

The True Cost of Becoming Aerospace Accredited

Heat Treater

Furnaces North America

Tuesday October 7th 2014

10:30-11am

Bob Hill

President

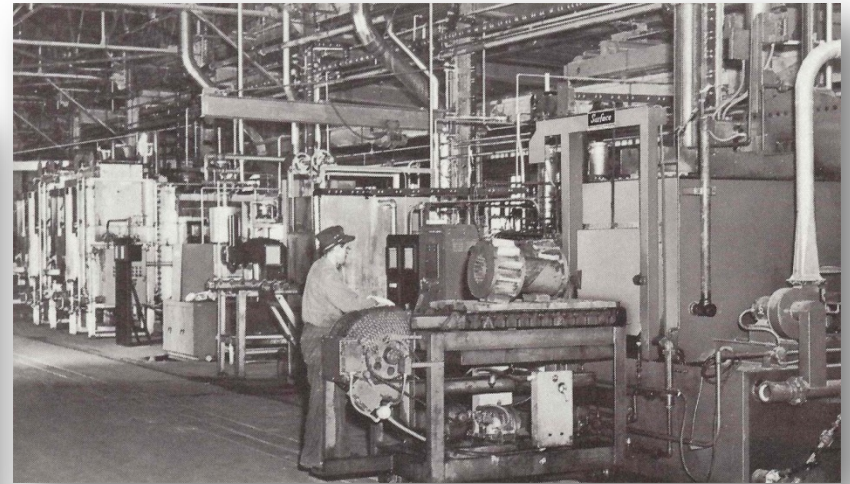
Solar Atmospheres of Western PA



Oct. 6-8, 2014 • Nashville, Tennessee



Heat Treatment of Yesterday



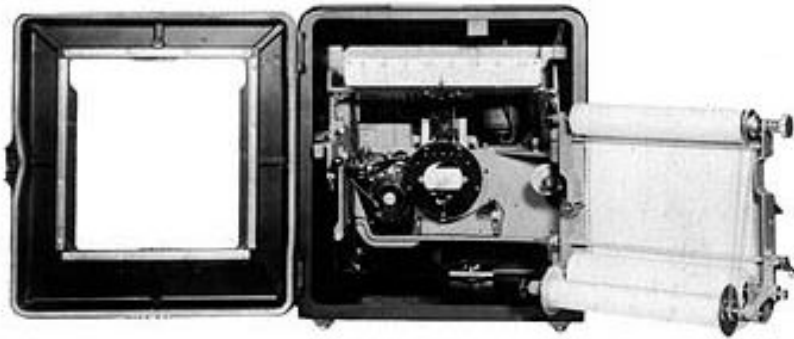
Courtesy of Surface Combustion

Heat Treatment of Today

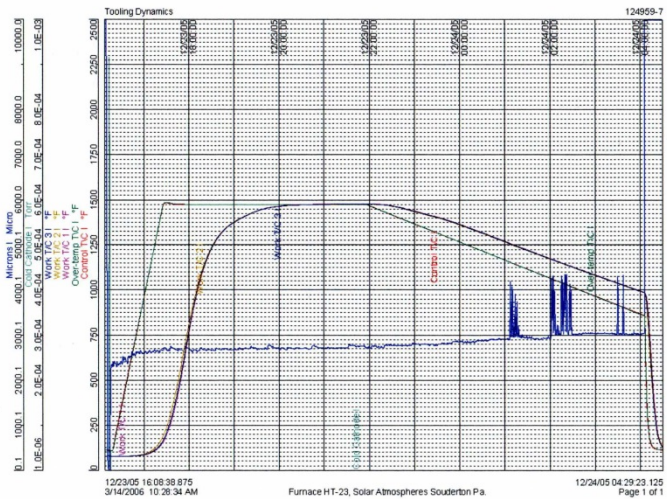


Courtesy of Surface Combustion
Courtesy of Surface Combustion

Instrumentation of Yesterday...



Instrumentation of Today...



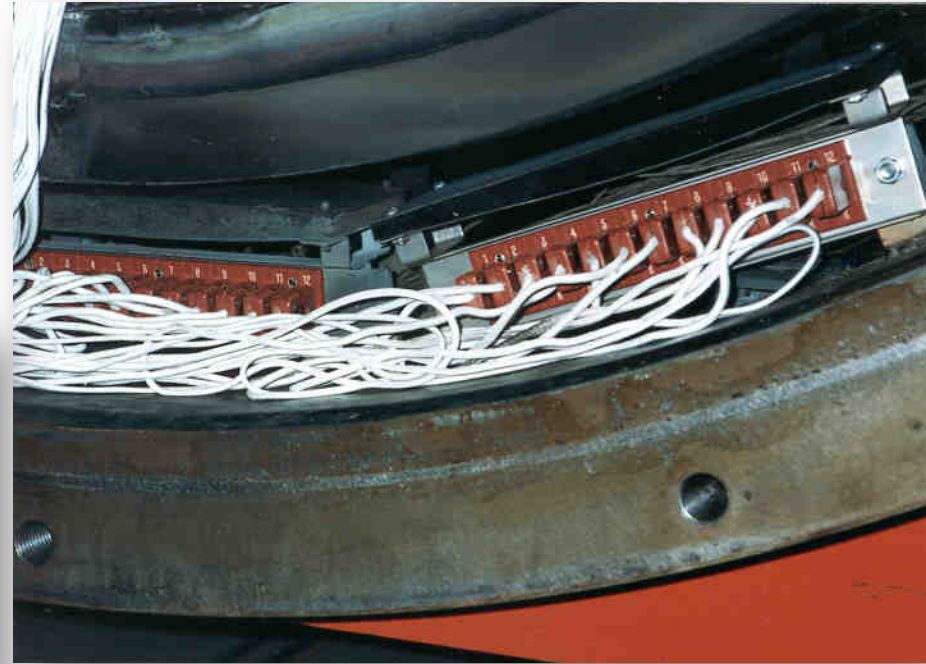
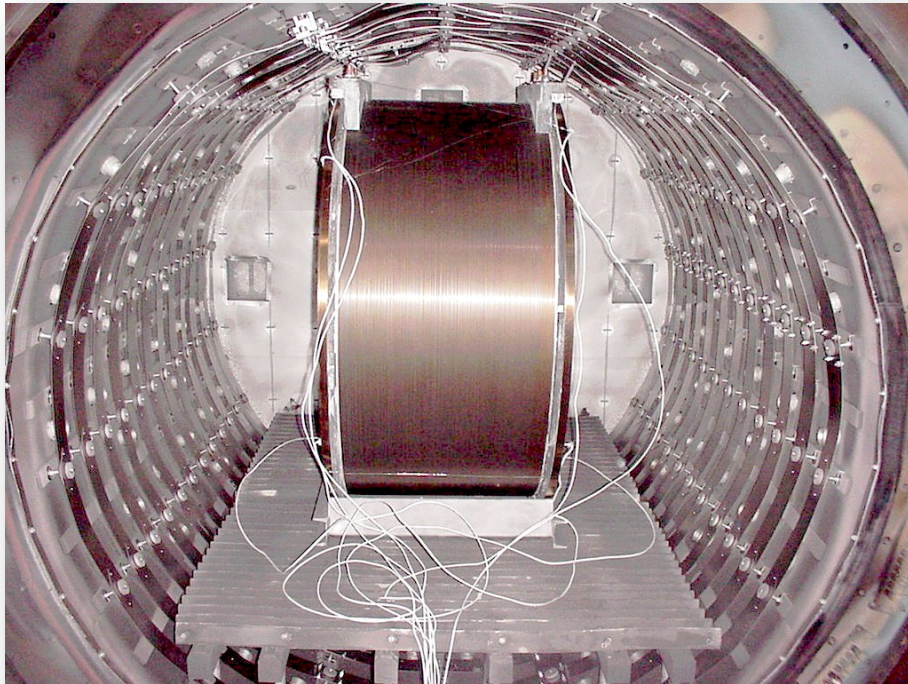
Pyrometric Tools of Yesterday



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Pyrometric Tools of Today



Today Quality Accreditations are Driving Perfection

In accordance with SAE Aerospace Standard AS7003, to the revision in effect at the time of the audit, this certificate is granted by the authority of the National Aerospace and Defense Contractors Accreditation Program (NADCAP) Management Council to:

Solar Atmospheres of Western Pennsylvania

30 Industrial
Hermitage, Pennsylvania

They have demonstrated conformance and are awarded
in the Scope of Accreditation to the revision

AS7102 for Heat

Expiration Date: July 31, 2003
Certificate No. 0260
Issued: August 27, 2002



William G. Wagner
PRI Managing Director



Certificate #: I22073-0



CERTIFICATE OF REGISTRATION

Registration #: 1816-02



RVC



Having been audited in accordance with the requirements of
ISO 9002:1994 - ANSI/ASQC Q9002-1994,
Steel Related Industries Quality System Registrar, Inc., Wexford, Pennsylvania, USA, hereby grants to:

Solar Atmospheres Inc.

registration of the quality system at its location:

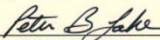
Solar Atmospheres of Western PA
30 Industrial Road
Hermitage, Pennsylvania, USA

The conditions for maintaining this certificate of registration are set forth in the
SRI registration agreements R20.3 and R20.4.

Scope of ISO 9002:1994 registration: "Commercial vacuum heat treating and brazing services."

Initial date of SRI Registration: August 22, 2002.
Current registration period: August 22, 2002 through December 13, 2003.

Signed for SRI:


Peter B. Lake, President

Date: August 22, 2002

The Boeing Company Process - Supplier Audit Report Conducted for Initial Qualification Audit

2nd Party / Boeing
Approval

Report Date 9/2002	SAR Number 3504 20020423 151118P	SAR Status <input type="radio"/> Open <input checked="" type="radio"/> Closed
-----------------------	-------------------------------------	--

Supplier Solar Atmospheres	Initiator Ken Gaston
Supplier Code 679465	Address PO Box 516 M/C S1021385 St. Louis, MO 63166 USA
Contact MIKE JOHNSON	Telephone 314-234-5048
Telephone 724-982-0660 EXT 223	

Maintenance - Process Audit for Initial Qualification

Audit was performed to the requirements of the specification(s) listed below with the corresponding questionnaires.

Specs	Apvd	Specification	Nomenclature
A		Quality System	Processor Basic Quality System for D1-4426 approval only
A		BAC 5617	Heat Treat of Alloy Steels
A		BAC 5619	Heat Treat of Corrosion Resistant Steels
A		BAC 5616	Heat Treat of Nickel & Cobalt Base Alloy
A		BAC 5613	Heat Treat of Titanium and Titanium Alloys

Number of Findings 9	Number of Comments 0
-------------------------	-------------------------

Findings:
RECTIVE ACTIONS TO FINDINGS WERE FOUND ACCEPTABLE
Attachment Document Attachment:

Representative: **Kenneth E Gaston** Date: 05/23/2002

Additional Information

Updated 05/23/2002

NADCAP

ISO

Boeing



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The Heat Treater's Bible (Including Aerospace)

AMS 2750E

SAE Aerospace
An SAE International Group

AEROSPACE MATERIAL SPECIFICATION

SAE AMS2750

REV. E

Issued 1980-04
Revised 2012-07

Superseding AMS2750D

(R) Pyrometry

RATIONALE

5 year update and review of specification with reorganization to improve access. Technical changes resolve issues determined in usage. Changes are extensive and not marked.

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Tel: 41 724 778-4479 (Outside USA);
Fax: 724-275-0790
Email: CustomerService@sae.org
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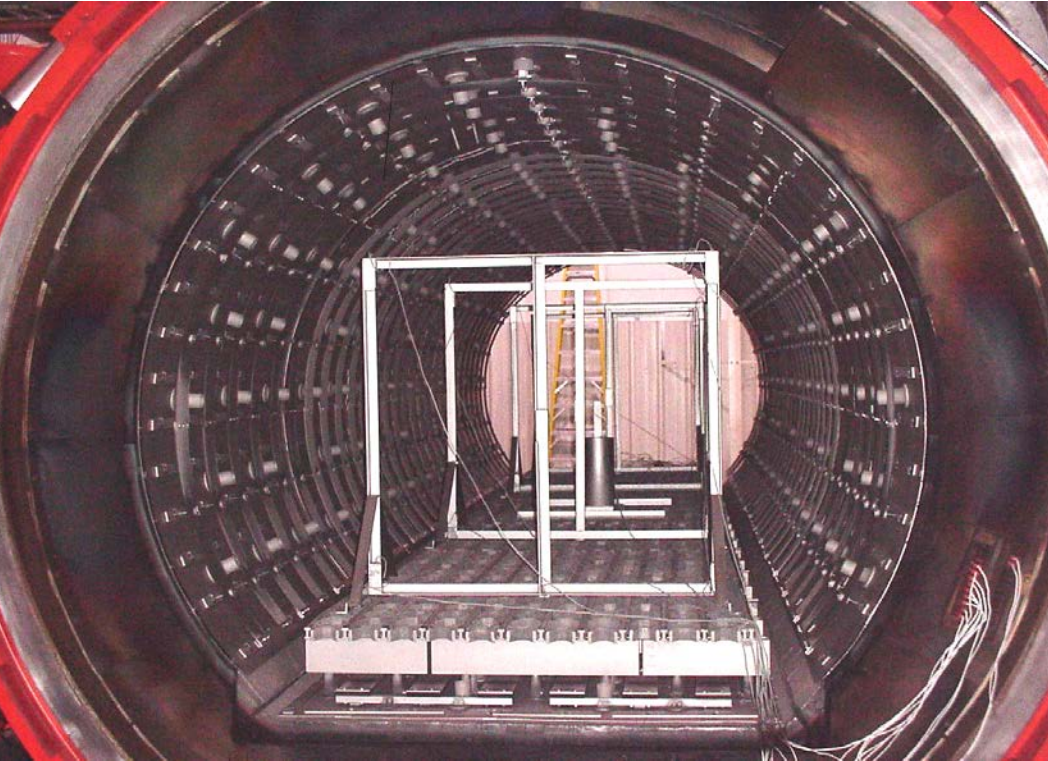
SAE values your input. To provide feedback
on this Technical Report, please visit
<http://www.sae.org/technical/standards/AMS2750E>



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Temperature Uniformity Surveys


- Validates the proper functioning & limitations of any heat treat furnace



700°F +3.13°F / -2.99°F
1000°F +5.37°F / -0°F
1200°F +3.02°F / -1.29°F
1500°F +3.58°F / -2.29°F
1800°F +4.75°F / -1.38°F
2000°F +4.82°F / -2.3°F

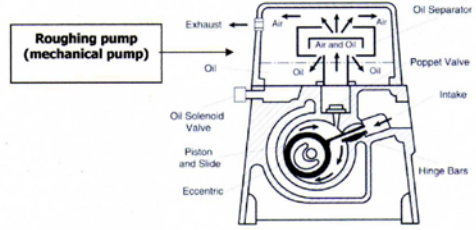
Operator Training Programs

- Detailed procedures, records, and statements of limitations regarding personnel

	HEAT TREAT OPERATOR TRAINING PROGRAM	Approved by: Mike Moyer	C.6.2.1
	1969 Clearview Rd Souderton Pa 18964	Revision: A	Dated: 3/7/03

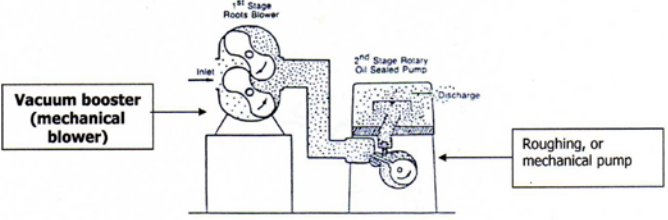
6.10.2 REVIEW OF PUMPING SYSTEM:

- **Roughing pump:** When pumping a vacuum furnace, the roughing pump (mechanical pump) does most of the work. The Roughing Pump is a pump that will work well from room pressure to approximately -28" of mercury (-28 on the "compound gauge"). The roughing pump is generally pumping all of the time, even during cooling and loading / unloading. During cooling, and loading / unloading, however, the roughing pump is isolated from the chamber by the roughing valve. When "process cycle start" is actuated, the roughing valve will open, exposing the chamber to the roughing pump; beginning the pump-down process.



Rotary piston vacuum pump cross section

- **Vacuum booster:** The vacuum booster (mechanical blower) operates only during the low-pressure part of operation. The vacuum booster starts automatically (if the switch is in the "auto" position) at approximately -28" of mercury. At the point of actuation, it is usually a little loud, but this is normal. As the pumping progresses, and the gas load is less, it will quiet down. If it does not quiet down, there may be a maintenance issue.

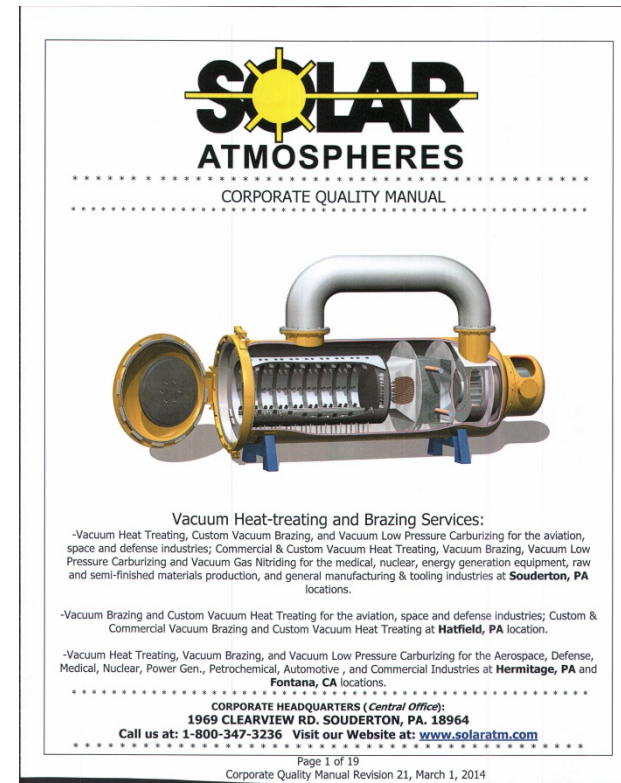


Mechanical blower and mechanical pump assembly

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Procedures:

- Equipment Capability
- Pyrometry
- Furnace Operations
- Preventative Maintenance
- Contract Review
- Technical Instructions to shop floor
- Testing and Reporting Results
- Non Conformances
- Control of Records



Purchasing

- Control of critical supplies
 - T/C's
 - Specialty Gases
 - Capital Equipment
- Control the purchase of Heat Treating Services
 - Proper Flow down of Information

7.4 PURCHASING:

7.4.1 PURCHASING PROCESS: Solar Atmospheres maintains a documented procedure (**Solar Atmospheres B.7.4**) to ensure that purchased "critical" products and services conform to relevant requirements. Critical products and services are products and services that must conform to customer specification/requirements, and/or have an impact on the quality of Solar Atmospheres' process. The extent of control applied to the product/service (and supplier) shall depend on the impact on product realization and quality.

Solar Atmospheres shall maintain responsibility for the quality of products and services purchased from suppliers, including customer-designated sources.

Suppliers to Solar Atmospheres shall be chosen and evaluated on their demonstrated ability to provide products / services in accordance with purchasing requirements. Criteria for selection and evaluation shall be established. Evaluations shall be performed and the results documented and maintained per 4.2.4. Solar Atmospheres shall:

- maintain a list of approved suppliers including the scope of approval and approval status,*
- review the performance of suppliers yearly, and use the results of the review to help establish the level of control imposed on the supplier,*
- define what actions will be taken if and when a supplier fails to meet requirements,*
- use (and require suppliers to use) only customer-approved special process suppliers,*
- define the process, responsibilities, and authority for the supplier approval status, changes to the supplier's approval status, and controlled use of any supplier based on their status,*
- determine and manage the risk associated with using the supplier.*



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AMS Specifications

- Complete and well vetted documents that control the heat treatment of most metals in a uniform and well tested environment



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Value Added Support Services



The Cost of Quality is Not Cheap!

Yearly Costs of Nadcap /AS/ISO Quality

- 5 Quality FTE's \$450K
- TUS Costs \$150K
- Procedural Costs
 - Bake Outs (bi monthly) \$550K
 - Leak Up Rates (weekly) \$550K
 - Calibrations \$10K
- Third Party Audit Costs (travel) \$20K
- Additional Thermocouple costs \$83K
- Additional Testing Equipment \$150K
- Level III NDT Consultant \$11K
- IT Related Costs \$10K

Total Costs = \$1,984,000

(approx. 13% of total sales)



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This Does Not Include Auditing Costs Associated with Primes

- Airbus
- Boeing
- Lockheed
- GE
- Honeywell
- Safran
- Pratt & Whitney
- UTC Aerospace
- Space X
- Northrup Grumman
- Hamilton Sundstrand
- Parker Aerospace
- Sikorsky
- Rolls Royce

Not to Mention Sub Primes



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This Does Not Include Supply Chain Requirement Costs:

- ITAR / EAR Registrations
- Exostar Registrations
- EDI (Electronic Data Interchange)
- Barcode Scanning
- Training:
 - SCA (Source Certifying Agent)
 - CHTR (Certified Heat Treating Representatives)
 - DQR (Designated Quality Representative)



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My Opinion:

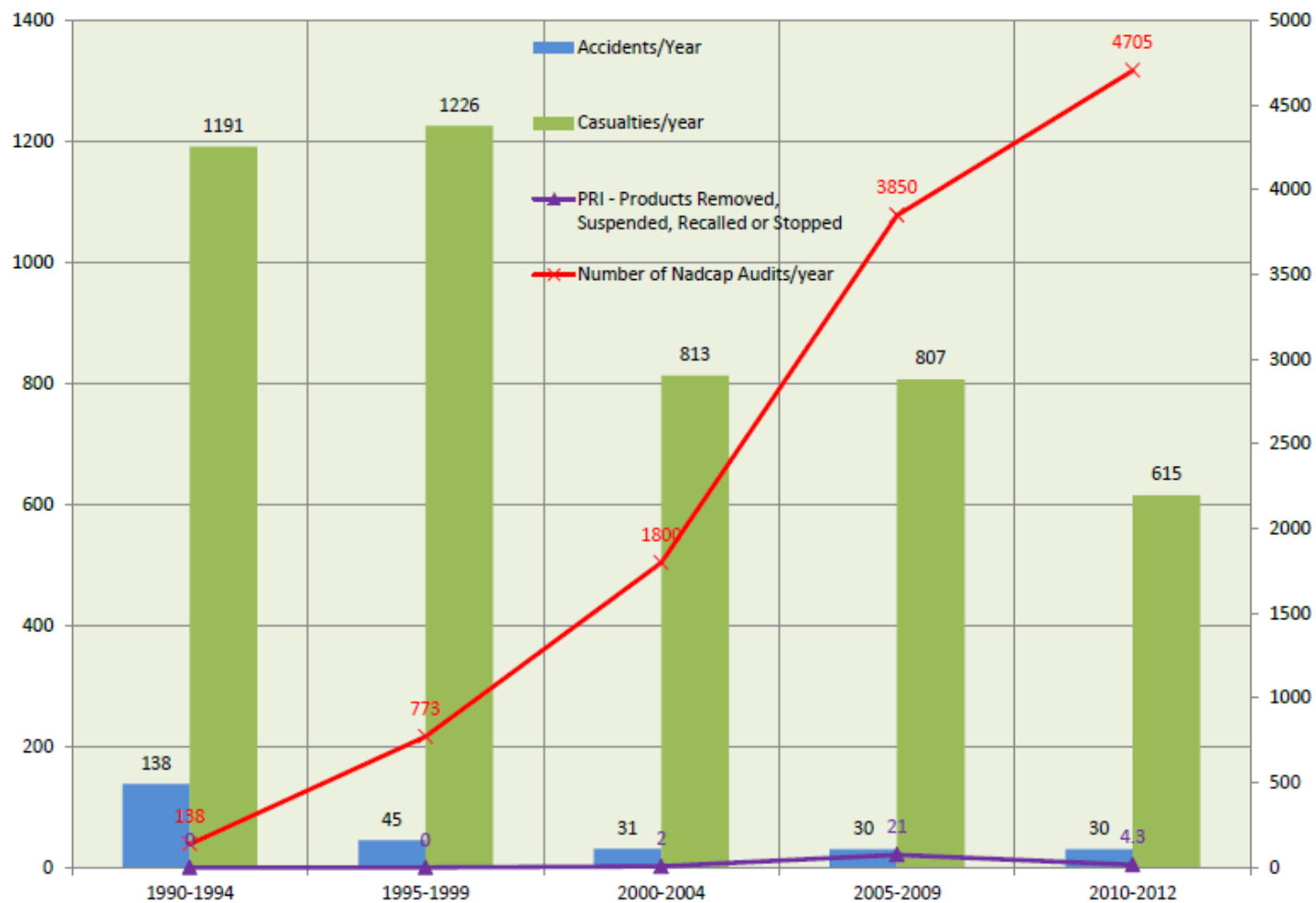
Heat Treat Accreditations are NOT going away!

Today's Heat Treating Market

- **North American MTI Commercials**
 - Nadcap Accredited = 52 out of 269
- **North American Captives and Commercials**
 - Nadcap Accredited = 492

The Ultimate Goal of an Aerospace
Engineer is to increase passenger
safety

Aerospace (Airline Passenger Safety Trends)



Revision Date: 30 August 2013

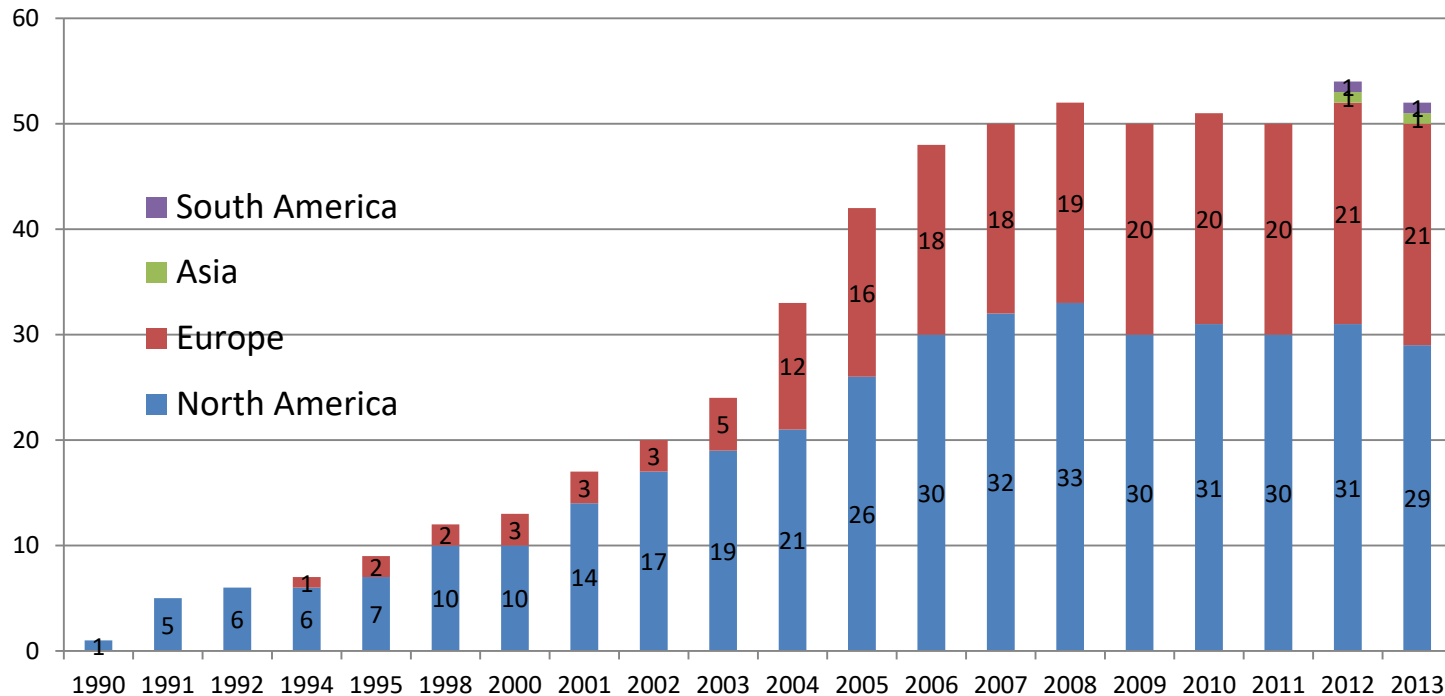
*Data from Aviation Safety Network and NTSB

© 2013 Performance Review Institute

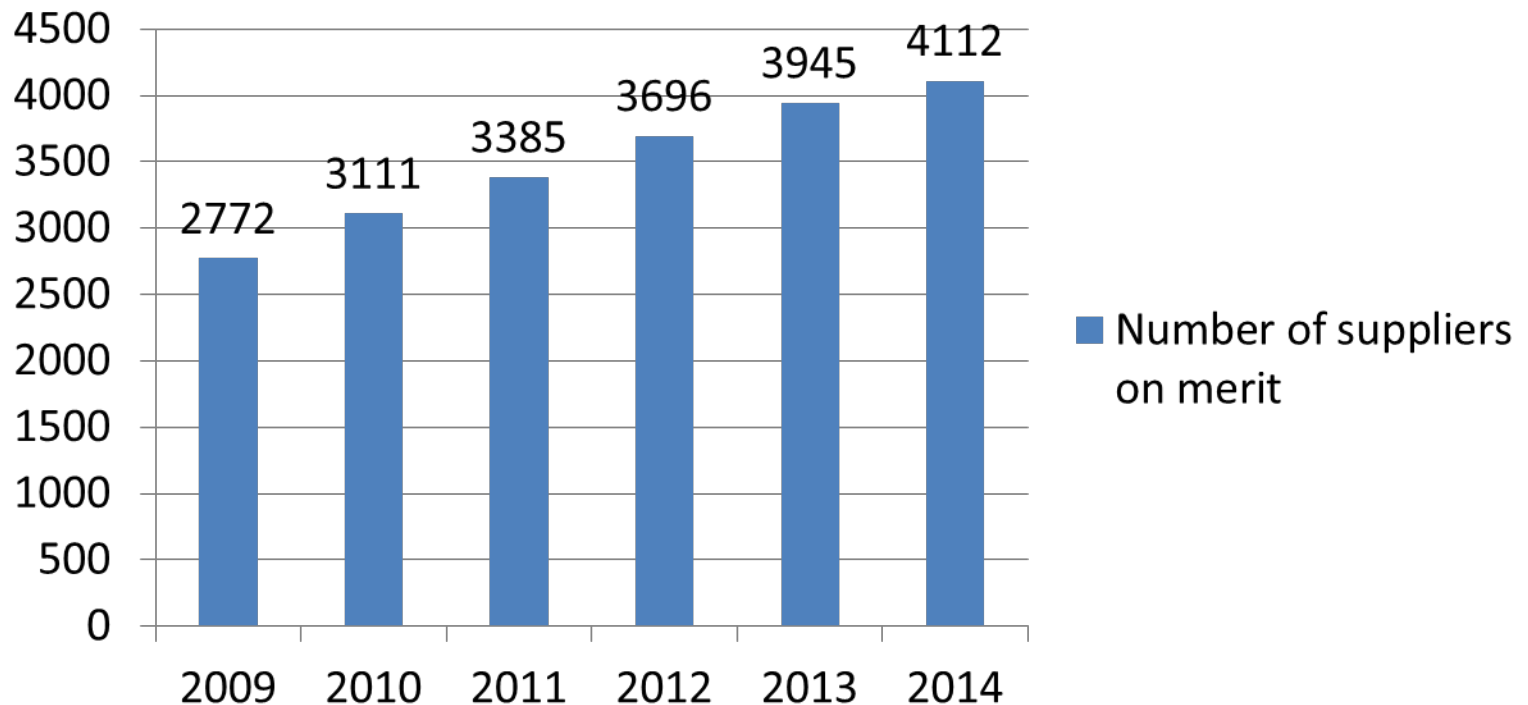


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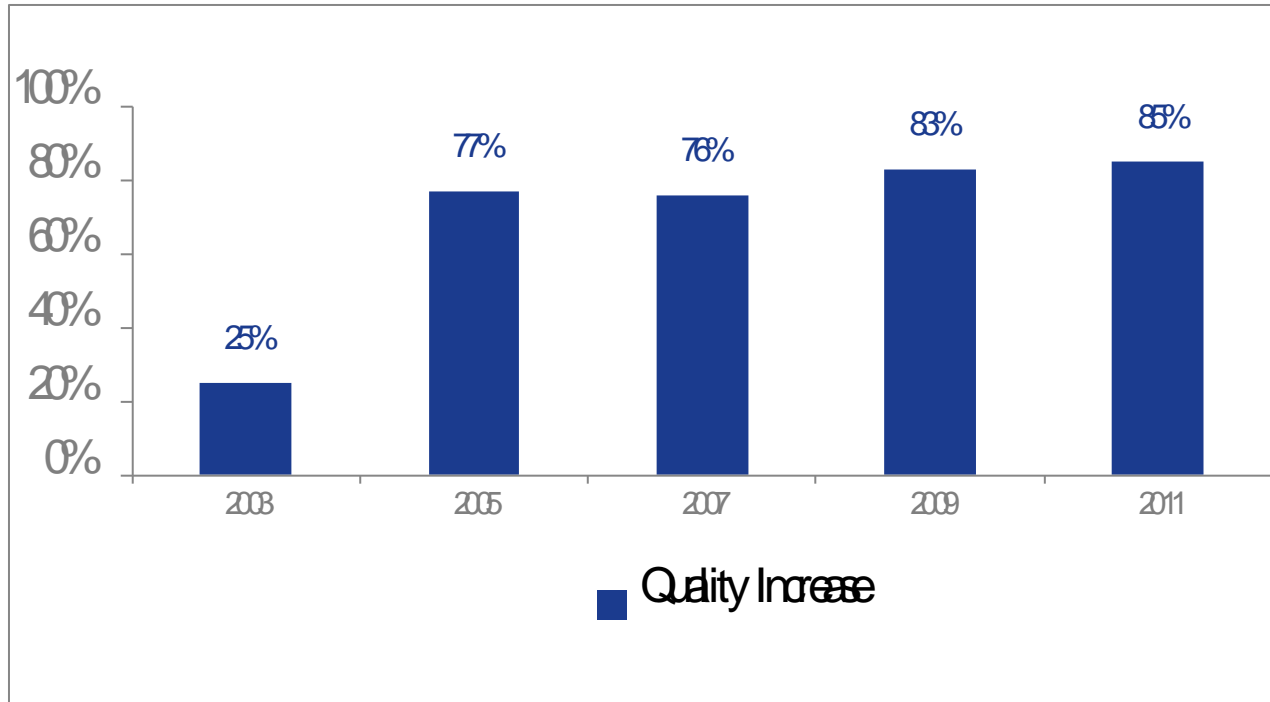
Nadcap Global Recognition



Nadcap Evidence of Increasing Quality



Nadcap Positive Supplier Feedback



2011 SSC Supplier Survey



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Nadcap Improved Performance

In your experience, to what extent has Nadcap affected your...

	Decreased	No effect	Increased
Scrap Rates?	35%	64%	1%
Rework Rates?	41%	56%	3%
Escape Rates?	44%	55%	1%

2011 SSC Supplier Survey

Nadcap Improved Commercial Opportunity

In your experience, to what extent has Nadcap affected your...

	Decreased	No effect	Increased
Sales / Ability to attract new business?	4%	42%	54%

2011 SSC Supplier Survey

Other Industries are Joining In...

Med Accred

Top Ten Keys to Quality & Compliance

- 1) Minimize Employee Turnover
- 2) Know the PRI checklist by memory
- 3) Take copious notes on the checklist & save it for next audit
- 4) Have every employee perform an internal audit on a job
- 5) Scrutinize every aerospace job prior to shipping
- 6) Attend the Nadcap annual meetings in October
- 7) Plan preparation meetings 6 months prior to your audit.
Don't procrastinate!
- 8) Review past findings & make sure they are not repeated
- 9) Top management must lead this effort!
- 10) Network with other Heat Treaters

THE MTI IS HERE TO HELP YOU!

Questions?

Bob Hill

bobh@solarwpa.com

