i>	1 Ob.	2003/06/27 09:43	
Folder	Dem-val components <i>Component being dem/val'd various locations</i>	5 Ob.	2003/06/27 09:44	
Folder	Environmental and medical issues <i>ESOH and medical reports</i>	19 Ob.	2005/01/18 11:41	
Folder	ESTCP and SERDP Documents <i>Guidance for documents required by SERDP and ESTCP, JTP, Demo Plan, Final Report, etc.</i>	5 Ob.	2005/03/02 11:53	

Objects: 43 (1...43) of 43 View 300 Page size 100 Page 1 of 1

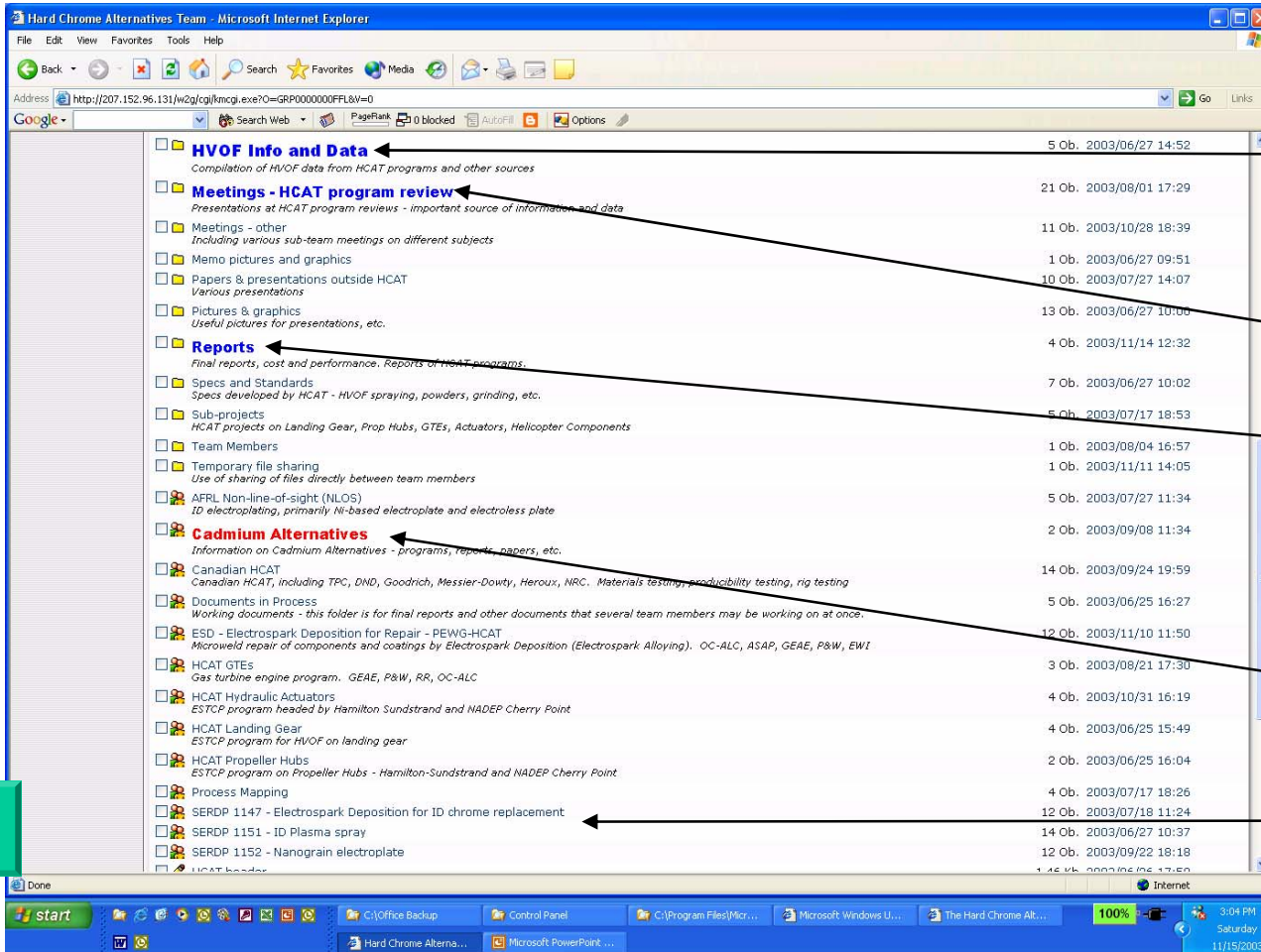
Username – if
"anonymous"
log in again

Seek and ye
shall find

Data folders
Check this box if
you don't see
descriptions



Where is the most important stuff?



All the primary HVOF data

These meetings

Reports on landing gear, prop hubs, etc.

Info on Cd

Specific projects

Downloading files

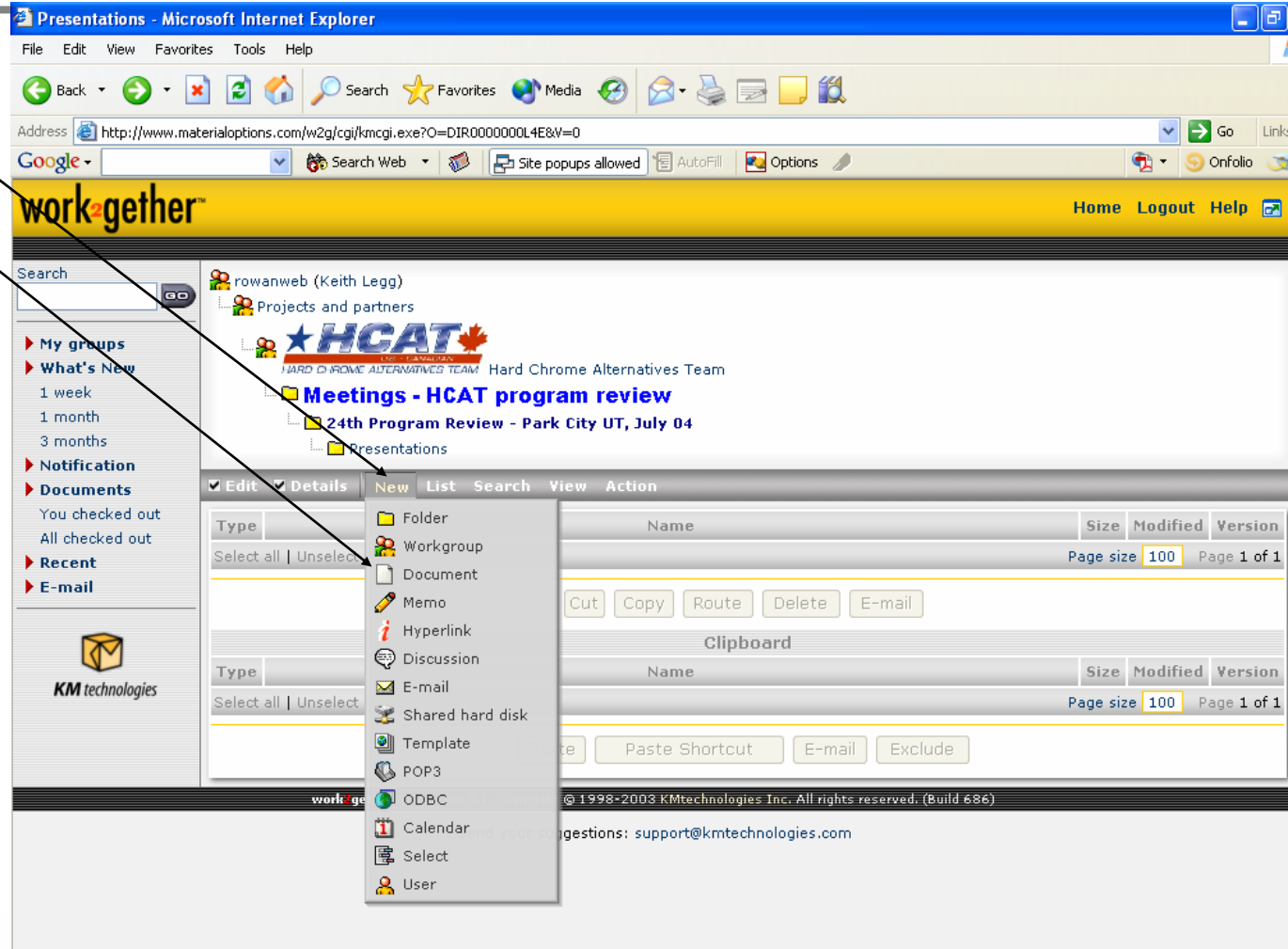
1. Move cursor up and down
2. Each file area turns yellow as you cross it
3. Right-click yellow area rather than filename
 - For most files right-or left-clicking filename works, but not zip files
4. Click Save
5. Follow the instructions

Left-click filename if you want to view on-line rather than download

Type	Name	Size	Modified	Version
PDF	Alford HVOF PEWG PRESENTATION 4.pdf	441.2 Kb	2003/12/22 10:26	1
PDF	Aylor ESD Meeting Nov 2003.pdf	3.23 Mb	2003/12/17 11:53	1
PDF	Beardsley Caterpillar hydraulic coatings.pdf	1.5 Mb	2004/03/24 09:12	1
PDF	Benaben HCAT Tech2.pdf	641.75 Kb	2003/12/22 10:26	1
PDF	bretzFATIGUEscape.pdf	1.58 Mb	2004/03/24 09:13	1
PDF	Deveraux - 1. HCAT Nov 2003 KSC.pdf	3.63 Mb	2003/12/22 10:46	1
PDF	Deveraux - 2. HCAT Nov 2003 KSC Grinding Spec.pdf	265.88 Kb	2003/12/22 10:46	1
PDF	Deveraux - 3. P-3 SLAP HVOF MLG Piston Final Report	13.56 Kb	2004/03/24 09:13	1
PDF	Deveraux - 4. P-3 NAVAIR HVOF APPROVAL LETTER.pdf	80.97 Kb	2003/12/22 10:50	1
PDF	Edwards Hill bend testing.pdf	1.81 Mb	2003/12/17 09:08	1
PDF	Garcia HCAT HVOF - November 2003.pdf	882.44 Kb	2003/12/17 11:54	1
PDF	Gebel Inovati-KM_V1.pdf	9.4 Mb	2004/03/24 09:13	1
PDF	Gonzalez Hcat15 CapeCanaveral Nov03.pdf	2.43 Mb	2004/03/24 09:14	1
PDF	Grendahl AFOSR HCAT 18 Nov 03.pdf	3.77 Mb	2003/12/17 11:57	1
PDF	Grendahl AFRL HCAT 18 Nov 03.pdf	2.79 Mb	2003/12/17 11:58	1
PDF	Ham-Sund-Prop-Update_Nardi	1.65 Mb	2003/12/01 07:55	1
PDF	Update of testing performed for the Propeller Hub Chrome Plate Replacement Testing			
PDF	HCAT carbon seals 111503 - Schell.pdf	404.62 kb	2003/12/01 16:36	1
PDF	JACOBS - HCAT 11-03 FL FINAL REVISION.pdf	1.54 Mb	2003/12/22 10:50	1
PDF	Legg Cr and Cd replacement options.pdf	2.2 Mb	2003/12/17 12:00	1
PDF	Legg - Heroux Producibility Studies.pdf	178.26 kb	2003/12/22 10:29	1
PDF	Legg ID Plasma Spray coatings.pdf	882.1 kb	2003/12/22 10:30	1
PDF	Legg - Web site update.pdf	1.08 Mb	2003/12/22 10:30	1
PDF	Legoux, Legg ID Orlando Nov 03.pdf	1.62 Mb	2003/12/22 10:31	1
PDF	Legoux Process Mapping Studies final.pdf	621.41 kb	2003/12/17 12:06	1
PDF	Moorman HCAT NAVAIR Update Nov 2003.pdf	2.09 Mb	2003/12/22 10:32	1
PPT	Moorman HCAT NAVAIR Update Nov 2003.ppt	1.25 Mb	2004/06/30 15:04	1
PDF	Nardi Hamilton Sundstrand Prop Hub summary.pdf	1.65 Mb	2003/12/17 12:07	1
PDF	Negre ECOCHROM HCAT MEETING presentation.pdf	1.82 Mb	2003/12/17 12:07	1
PDF	Panza Giosa HCAT_03-11-17.pdf	2.07 Mb	2004/03/24 09:15	1
PDF	Peterson 3M finishing.pdf	741.97 kb	2003/12/17 12:08	1
PDF	Pollard Army TWG Brief 11-17-03.pdf	213.28 kb	2003/12/22 10:33	1
PDF	Price HCAT Nov 19.pdf	3.81 Mb	2003/12/17 12:09	1

Uploading files

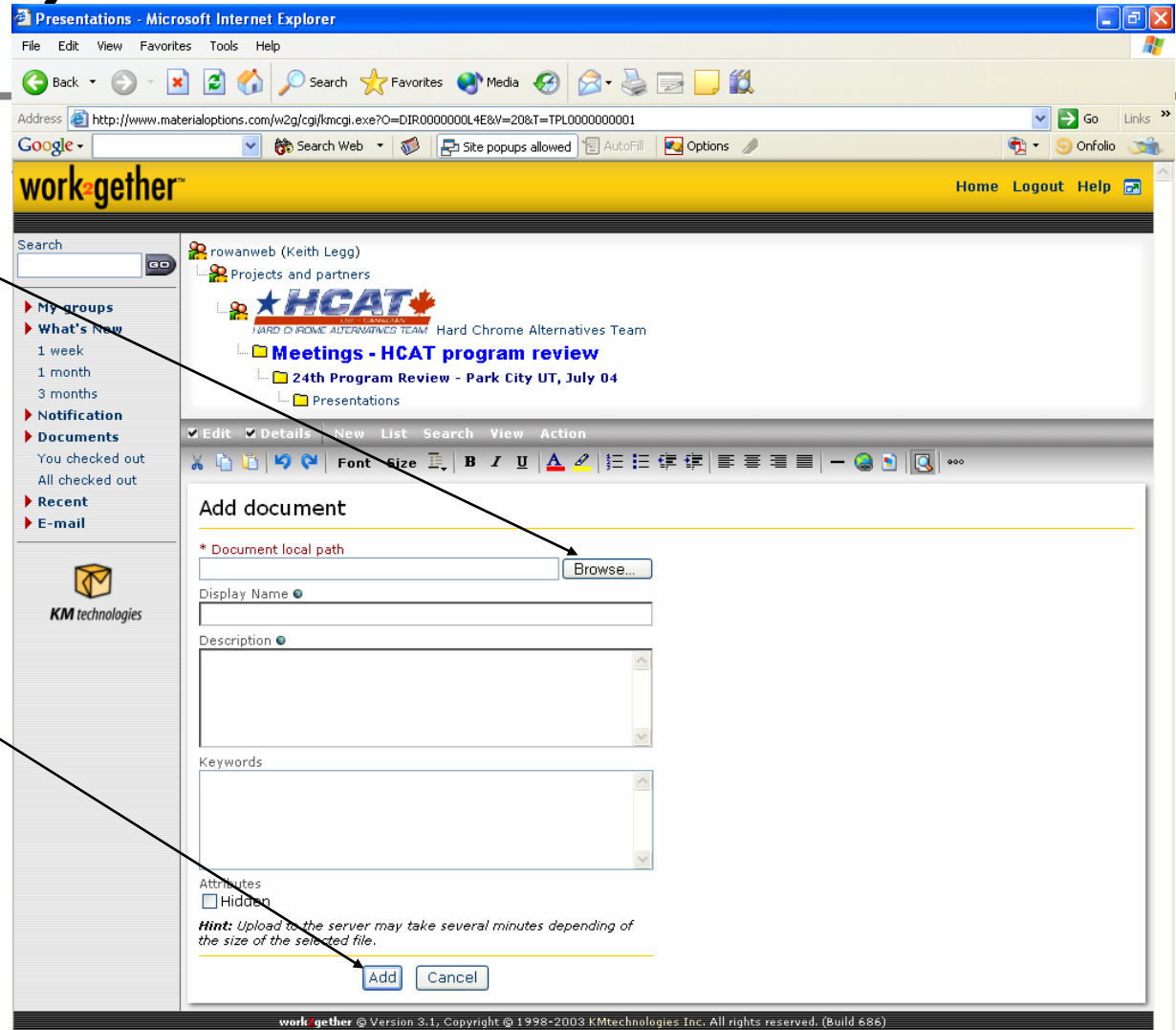
- Click New on menu
- Click Document on drop-down



The screenshot shows a Microsoft Internet Explorer browser window displaying a web application. The browser's address bar shows the URL: <http://www.materialoptions.com/w2g/cgi/kmcgi.exe?O=DIR0000000L4E&V=0>. The web application has a yellow header with the 'work2gether' logo and navigation links for 'Home', 'Logout', and 'Help'. The main content area shows a user profile for 'rowanweb (Keith Legg)' and a list of projects and partners, including 'HCAT' (Hard Chrome Alternatives Team) and 'Meetings - HCAT program review'. A 'Presentations' folder is expanded, showing a '24th Program Review - Park City UT, July 04'. A 'New' menu is open over the 'Presentations' folder, listing options: Folder, Workgroup, Document, Memo, Hyperlink, Discussion, E-mail, Shared hard disk, Template, POP3, ODBC, Calendar, Select, and User. The 'Document' option is highlighted. The interface also includes search bars, a left sidebar with navigation links like 'My groups', 'What's New', and 'Recent', and a bottom status bar with copyright information for KM technologies.

Uploading (cont)

- Browse for filename on your machine
- Give it a Display Name (or leave blank and it will give it your filename)
- Add some descriptive comments if you feel it will help
- Click Add and wait for this screen to disappear and update the



Checking out a document (Click the lock)

DO NOT lick the clock unless you mean it!

- ❑ This icon is for checking out a document so nobody else can upload a new version until you are done
- ❑ Click the lock icon  on the far right

<input type="checkbox"/>		Deveraux - 3. P-3 SLAP HVOF MLG Piston Final Report.pdf	13.56 Kb	2004/03/24 09:13	1	
<input type="checkbox"/>		Deveraux - 4. P-3 NAVAIR HVOF APPROVAL LETTER.pdf	80.97 Kb	2003/12/22 10:50	1	
<input type="checkbox"/>		Edwards Hill bend testing.pdf	1.81 Mb	2003/12/17 09:08	1	
<input type="checkbox"/>		Garcia HCAT HVOF - November 2003.pdf	882.44 Kb	2003/12/17 11:54	1	

- ❑ It will turn into a little key icon  and will ask if you want to download (just cancel)

<input type="checkbox"/>		Deveraux - 3. P-3 SLAP HVOF MLG PISTON FINAL REPORT.pdf	13.56 Kb	2004/03/24 09:13	1	
<input type="checkbox"/>		Deveraux - 4. P-3 NAVAIR HVOF APPROVAL LETTER.pdf	80.97 Kb	2003/12/22 10:50	1	
<input type="checkbox"/>		Edwards Hill bend testing.pdf	1.81 Mb	2003/12/17 09:08	1	

- ❑ Click the key, browse for the new version of the file and click Save. It uploads with Version # 2

Individual projects



Team information sharing website.



Environmental Security
Technology Certification
Program



SERDP
Strategic Environmental Research
and Development Program

This much-improved web site is designed to make it easier for team members to share data, to see who has had discussions. For detailed instructions on how to use this site [click here](#).

To **download a file**: Right-click in the clear space to the right of the filename and choose Save. You can choose Save Target As, but this method will not work with zip files.

Information on Cadmium Alternatives - programs, reports, papers, etc.



Canadian HCAT
Canadian HCAT, including TPC, DND, Goodrich, Messier-Dowty, Heroux, NRC. Materials testing, producibility testing, rig testing



ESD - Electrosark Deposition for Repair (mostly GTEs) - PEWG-HCAT Project EPP 0202
Microweld repair of components and coatings by Electrosark Deposition (Electrosark Alloying). OC-ALC, ASAP, GEAE, P&W, EWI



HCAT GTEs
Gas turbine engine program. GEAE, P&W, RR, OC-ALC



HCAT Helicopter Components
HVOF chrome replacement for helicopter head components



HCAT Hydraulic Actuators
ESTCP program headed by Hamilton Sundstrand and NADEP Cherry Point



HCAT Landing Gear
ESTCP program for HVOF on landing gear
PROJECT COMPLETE

rowanweb (HCAT USER)

- Projects and partners
- ESD - Electrosark Deposition for Repair (mostly GTEs) - PEWG-HCAT Project EPP 0202

Edit Details New List Search View Action

Type	Name
	Announcements
	Approvals
	Current Issues
	Data
	Meetings
	Papers & Presentations
	Pictures and graphics
	Reports
	Team Members (reports etc)
	Temporary information sharing
	Test plans
	Trash



Sometimes it asks for your username and password again



No, it's not OK,
dammit Gates!!

- ❑ The rule is "if you can see it you have rights to it"
 - Just enter username and password again
- ❑ Also, when you use the back arrow to get back you often get a Gatesian "page expired" message
 - Just click the arrow again



Keith Legg

Implementation Assessment

An Implementation Assessment



Implementation Assessment

Replacement of Internal Diameter Hard Chrome with Plasma Spray Coatings at NADEP Jacksonville

Authored by:
Keith Legg
Rowan Technology Group

Organization: HCAT
Project #: SERDP PP-1151
Report Number: Final Implementation Assessment
Date: April 4, 2004

DISTRIBUTION STATEMENT:

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Email: rowan@rowantechnology.com • www.rowantechnology.com

[Acknowledgements](#)

[Executive Summary](#)

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[5. Cost/Benefit Analysis](#)

[6. Impact on readiness](#)

[7. Risk Analysis](#)

[8. Environmental Assessment](#)

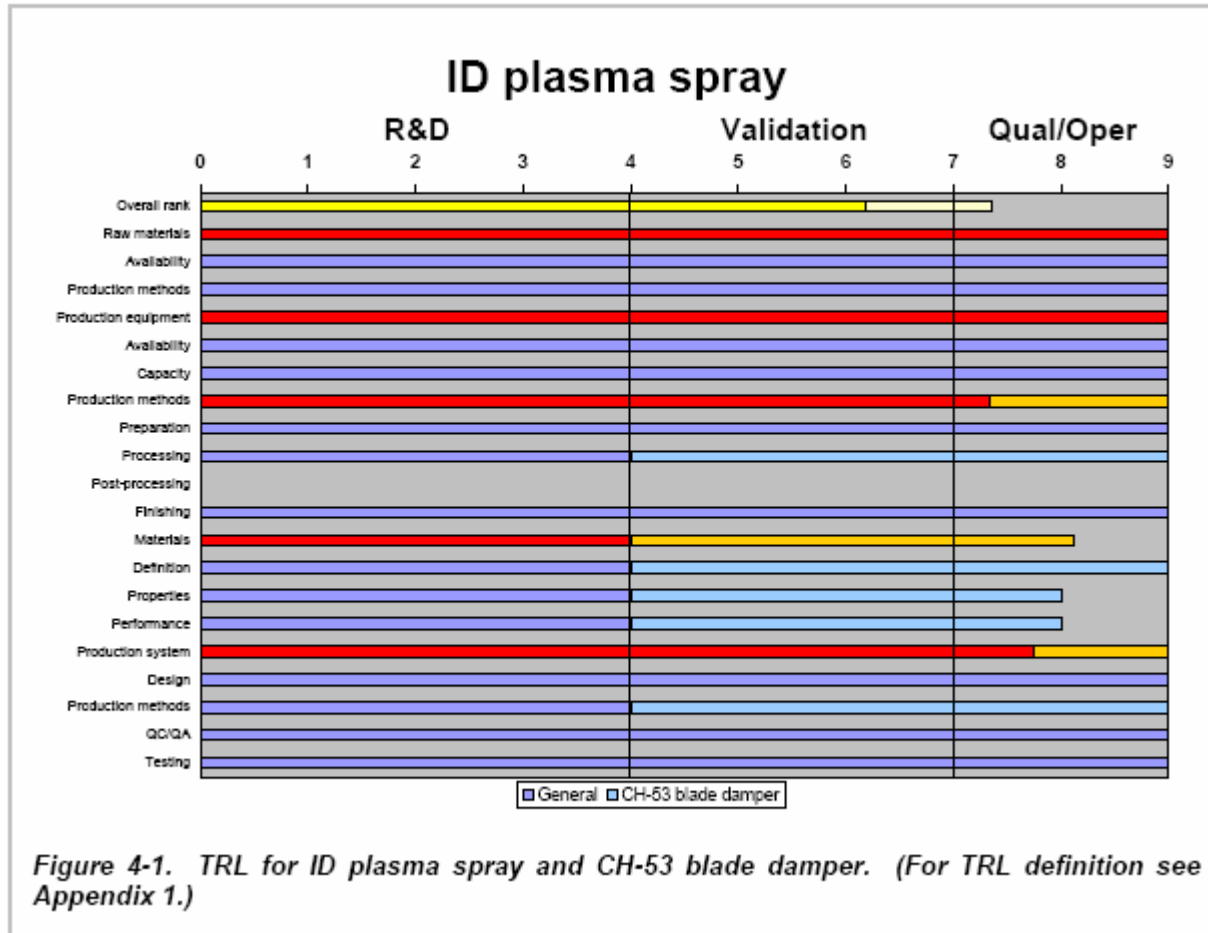
[9. Recommendations and Conclusions](#)

[Appendix 1. TRL Definitions](#)

[References](#)



Technology status summary – Technology Readiness Level



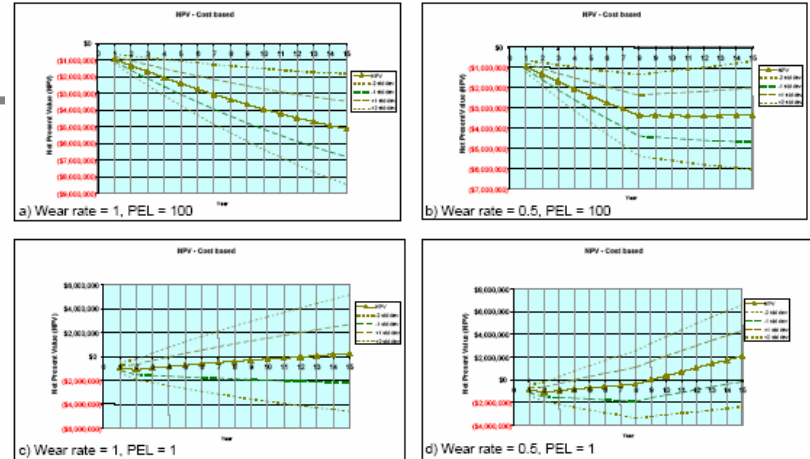
Gap analysis

TRL#	Gaps	Work required	Success prob			Est. cost	Time years
			Low	Med	High		
4	Processing method	Demonstration on real components, some overspray and temperature control	████████████████████			\$50,000	0.5
4	Material properties	Measurement in typical configurations	████████████████████			\$100,000	1
4	Component performance	Full battery of coated materials performance tests	████████████████████			\$500,000	2
	Component qualification	Rig and flight tests	████████████████████			\$300,000	3
	Production approval	Spec development, approvals, TO changes, drawing changes	████████████████			\$50,000, initial	2 per item

Direct production costs under different scenarios

- Rapid analysis of different options

Small ID gun (F210, 2700)



Large ID gun (F100)

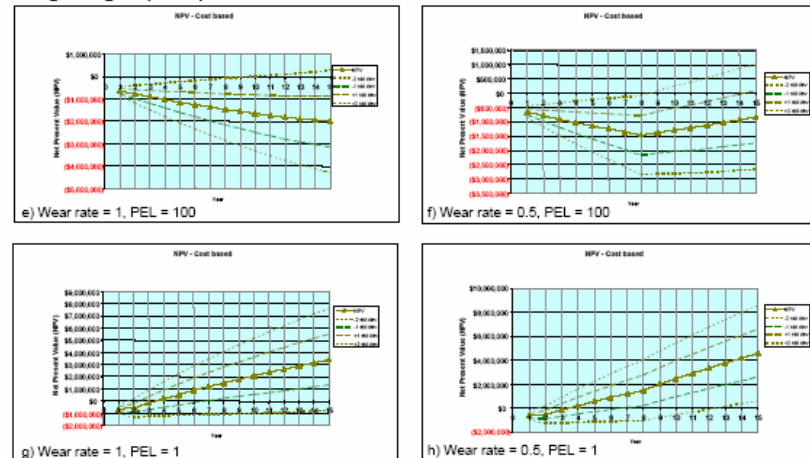


Figure 5-1. Simple NPV calculations for low and high wear rate, low and high PEL. Small ID gun (top) and large ID gun (bottom).

Shirt-losing probability

- What is the likelihood that the return will be positive?

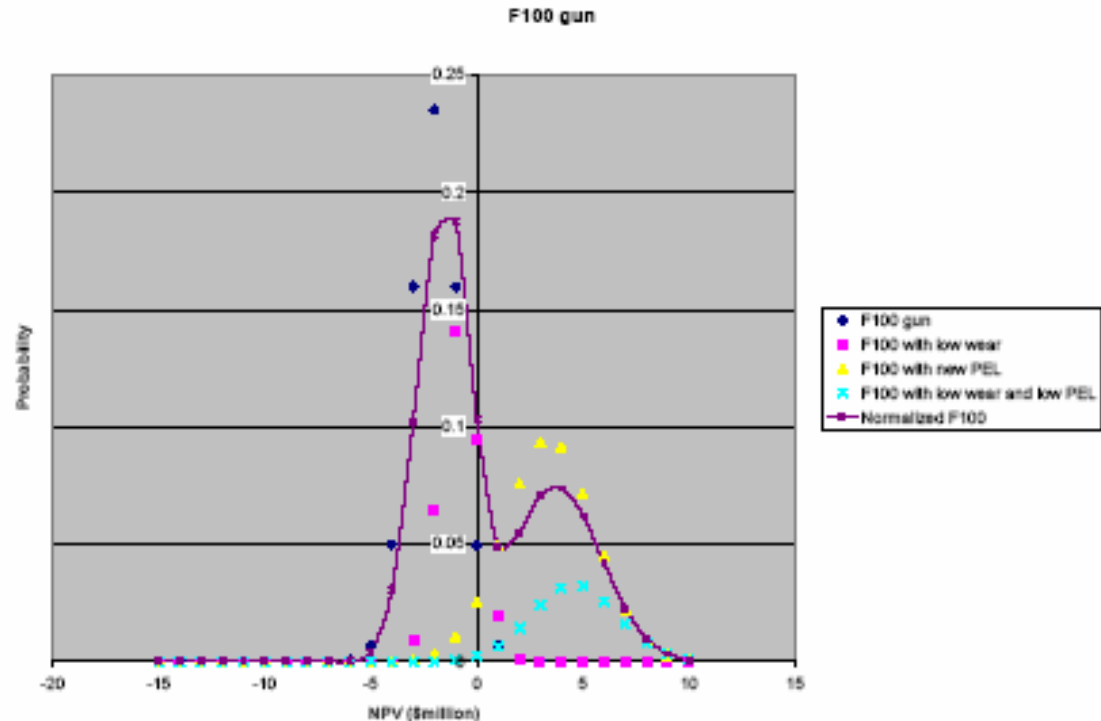


Figure 5-3. Probability distribution for 15-year NPV, assuming use of the larger F100 or similar plasma gun.

Best estimate of NPV with realistic adoption time

- ❑ The usual stuff
- ❑ NPV as a function of how far out you look
- ❑ Can base on cost saving (depots) or cash flow (OEMs)

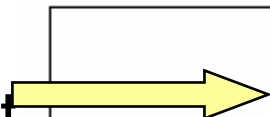
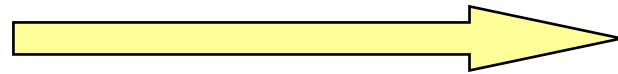


Table 5-7. Economic value for conditions of Figure 5-4 - OSHA PEL of $1\mu\text{gm}^{-3}$ and improved wear performance. Assumes 10 year changeover.

	-2 sigma	Value	+2 sigma
NPV	(\$1,920,239)	\$2,105,661	\$6,131,562
IRR	-6%	14%	31%
ROI	25%	47%	69%
Payback period	5.1	8.3	11.2

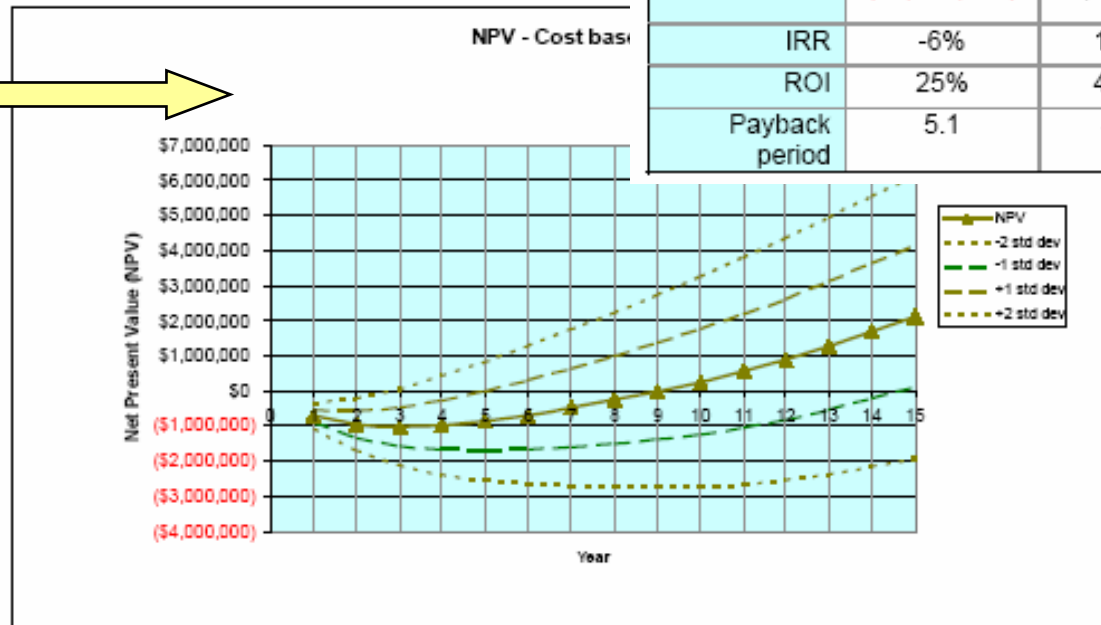


Figure 5-4. NPV for F100 gun with OSHA PEL of $1\mu\text{gm}^{-3}$ and improved wear performance. Assumes 10 year changeover.

Summary

- ❑ No matter what the stage of development an Implementation Assessment can give a good picture of the total cost and technical and financial risk of replacing an old technology with a new one
- ❑ Technology status and development cost can be combined with the cost and risk of different Implementation Scenarios to decide on the best approach:
 - Lowest cost
 - Lowest risk
 - Fastest implementation

