GSFC EEE Parts Standards Activities

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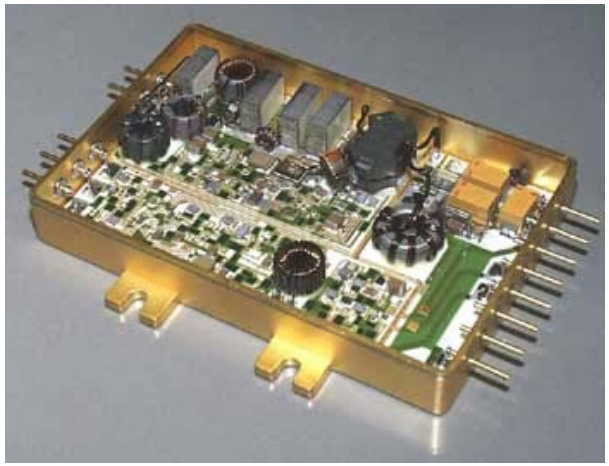
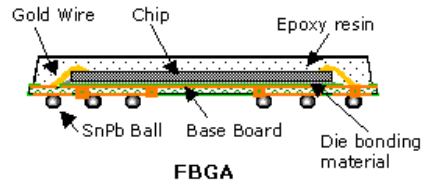
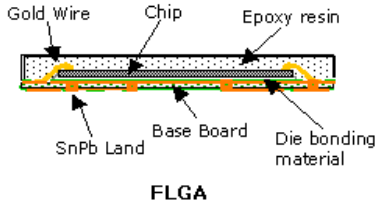
Head, Parts, Packaging and Assembly Office,
GSFC, Code 562

Outline

- EEE Parts Engineering Process
- EEE Parts Standards
  - EEE Parts Documents
  - EEE Parts Manufacturers
  - EEE Parts Selection
- EEE Parts Databases
- Challenges







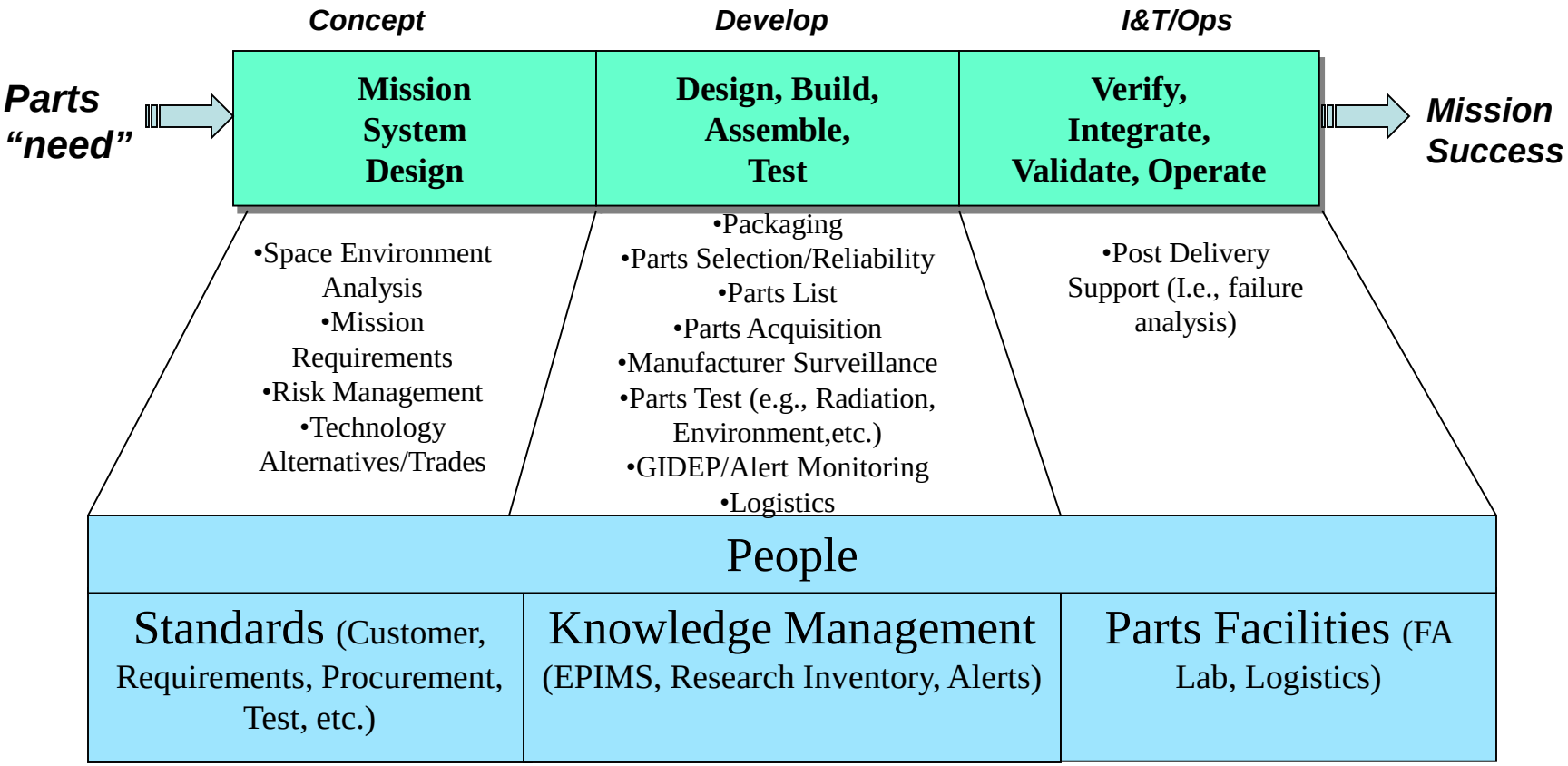
Organization

Components & Radiation Effects
Darryl Lakins, Branch Head
Harry Shaw,Chief Technologist
Henning Leidecker, Chief Engineer

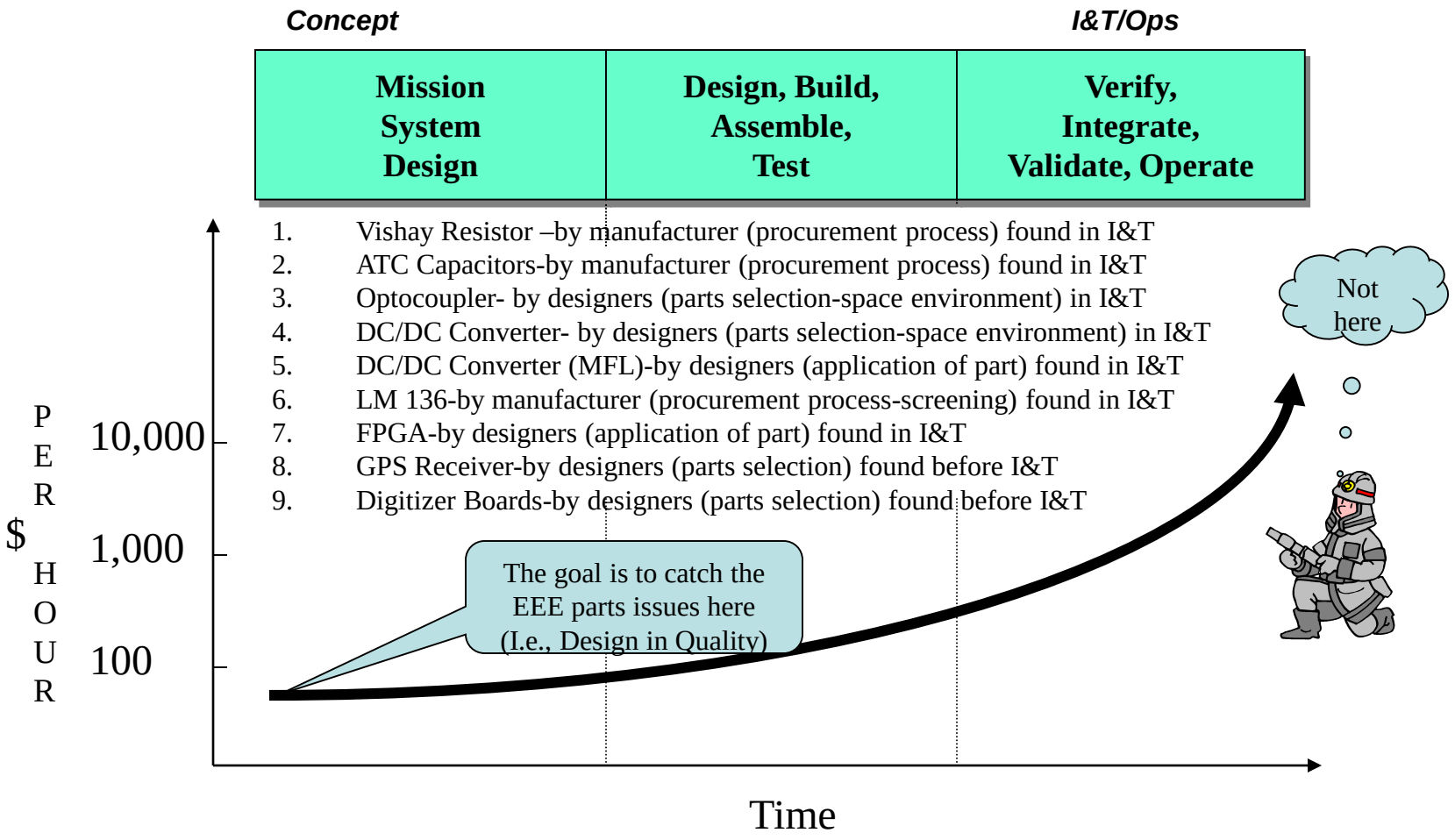
Parts Engineering	Advanced Component Technologies	Space Flight Manufacturing L. Pack, Staff Engineer
Project Parts Engineers EEE Parts Laboratories Failure Analysis	Fiber Optics/Photonics Development Advanced Packaging Laboratories Nanotechnology Material Science	SMT Assembly Rapid Response rework Board/Box Design

Approximately 40 scientists, engineers, technicians, and students

Parts Engineering Process



Parts Engineering Process-Issues



EEE Parts Standards

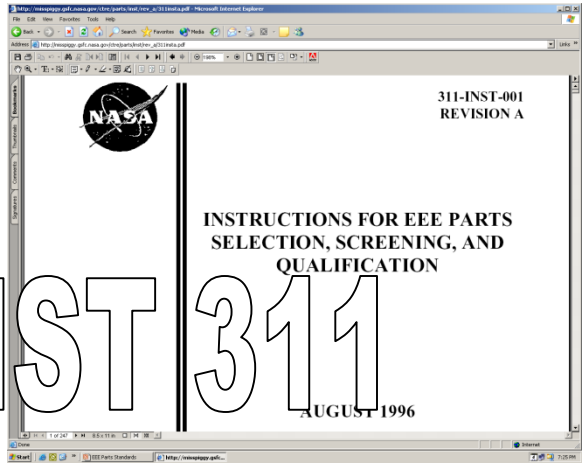
- The existing specifications, of which, there are more than 700, are either stored in filing cabinets, websites or internal filing systems.
  - The Standards System comprises of guidelines, procurement and screening specifications:
    - The **Guidelines** provide the requirements for screening, lot acceptance testing and qualification testing for individual families of EEE parts. Based on three grade levels (i.e. Grade 1,2 and 3)
      - The grade levels establish reliability levels for the mission type. Grade 1 is the highest and Grade 3 is the lowest.
      - New guidelines for selection, screening and qualification established. Old system used as basis guidelines. The new document consist of new technical information, project experiences and new ISO format.

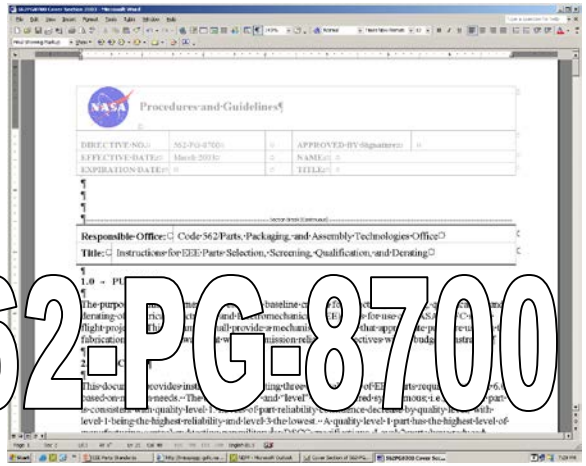
EEE Parts Standards

- Procurement specifications for thermostats, connectors, relays and heaters are very popular.
  - The procurement specifications are being converted to electronic format and will eventually be placed into our database.
- Screening specifications are obsolete. Most datasheets have been updated and test facilities have incorporated new test procedures and methods that have outdated the existing specifications.
  - Our plans are to discontinue the obsolete screening specifications.
  - As new projects are developed, new specifications will be incorporated into our QMS or master catalog. All specifications are approved by the GSFC standards committee.
- Test methods (i.e., burn-in, DPA, PIND, etc.) that are used in the GSFC EEE Parts Analysis Laboratory are being converted to work instructions (IAW ISO).
  - We also consider adoption of “NASA approved” standards from other Centers or external bodies.

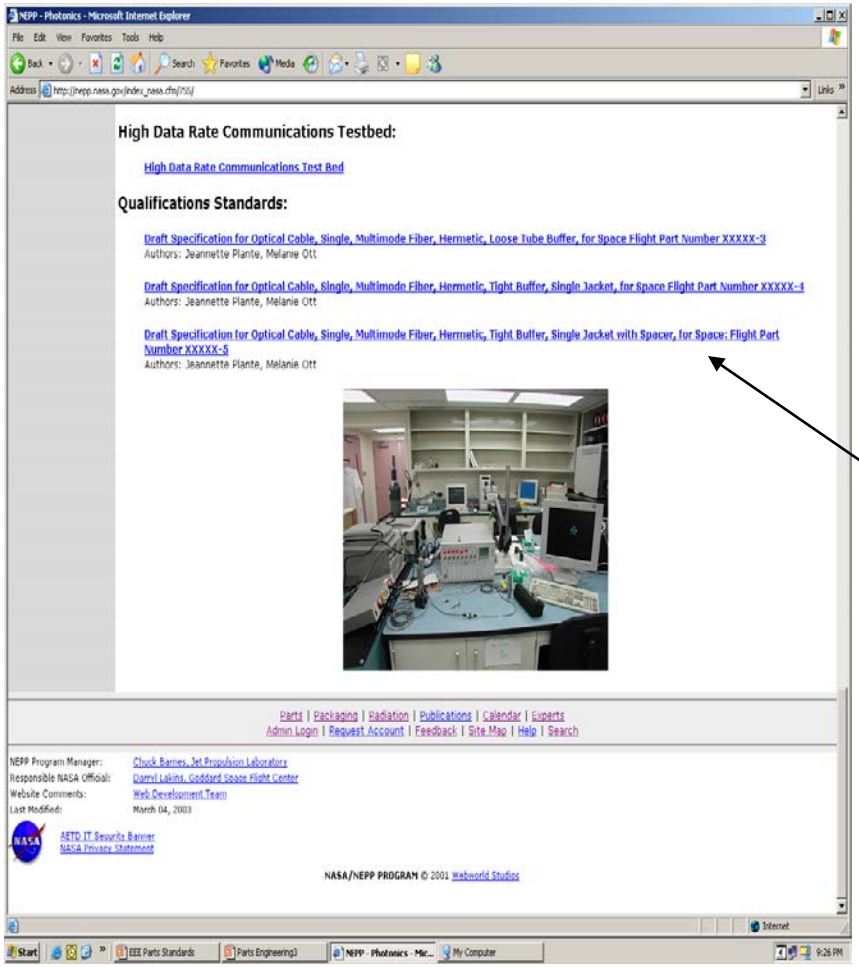
Old System to New (ISO)

- Carbon copy of the previous Code 311 system except that we are using QMS process to document the procedures and guidelines.
  - Described in Code 562-PG-8700.2.7
  - Examples of the records that are associated with the overall system includes:
    - 562-WI….Procurement Specifications
    - 562-PG….Guidelines
    - G562PXXX….Part Identification Number
- As time/resources are available the old documents will be converted.



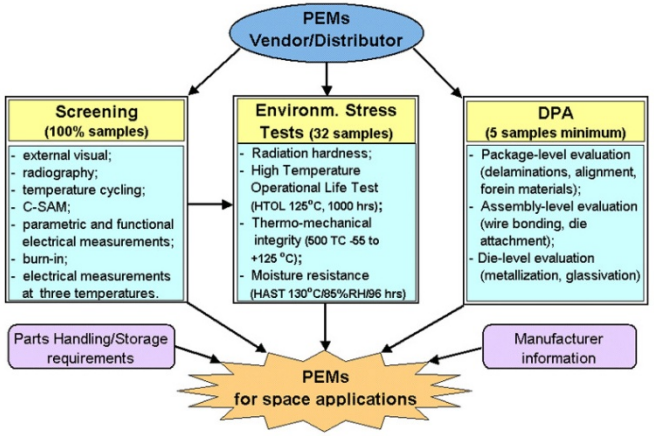


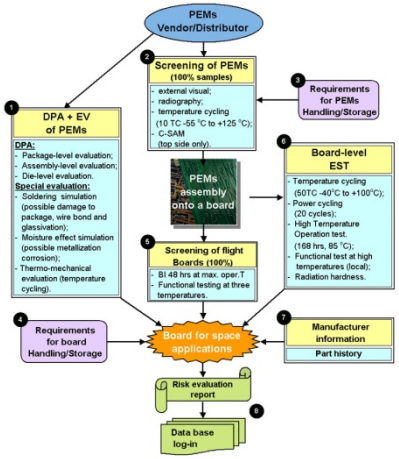
New Capabilities



- As new capabilities are added to the Office, such as the Fiberoptics/Photonics Laboratory, new procedures and specifications will be established, posted and maintained by the Office.

COTS Challenges





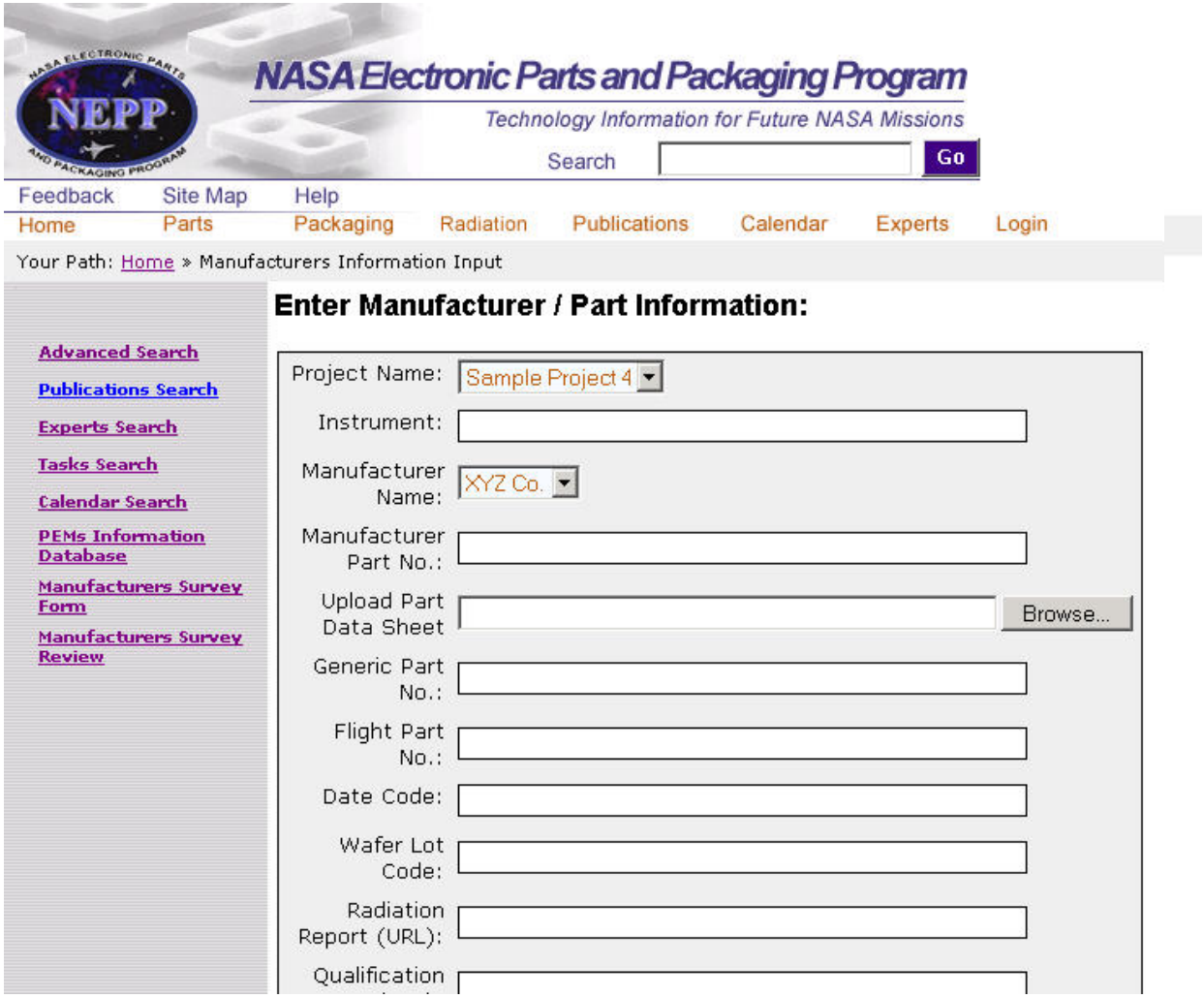
- Manufacturers of commercial and military or aerospace graded components employ different ideologies regarding quality and reliability issues of their products, which can be described as “produce-it-right” and “produce-it-to-rules plus test-it-right” approaches.
- Most PEM manufacturers rely on built-in reliability design and thorough process control, leaving testing and verification of quality and reliability of their product to the end users.
- For these reasons, use of PEMs in high reliability systems is always a risk, and the purpose of qualification and testing of PEMs is to mitigate these risks against known failure mechanisms in project-specific conditions.

Manufacturer's Assessment

- Presently using DSCC listing of qualified vendors, the NASA Preferred Parts Selection List (NPSL) and the GSFC Procurement Specification Qualified Parts List Directory for information regarding our suppliers.

- Plan to augment the mentioned repositories using information and assessments provided by Supplier Audit Contract (SAC) and project related audits. The information will be inserted into a database.

Manufacturer's Information



NASA Electronic Parts and Packaging Program

Technology Information for Future NASA Missions

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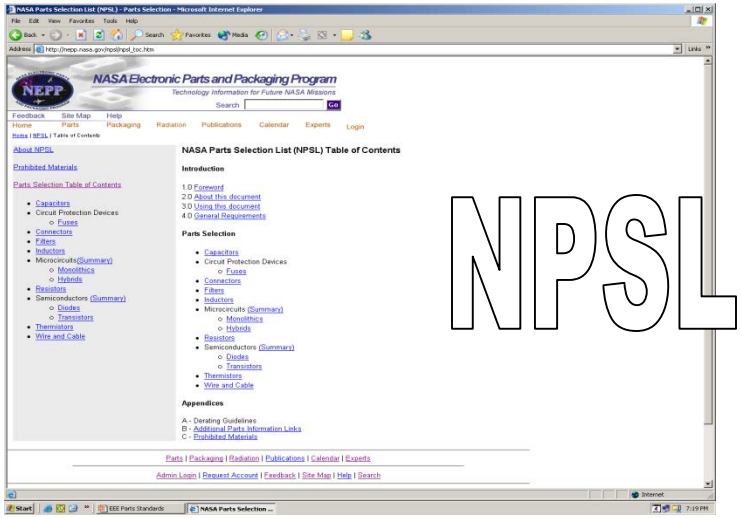
anufacturers Survey Form
anufacturers Survey eview

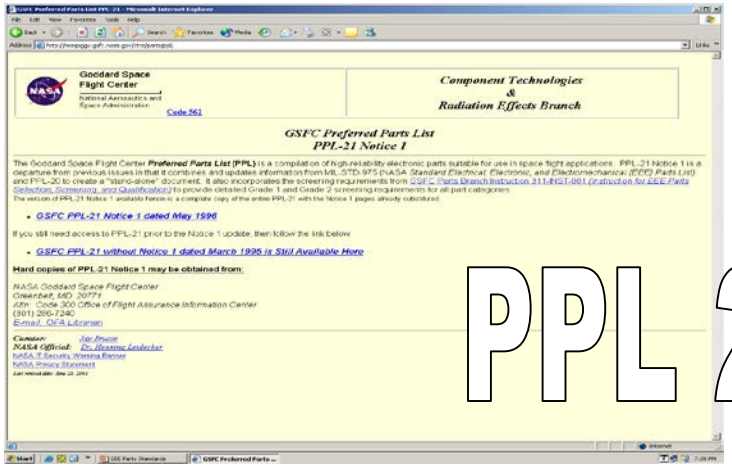
View Manufacturer Assessment:

Manufacturer	Cage Code	Survey Date	Surveyor	MAI
TI	12345	16-Jan-03	Derrington, Cheryl	0.0
TI	12345	17-Jan-03	Derrington, Cheryl	0.1
TI	HP001	29-Aug-02	Derrington, Cheryl	0.3

Program Manager: Chuck Barnes, Jet Propulsion Laboratory
onsible NASA Official: Darryl Lakins, Goddard Space Flight Center
site Comments: Web Development Team
Modified: February 24, 2003

Parts Selection Info

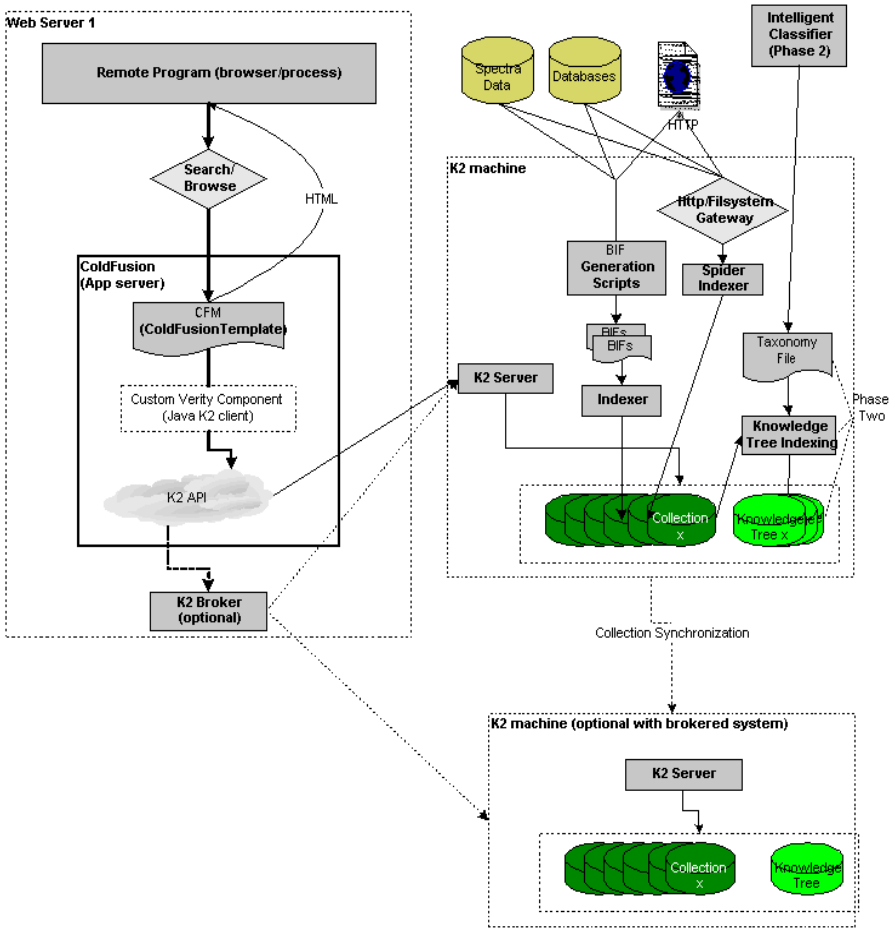




- Parts are selected by the design engineers. They may use standard parts from NSPL or the preferred parts list (i.e., PPL21).
- Code 562 assigns a Parts Engineer to work with each project and advise on parts issues, develop plans, and provide procurement support including scheduling of parts deliveries and other tasks (screening, qualification, etc.).
- The Parts Engineer meets with the designers, instrument managers and system assurance managers on a regular basis.
- Goddard Space Flight Center 311-PEM instructions (soon to be 562-PG-8700) provides guidance to projects regarding parts selection and is the document most used by Code 562 parts engineers.
  - Three most important elements are screening, environmental stress testing (or qualification), and DPA.
    - The major elements of screening are electrical testing and burning-in (BI).
    - The major elements of environmental stress testing (EST) are multiple temperature cycling, radiation testing, high temperature operational life test (HTOL), and highly accelerated stress test (HAST) in moisture environments.

Database

- Parts Library- that provides information regarding parts use, testing and lessons learned.
- EEE Parts Research-that provides information associated with emerging technologies so that NASA engineers are given a sneak preview of the reliability of new “sweet” parts.



arch PEMs Database:

er Part Number for Search

Search

er Manufacturer for Search

Search

Plastic Parts

ROJECT	INSTRUMENT	PARTS ENG.	QTY.	MANUFACTURER PART NO.	MANUFACTURER	SCREEN TEST	QUAL SPEC	RELIABILITY CONCERNS	REL. CONCERNS URL	EVAL. RPT.
LA	MLA	Plante, Jeannette	0	AD5334BRU	Analog	NO FILE	NO FILE	NO FILE		NO FILE
WIFT	BAT	Teverovsky, Alexander	290	AD620BR	Analog	NO FILE	NO FILE	NO FILE		NO FILE
WIFT	BAT	Meinhold, Bruce	0	AD623AR	Analog	NO FILE	NO FILE	NO FILE		NO FILE
CL	MBLA/Digitizer	Sahu, Kusum	0	AD6640	Analog	NO FILE	NO FILE	NO FILE		NO FILE
WIFT	BAT	Teverovsky, Alexander	900	AD7564ARS-B	Analog	NO FILE	NO FILE	NO FILE		NO FILE
WIFT	BAT	Meinhold, Bruce	0	AD7564ARS-B	Analog	NO FILE	NO FILE	NO FILE		NO FILE
WIFT	BAT	Meinhold, Bruce	0	AD780BR	Analog	NO FILE	pemqual.pdf	NO FILE		NO FILE
WIFT	BAT	Teverovsky, Alexander	496	AD780BR	Analog	NO FILE	NO FILE	NO FILE		NO FILE
WIFT	BAT	Teverovsky, Alexander	735	AD7888ARU	Analog	NO FILE	NO FILE	NO FILE		NO FILE

NASA Electronic Parts and Packaging Program

Technology Information for Future NASA Missions

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Project Related Parts

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ew PEMs Data
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ew Manufacturer ssessment
anufacturers Survey Form
anufacturers Survey eview

Select Part Number to View:

Part Number	Manufacturer	PA Lab JobID	Type	Parts Engineer
16CTQ100S	IRF	Q10572	DPA	Teverovsky, Alexander
AD5334BRU	Analog	NO REPORT	N/A	Plante, Jeannette
AD620BR	Analog	Q10146 Q10147	DPA DPA	Teverovsky, Alexander
AD623AR	Analog	NO REPORT	N/A	Meinhold, Bruce
AD6640	Analog	NO REPORT	N/A	Sahu, Kusum
AD7564ARS-B	Analog	Q10149	Screening	Teverovsky, Alexander
AD7564ARS-B	Analog	Q10149	Screening	Meinhold, Bruce
AD780BR	Analog	Q10150	Screening	Meinhold, Bruce
AD780BR	Analog	Q10150	Screening	Teverovsky, Alexander
AD7888ARU	Analog	Q10151 Q10152 Q10568 Q10153	Screening Screening DPA Screening	Teverovsky, Alexander
AD7888ARU	Analog	Q10151	Screening	Meinhold, Bruce
AD8138	Analog	NO REPORT	N/A	Sahu, Kusum
CMP402FS	Analog	Q10155	Screening	Meinhold, Bruce
CMP402GS	Analog	Q10155	Screening	Teverovsky, Alexander
GAFE	HP/MOSIS/ASAT	NO REPORT	N/A	Virmani, Nick
GARC	HP/MOSIS/ASAT	NO REPORT	N/A	Virmani, Nick

Mr. Alexander Teverovsky

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Organization/Employer:
QSS Group, Inc.
http://www.qssmeds.com
7404 Executive Place
Suite 400
Seabrook, Maryland 20706
301-867-0038

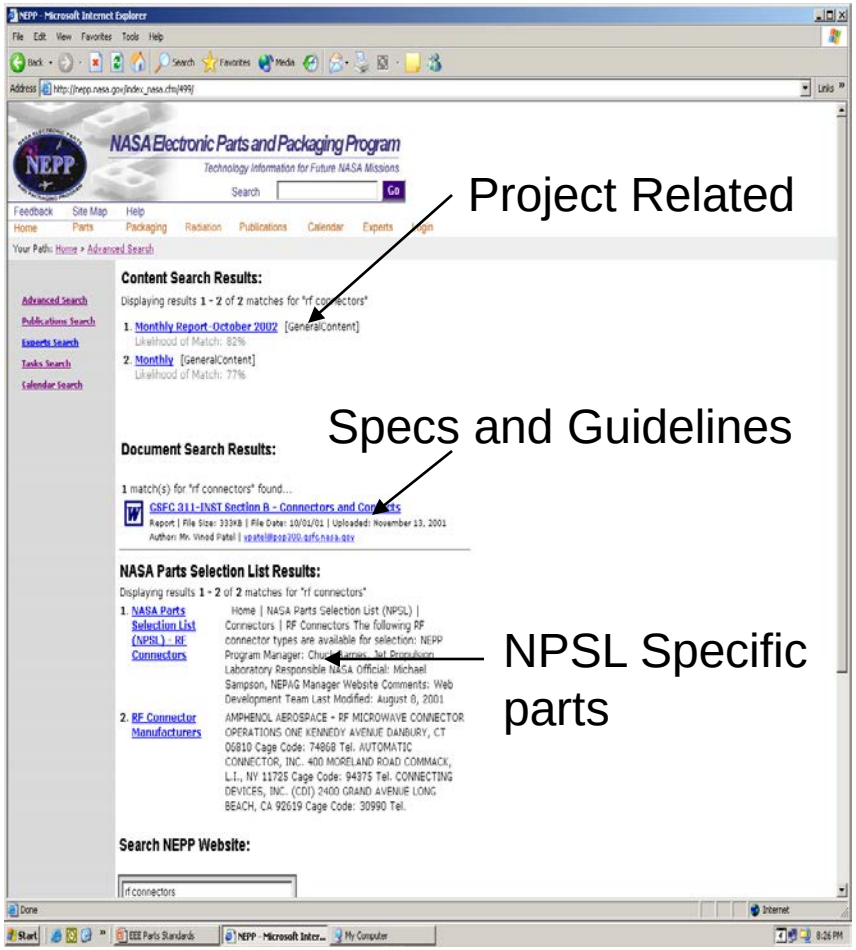
Authored Publications:

1. Chlorine contamination diffusion in silicones
   Whitepaper | File Size: 791KB | File Date: 10/10/99
2. In Situ Moisture Diffusion and Swelling Characterization of Molding Compounds in PEMs
   Whitepaper | File Size: 62KB | File Date: 2/26/02
3. EOS Simulation and Failure Analysis of Metallurgically Bonded Silicon Diodes
   Whitepaper | File Size: 19KB | File Date: 1/1/01
4. Thermal Impedance Measurements for Quality Assessment of Metallurgically Bonded Diodes
   Whitepaper | File Size: 2369KB | File Date: 10/10/2001
5. EV08513_AD6640.pdf
   Evaluation Report | File Size: 1514KB | File Date: 02/22/02
6. 1200_SY89424VZC
   Evaluation Report | File Size: 1485KB | File Date: 02/22/02
7. EOS Simulation and Failure Analysis of Metallurgically Bonded Silicon Diodes.
   Conference Proceeding | File Size: 402KB | File Date: 10/10/2001
8. A TECHNIQUE FOR ASSESSING THE MOISTURE RESISTANCE OF PEMs USING MOS TEST STRUCTURES
   Conference Proceeding | File Size: 1019KB | File Date: 10/10/98
9. 1200_AD8138.pdf
   Evaluation Report | File Size: 758KB | File Date: 02/22/02
10. EV72015_LT1014IS
    Evaluation Report | File Size: 725KB | File Date: 02/22/02
11. Moisture effects in PEMs intended for space applications
    Presentation | File Size: 5247KB | File Date: 4/12/02
12. EV78074_58V1001T25
    Evaluation Report | File Size: 1051KB | File Date: 02/22/02
13. EV61261_LT1014IS
    Evaluation Report | File Size: 439KB | File Date: 02/22/02
14. Relay Failures Specific to Space Applications
    Conference Proceeding | File Size: 886KB | File Date: 10/10/2000
15. Characteristic Times of Moisture Diffusion for Plastic Encapsulated Parts
    Whitepaper | File Size: 111KB | File Date: 3/18/02
16. EV62563_LT1014IS
    Evaluation Report | File Size: 539KB | File Date: 02/22/02
17. Reverse Bias Behavior of Surface Mount Solid Tantalum Capacitors
    Whitepaper | File Size: 681KB | File Date: 2/26/02
18. 61206.pdf
    Evaluation Report | File Size: 35KB | File Date: 02/22/02
19. EV88555_49C465
    Evaluation Report | File Size: 1863KB | File Date: 02/22/02

This User is a member of the NEPP Experts List

Area(s) Of Expertise:
Plastic Encapsulated Microcircuits
High Performance Processor and Memory Technologies
Advanced and Emerging Technologies
Development of Innovative Qualification Methods
MEMS/MOEMs Reliability Assurance

Database



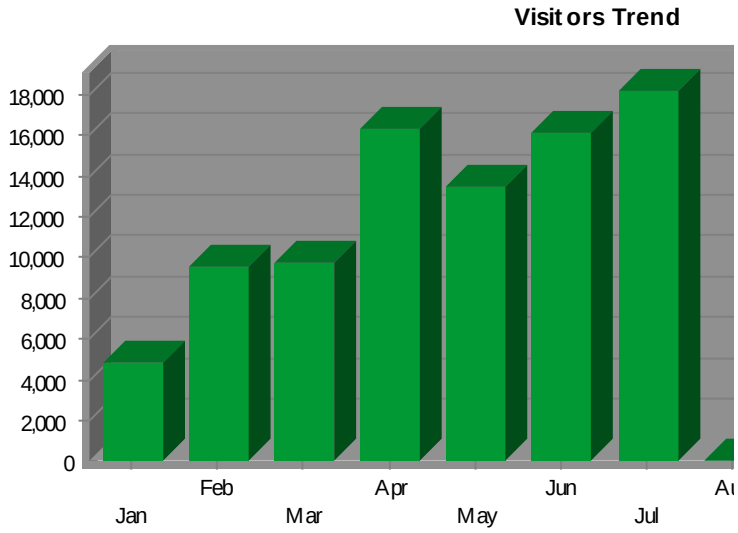
- System (portal) search is capable of searching multiple databases, filing systems and websites simultaneously. The results are arranged so that the user can view related information regarding a EEE parts.
- Example:
  - “RF connectors” was the search term.
  - The system provided the user project related information, specific standards and guidelines, research documents and specific part information.

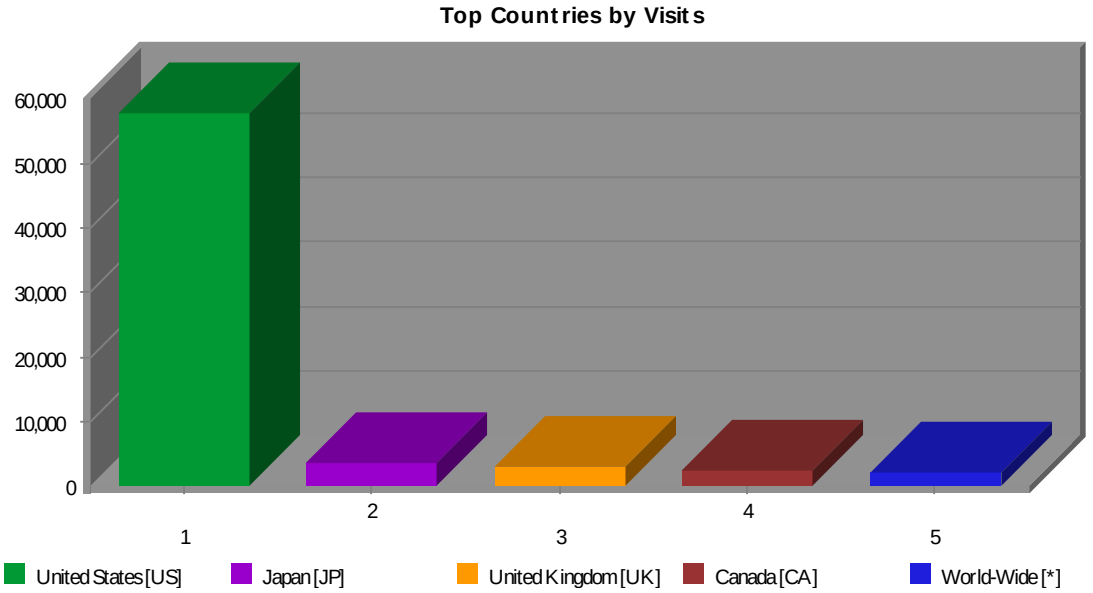
Requested Information

- Google search statistics indicate that NASA specifications and MILSPECs are very popular.
- The NEPP portal receives a lot of hits and referrals that pertain to specifications.

Activity by Search Engines with Search Phrases Detail			
Engines	**Phrases**	**Referrals**	**%**
1.google	mil-c-27500	123	0.44%
	tin whiskers	103	0.37%
	electronic parts	77	0.28%
	d38999	66	0.24%
	m38510	59	0.21%
	rlr07	56	0.20%
	m83513	56	0.20%
	resistor manufacturer	53	0.19%
	m39014	50	0.18%
	rwr81	48	0.17%
	tin whisker	46	0.17%
	cwr09	44	0.16%
	cuinterconnect_evalreport.htm semspec	1	0.00%
	nepp	41	0.15%
	intel	8	0.03%
	mil-dtl-38999	38	0.14%
	rlr05	38	0.14%
	understanding whisker phenomenon	37	0.13%
	stereo parts	35	0.13%
	inductor manufacturer	35	0.13%

Visits





Visit Summary	
Visits	88,254
Average per Day	416
Average Visit Length	00:18:13
Median Visit Time	00:03:44
International Visits	34.38%
Visits of Unknown Origin	0.02%
Visits from Your Country: United States (US)	65.59%

Challenges

- Review, Sort and Conversion of hardcopies to electronic documents.
- Insertion of documents into database that is linked with Standards website to ensure all documents are accessible from the either the standards website, GSFC GDMS and the NEPP portal.
- Establishment of new standards as new capabilities come online.
- Staying abreast of the changes that industry is making to facilitate adoption of new standards.
- Monitoring our suppliers and understanding the complete supply chain from forecasting and obsolescence; to procurement and handling.