

Development of a Manufacturing Facility for Aerospace Components in Mexico

A presentation
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Agenda

- **Overview**
- **Strategy**
- **Challenges of start-up**
- **Company history and milestones**
- **Lessons learned**
- **Conclusions**

Overview

- The company: Senior Aerospace Mexico
 - The challenge:
 - ◆ Set up a profitable manufacturing site in Mexico
 - ◆ Transfer of technology from a sister company in USA
 - ◆ Development of Aerospace Manufacturing culture
 - The Year:
 - ◆ 2000 – December
 - The environment:
 - ◆ Aerospace Industry was entirely new for the region
 - ◆ A city with rich history, and strong manufacturing legacy
 - The location:
 - ◆ Saltillo, Mexico
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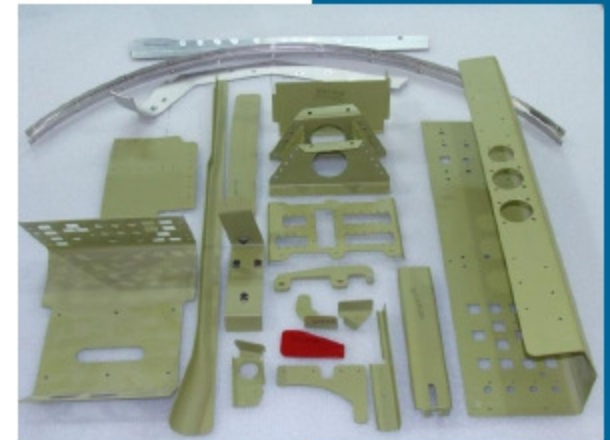
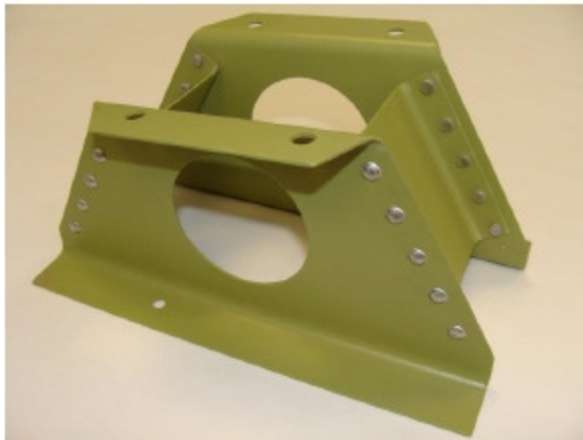
Overview / Company: Senior Aerospace Mexico

Company name	Senior Aerospace Mexico (SAM)
Location	Saltillo, Mexico
Main Products	a) Structures for Commercial Turbines b) Detail components and small subassemblies for Aerostructures
Employees	90
Revenue (2010) [Peak year 2008]	(US\$8 Million) [US\$11 Million]
Year Established	2001
Initial scope	Satellite operation of an existing operating company in USA
Current scope	Stand-alone entity within the Group

The logo for Senior Aerospace, featuring the word "senior" in a bold, blue, sans-serif font. The letter "i" is lowercase and has a small dot above it. The "o" is lowercase and has a small dot above it. The "r" is lowercase and has a small dot above it. The "s" is lowercase and has a small dot above it. The "e" is lowercase and has a small dot above it. The "n" is lowercase and has a small dot above it. The "i" is lowercase and has a small dot above it. The "o" is lowercase and has a small dot above it. The "r" is lowercase and has a small dot above it.

Overview / Company Profile: Senior Aerospace Mexico

- **Labor intensive processes**
- **Sheet metal Fabrication**
- **All special process in-house**
- **Staff members are citizens of Mexico**



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Overview / Corporate Profile: Senior PLC

Senior (The Group) is an international manufacturing group with 27 operations in 11 countries.

Senior designs, manufactures and markets high technology components and systems for the principal original equipment producers in the worldwide aerospace, defense, land vehicle and energy markets.

Divisions:

- a) Aerospace (Aerostructures)
- b) Aerospace (Fluid Systems)
- c) Flexonics (Industrial and Automotive)

Please visit:

www.seniorplc.com

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Overview / Senior Aerospace Companies



Absolute



Capo



BWT



AMT



Calorstat



Composites



**Bird
Bellows**



Ermeto



Ketema



Bosman



**Jet
Products**



Sterling



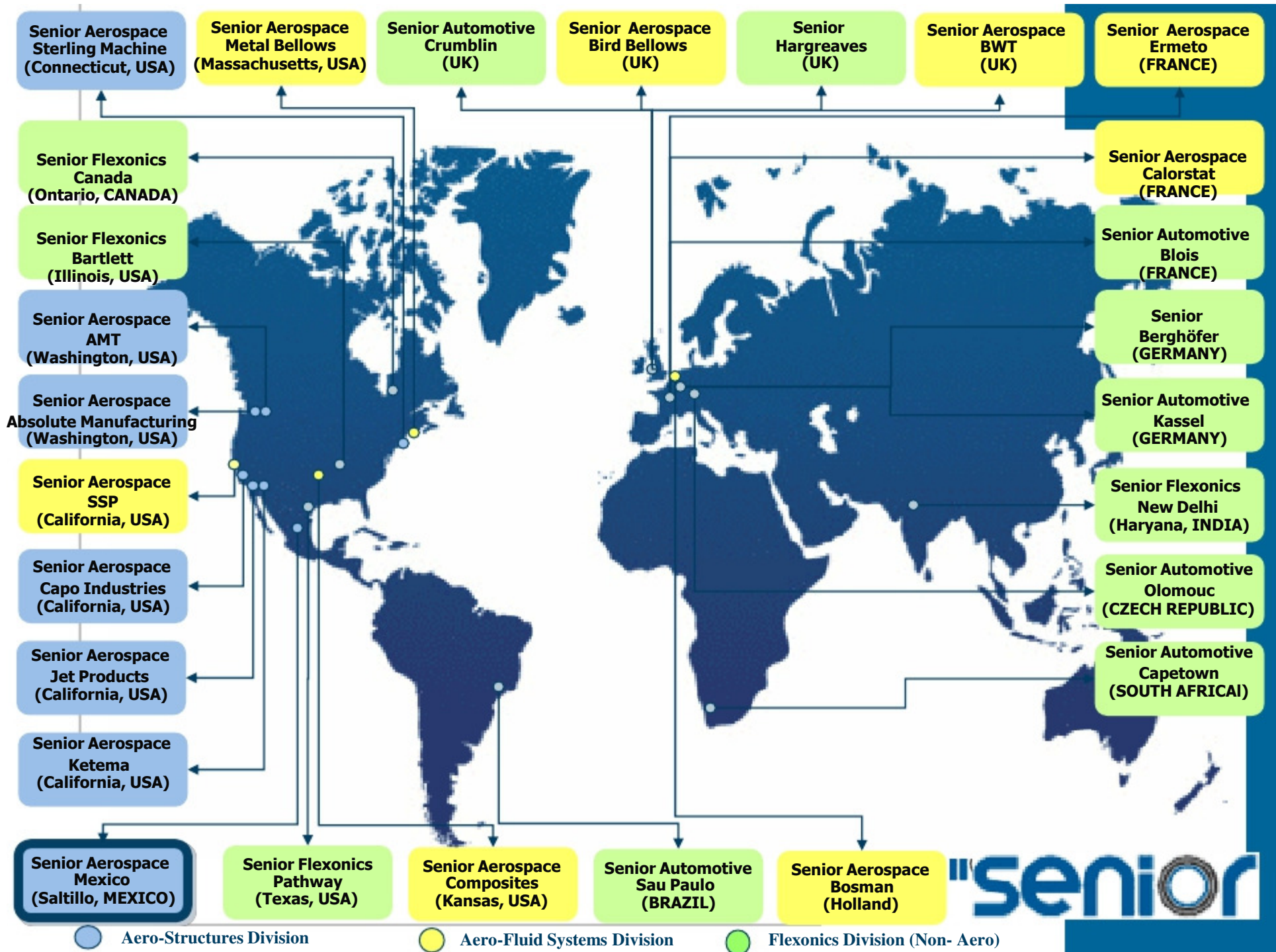
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**Metal
Bellows**

<http://www.seniorplc.com/>

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Strategy: Senior Aerospace Mexico

◆ Vision and Philosophy

- Vision: Set up a profitable and successful manufacturing site in Mexico
 - ◆ Initial 5 years dedicated to build a manufacturing culture
 - ◆ Initial scope was to fabricate details for sister company in California, USA
 - ◆ Cost Savings
 - ◆ Footprint in Low Cost Country
 - High – mix, low volume environment
 - Labor Intensive vs Capital Intensive
 - ◆ Human factor: key for success
-

Stategy / Senior Aerospace Mexico: Location



Saltillo: Population 650,000. Capital State of Coahuila.
Industrial Area, Major cluster for Automotive companies.
Skilled labor and Engineering resources.

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Strategy / Saltillo, Mexico



Manufacturing legacy since 1940s,
agricultural equipment.

Mid 1980's: Automotive started a large
migration.

Nowadays, Saltillo is a major cluster for
auto industry.

High-volume, low mix environment.

Very successful model.

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Strategy: Location

- ◆ Close proximity to USA border (not at the border)
 - ◆ Existing pool of talented and skilled technical and engineering resources
 - ◆ Cultural and language differences, not barriers.
 - ◆ Technical schools, universities
 - ◆ Access to specialized service, spares, equipment, etc
 - ◆ Superior living standards, aim for long-term relationships with workforce.
-

Strategy: Senior Aerospace Mexico (SAM)

Started operations in December 2000



Saltillo. State Capital of Coahuila.
Industrial Metalworking Metropolitan area.
Large Presence of Automotive Industry.

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Strategy / Low Cost Country

- Target products and processes: Off-load of details, components to be assembled in main factory in California, USA.
- Labor Intensive, low technical complexity in first stage.
- Training and technical development to be carried out using a comprehensive development plan.
- Started site selection studies.
- Shelter option chosen.
- Broke ground in 2000.

Challenges of startup: Initial development

- First Challenge: People
 - Started with screening process, welders and technicians with proven experience in automotive manufacturing
 - Technicians used to high-volume
 - No experience in Aerospace “pedigree”
 - Since day one: focus on discipline and procedures.
 - This is low volume, high mix!
 - Quality: Critical more than ever before.



Challenges of start-up

- Breaking paradigms: People with education and leadership can achieve exceptional levels of productivity and quality



VS



Productivity and Quality.....
Elements for success and profitable growth.

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Company history and milestones

- 1999: Strategic decision was made. Management had the vision for Mexico as natural option for expansion.
- Close proximity to suppliers and customers, North American Free Trade Agreement.
- Key driver: cost-reduction.
- Customers started aggressive initiative for Sourcing in Low Cost Countries.
 - International Procurement offices in Monterrey, Chihuahua, Queretaro, etc.

Company history and milestones

Start of Operations: December 2000

SCOPE: Fabrication of metallic structures for Gas Turbines (Energy Sector) and fabrication of components for Aerostructures (Aerospace Sector).

Total Manufacturing Area: 58,000 sq. ft. (5400 m²)

Open/available Manufacturing Area: 15,000 sq. ft. (1400 m²)

Certifications and Approvals:

System Approvals:

- ✓ Quality Management:
ISO9001:2000 / AS9100B
- ✓ EHS System:
ISO14001:2006

Nadcap Approvals:

- ✓ Heat Treatment
- ✓ Chemical Processing
- ✓ Non Destructive Testing
- ✓ Welding

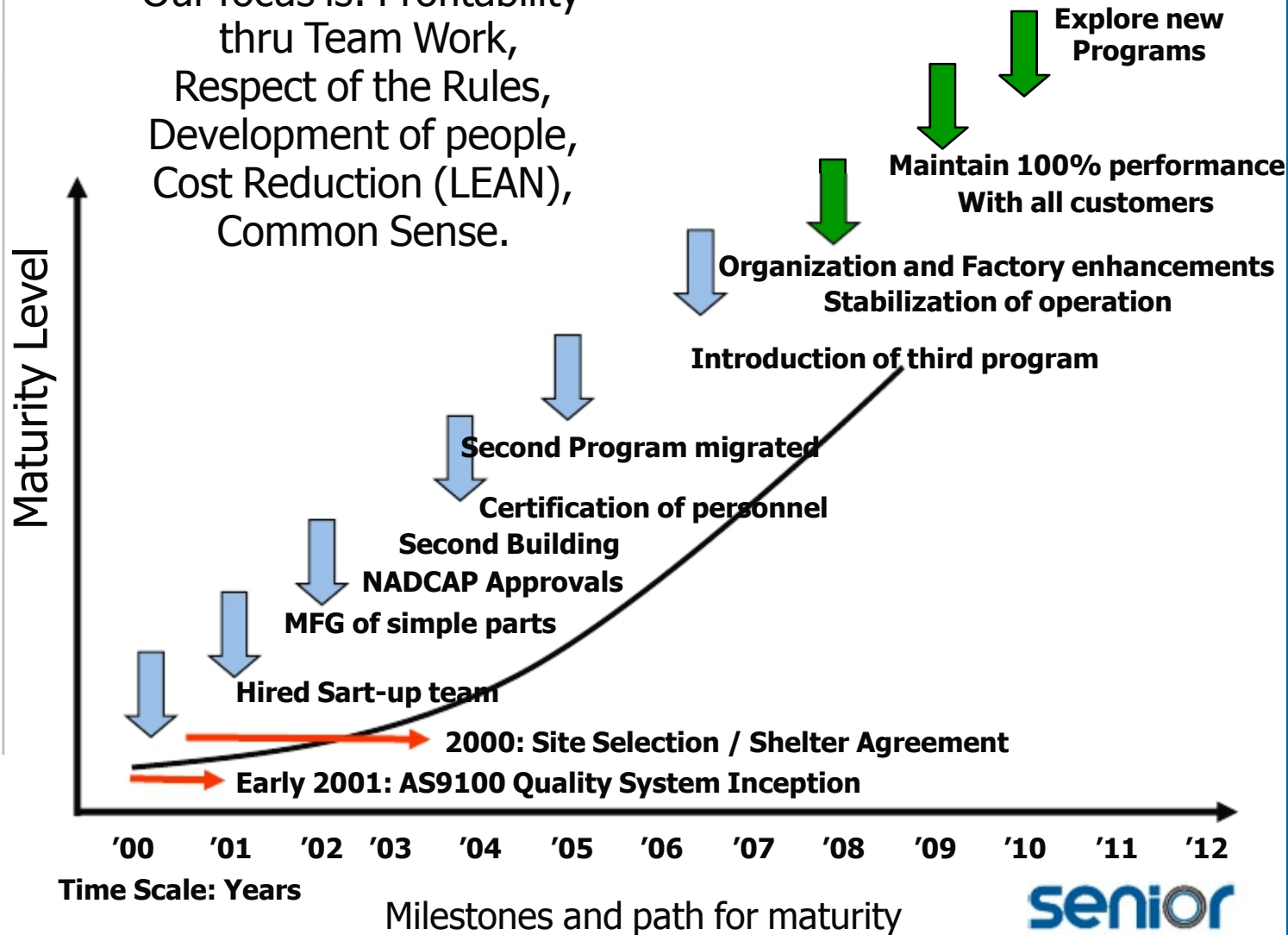
Customer Quality System and Process Approvals:

- ✓ Boeing Commercial Airplanes
- ✓ Goodrich Aerostructures
- ✓ Cessna Aircraft Company
- ✓ Bell Helicopters
- ✓ Snecma Moteurs
- ✓ Rolls Royce
- ✓ Solar Caterpillar Turbines

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SENIOR AEROSPACE MEXICO DEVELOPMENT AND CHALLENGES

Our focus is: Profitability
thru Team Work,
Respect of the Rules,
Development of people,
Cost Reduction (LEAN),
Common Sense.



History and milestones: Products and Processes

Today: Fabrication of structures for Industrial Turbines

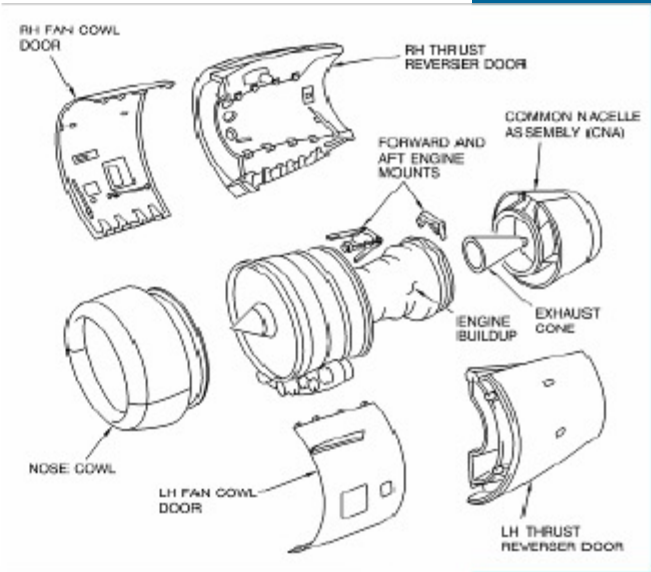


Stainless Steel, sheet metal cut-form-weld-heat treating-paint.

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History and milestones: Products and Processes

Today: Details and subassemblies for Aerostructures, Nacelles.



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History and milestones: Processes



Heat Treating,
Chemical Processing,
Primer / Paint,
Laboratory Testing,
Kitting for
point-of-use



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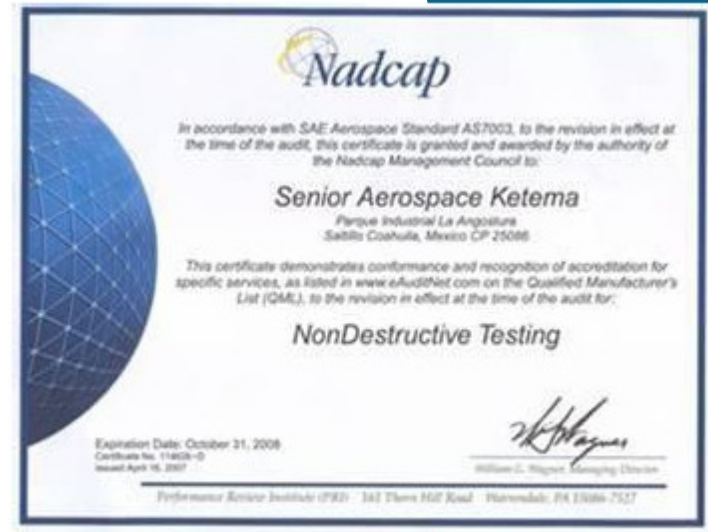
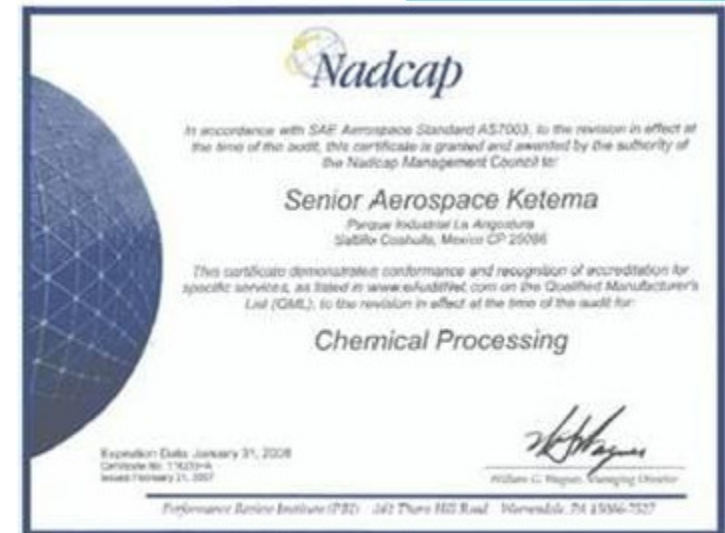
History and milestones: Nadcap Approvals

Chemical Processing Nadcap Scope:

- Anodizing (Chromic)
- Chemical Cleaning – Alkaline Cleaning
- Chemical Cleaning – Titanium Cleaning – Acid
- Chemical Cleaning – Titanium Cleaning - Alkaline
- Chemical Cleaning – Ultrasonic
- Conversion / Phosphate Coating
- Surface Treatment – Passivation – AMS-QQ-P-35
- Surface Treatment – Passivation – Customer's Spec.
- Pre-penetrant Etching

Non Destructive Testing Nadcap Scope:

- Penetrant Inspection



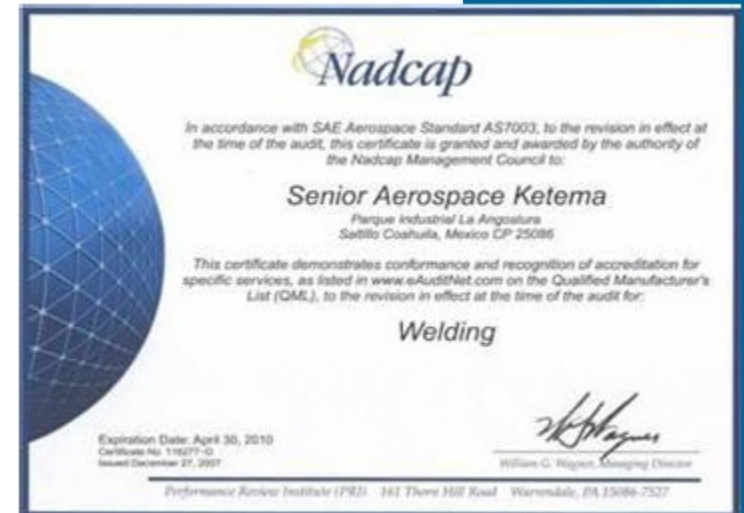
History and milestones: Nadcap Approvals

Heat Treating Process Nadcap Scope:

- Aluminum Alloys – AMS 2770
- Cryogenic Treatments
- Nickel and Cobalt Alloys – AMS 2774
- Nickel and Cobalt Alloys – Customer Specs
- Stainless Steels – Customer Specs
- Titanium Alloys - Age, anneal, and / or duplex anneal, and stress relief
- Titanium Alloys – Customer Specs
- Vacuum Heat Treating – Customer Specs
- Hardness Testing – Rockwell hardness
- Conductivity Testing
- Heat Treatment – AMS 2750

Welding Process Nadcap Scope:

- Fusion Welding (GTAW, GMAW)



Lessons Learned: People



- Hire the right people for the right activity
 - Ample pool of qualified technical personnel is available
 - Basic set of skills, then train and qualify
- Get personally involved!
- Develop clear set of expectations
- Motivate (not all is money)
- But get competitive pay structure.

Lessons Learned



Shelter?

- Shelter agreement signed
 - This option was adequate for us.
- Considered cost of extended staff (Administrative, local purchasing, HR)
- Essential functions and responsibilities are controlled by Site General Manager
- For a 100-people operation, our type of business, Shelter option has been satisfactory
- What work for some companies, may not work for you!

Lessons Learned



Shelter

- Shelter option =
 - Non – value added (but needed) activities carried out by third party (i.e. payroll admin, Mexican Tax, MRO – local purchases)
 - Building lease
 - Mexican legal entity
- Assets, IP, technology, inventory, customer and supplier relationships remain at Senior.
- Please refer to shelter providers.

Lessons Learned

- Help was required for the early days
- Deployment of Quality System required on-site support from parent company.
- Basic On The Job training
- AS9100 and Nadcap approvals, the test.
- Strategy for launch: Ex-Pat presence. 2-year term
- Just enough time to develop working staff (all Mexican)



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Conclusions: A few things to consider

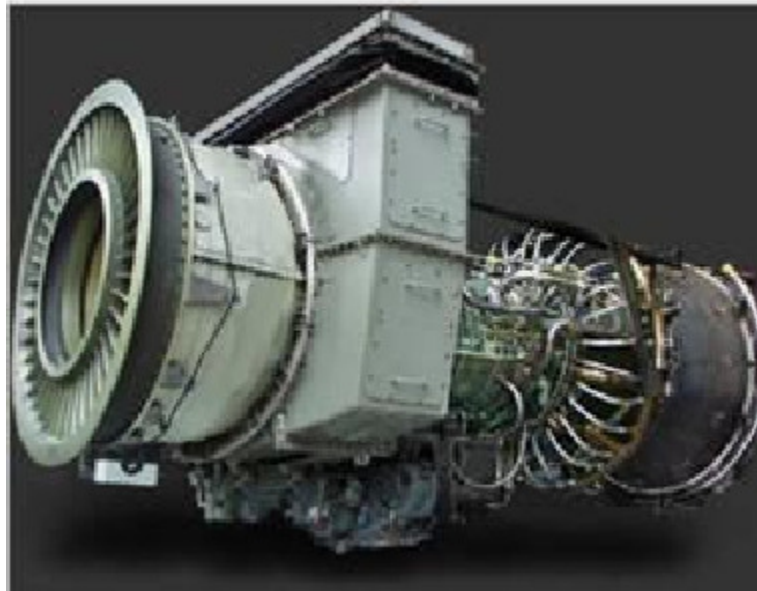
- Stand-Alone versus Shelter: a serious analysis.
- Greenfield, “start-from-scratch” option requires extensive research and investment of resources.
- Familiarity with Mexican business practices and cost-effective acquisitions and contractor services is very important.

Conclusions: Few things to consider

- Ownership of a manufacturing building implies advantages (and added effort)
- Depending on size of operation and existing branches of your corporation.
- Business decision should be based on expert advise and in-depth analysis.
- Get in contact with Government, consultants.
- Strong advise: consider the Mexican Government as your primary consulting entity (i.e. Secretaria de Economia, ProMexico)
- Mexico is a good option for business development regardless of scheme.

Vision 2011 - 2015

- Pursue Profitable Growth with Aerospace OEMs and Primes currently establishing operations in Mexico.
- A clear and solid Marketing Strategy.



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Success Story: 10 years of continued development, and going forward.



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THANK YOU !

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