



# Jet Products

# Senior plc.

- Based in Rickmansworth, UK.
- Two operating markets and 27 total companies.
  - Total Senior plc sales:
    - 2008: \$833m
    - 2009: \$800m
    - 2010: \$840m
    - 2011: \$1B
  - Senior Aerospace Division, 16 companies, 2011 sales of \$612m.
    - Structures Divisions: 8 companies.
    - Fluid Systems Divisions: 8 companies.
  - Senior Flexonics Division, 2011 sales of \$412m.
    - 11 companies, serving both automotive & industrial markets.

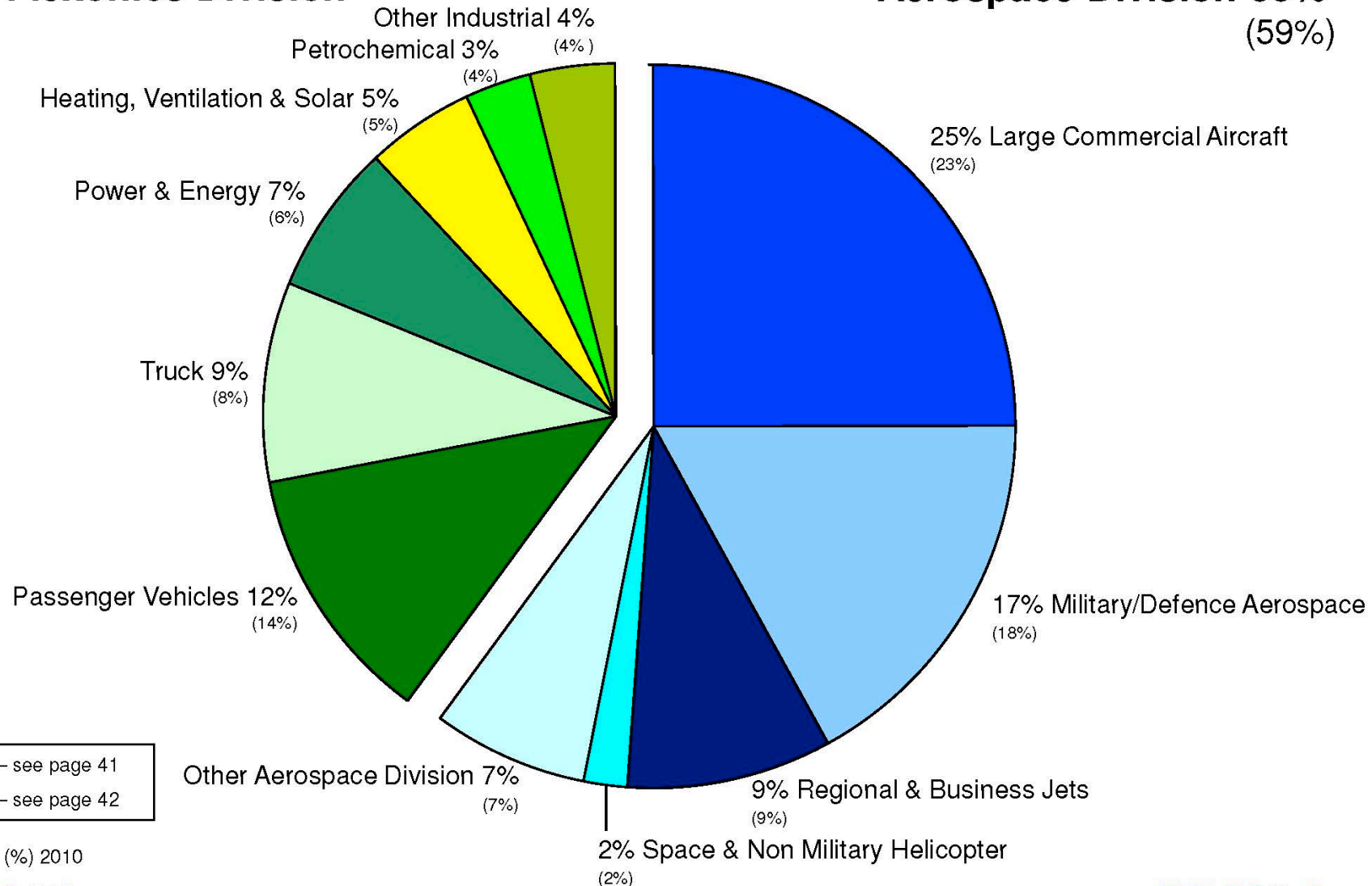
# SENIOR'S MARKETS – 2011

**40% Flexonics Division**

(41%)

**Aerospace Division 60%**

(59%)



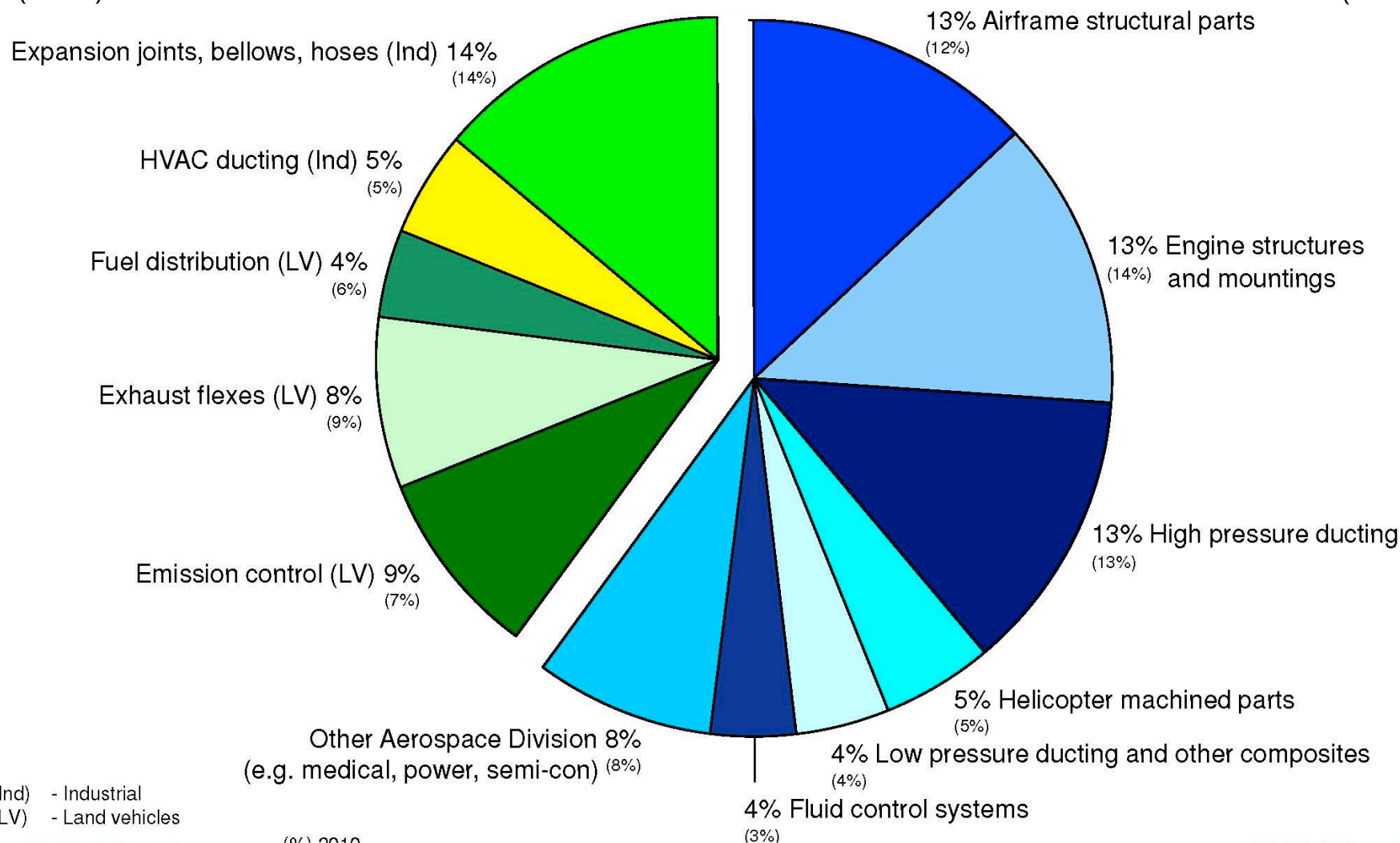
Products – see page 41

Customers – see page 42

# SENIOR'S PRODUCTS – 2011

**40% Flexonics Division**  
(41%)

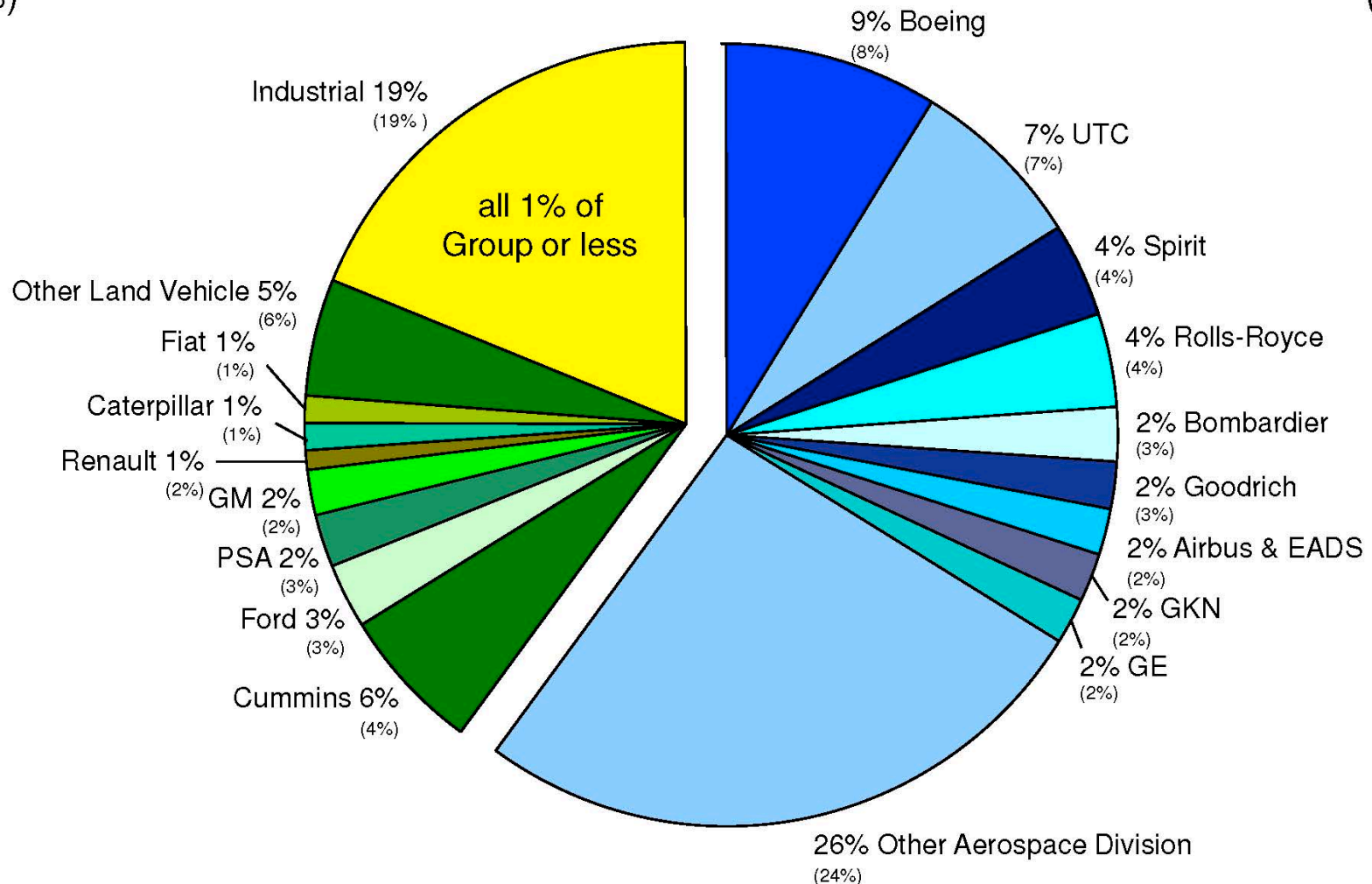
**Aerospace Division 60%**  
(59%)



# SENIOR'S CUSTOMERS – 2011

**40% Flexonics Division**  
(41%)

**Aerospace Division 60%**  
(59%)



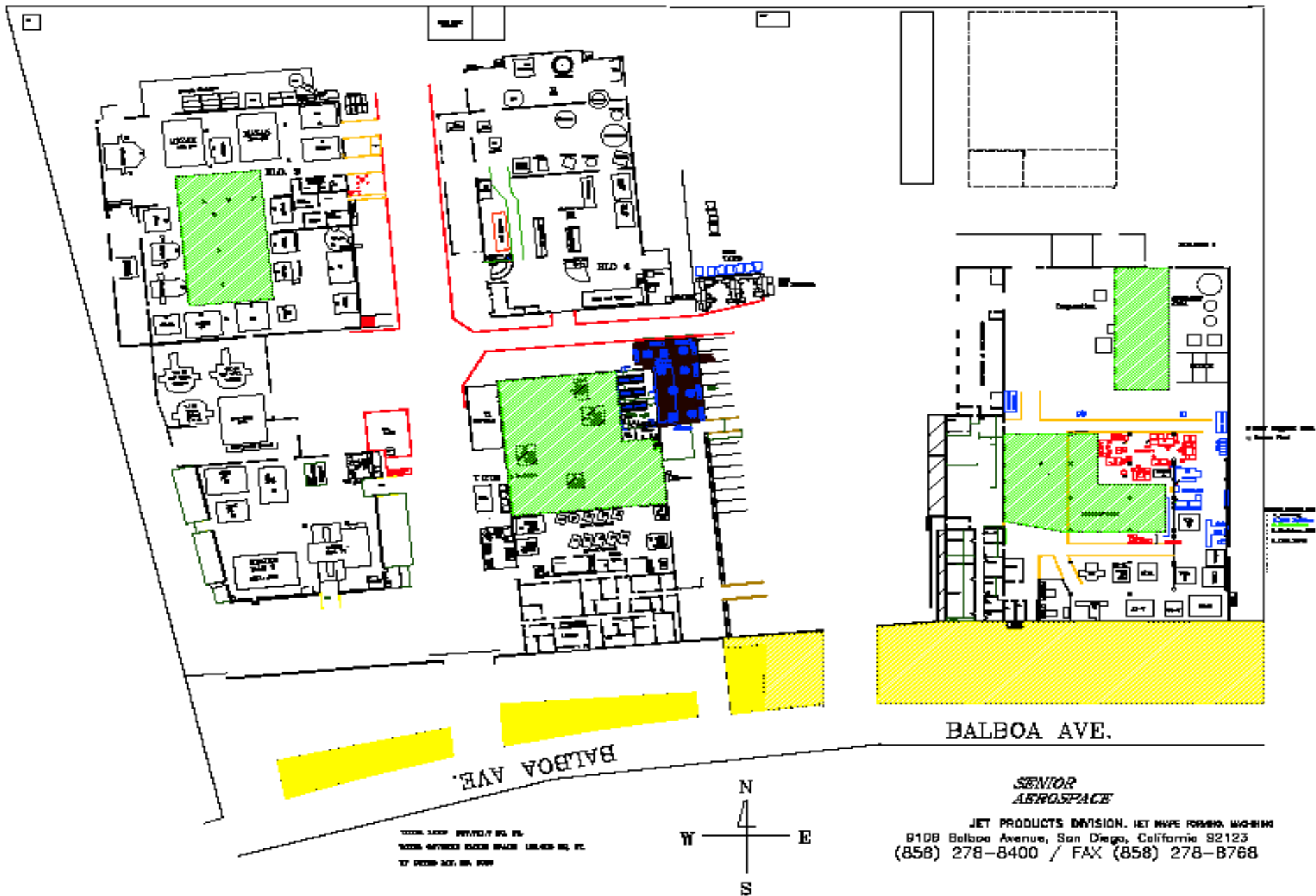
(%) 2010

# Jet Products

## History/Overview

- Founded in 1965.
- Moved to San Diego, Balboa Ave. in 1968 on 9 acre site, 150,000 sq/ft facility.
- Acquired by Senior Plc. in 1998 and became Senior Aerospace - Jet Products Division.
- 2011 sales of \$56M, \$57M projected for 2012.
- 190 employees, non-union.
- 95% commercial aerospace, 5% military.

# Site Layout (22k sq/ft opened)



# Certifications / Support Capability

- ISO 9001:2008 - AS9100 Rev C.
- Nadcap Approved for welding and heat treating
- ISO 14001:2004.
- Certified as delegated source to various primes:  
(Spirit/Boeing/RR/GE/GR/AEM/MHI/MRAS)
- ITAR / EAR compliant.
- Customer MBD / DPD certified.
- Catia V5, Solidworks, Surfcam, I-Compare, Vericut.



# Core Business

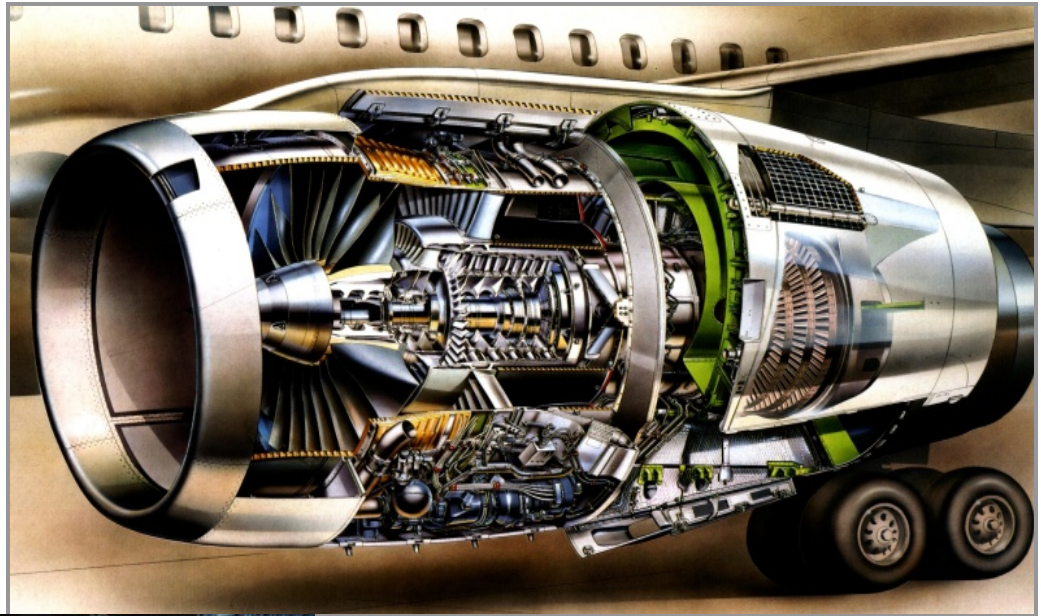
- Near-net shape technology.
  - In house roll-forming machines for Titanium, Inconel, Stainless Steel types
  - CNC rounding of Aluminum and Titanium extrusions.
- Flash welding.
  - 300, 600 and 1500Kva.
  - Materials include Titanium, Inconel, Stainless Steel.
- High speed turning and 5-axis Milling.
  - Size range up to 180” turning diameter, table speeds up to 200 rpm.
  - Size range up to 180” milling diameter, spindle speed up to 33k rpm
- Assembly capability.
  - Cellularized assembly capability, fastener type and class-A welding.

# Core Business

- New Product Introduction (NPI).
  - Dedicated New Program Manager; former Ops Director, with 27 years of machining and management at Jet Products.
  - Microsoft Project utilized as direct link to customer during NPI.
- Engineering.
  - In-house Engineering Dept utilizing Catia V5, Solidworks, Surfcam, I-Compare, Vericut.
  - In-house tool design and manufacturing.
- Lean Manufacturing.
  - Established Lean program, with full time in-house Coordinator.
  - Regular kaizen events, visual performance boards throughout facility.

# Markets Served

## Airframe



THE POWER  
OF FLIGHT

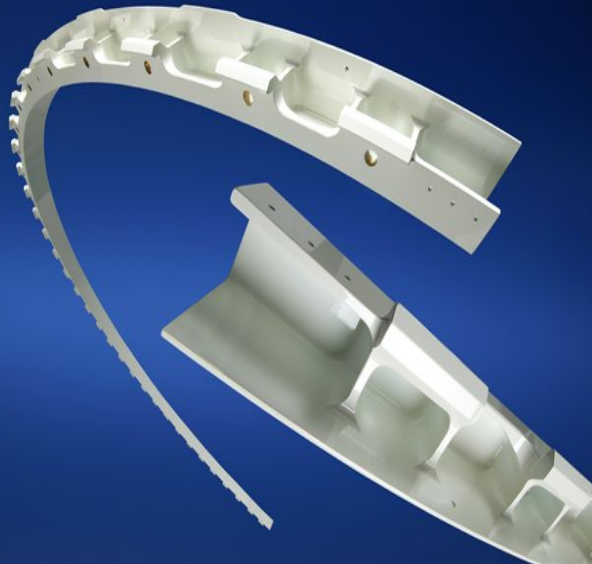


## Gas Turbines

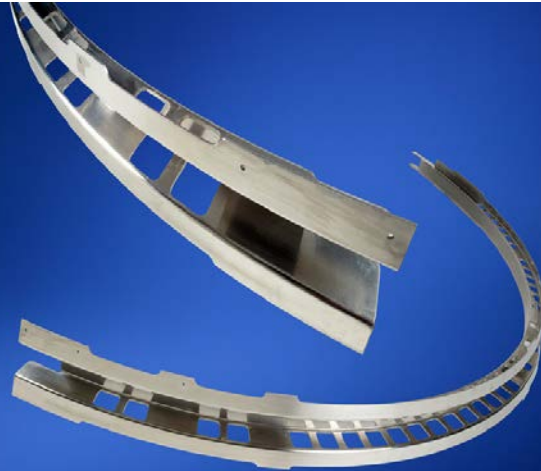
**senior**  
Aerospace



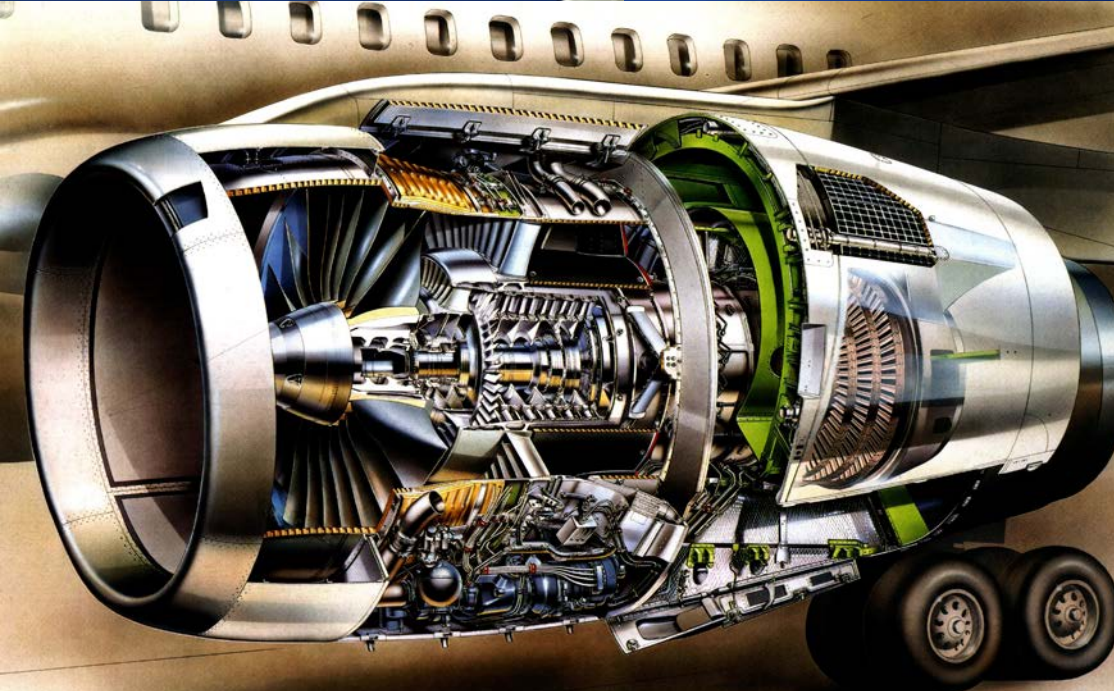
**Inlet Attach Ring, B777**



**Load Share Ring, B777**



**Cascade Support Ring, B737**



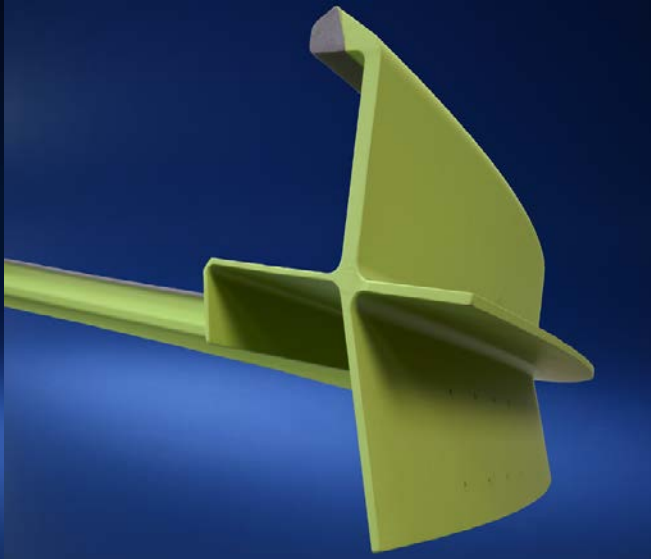
**Torque Box Ring, ERJ190**



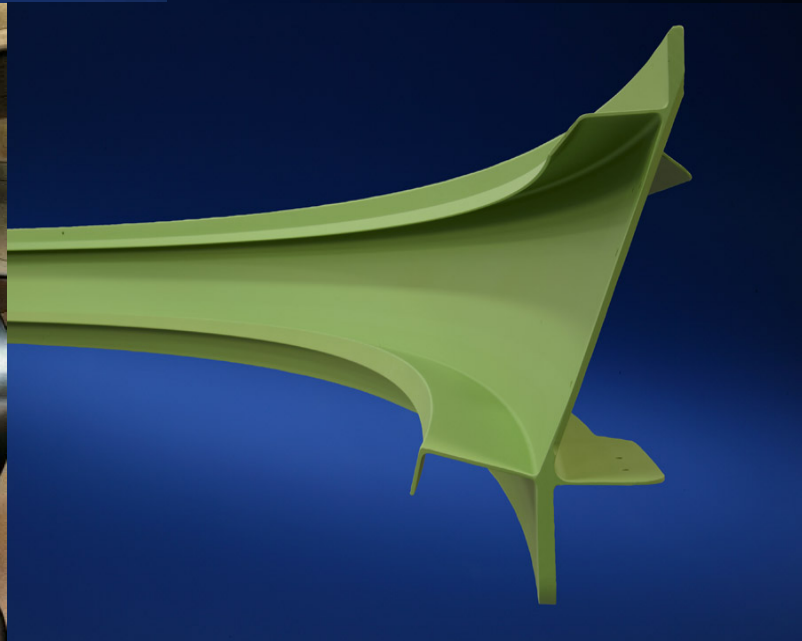
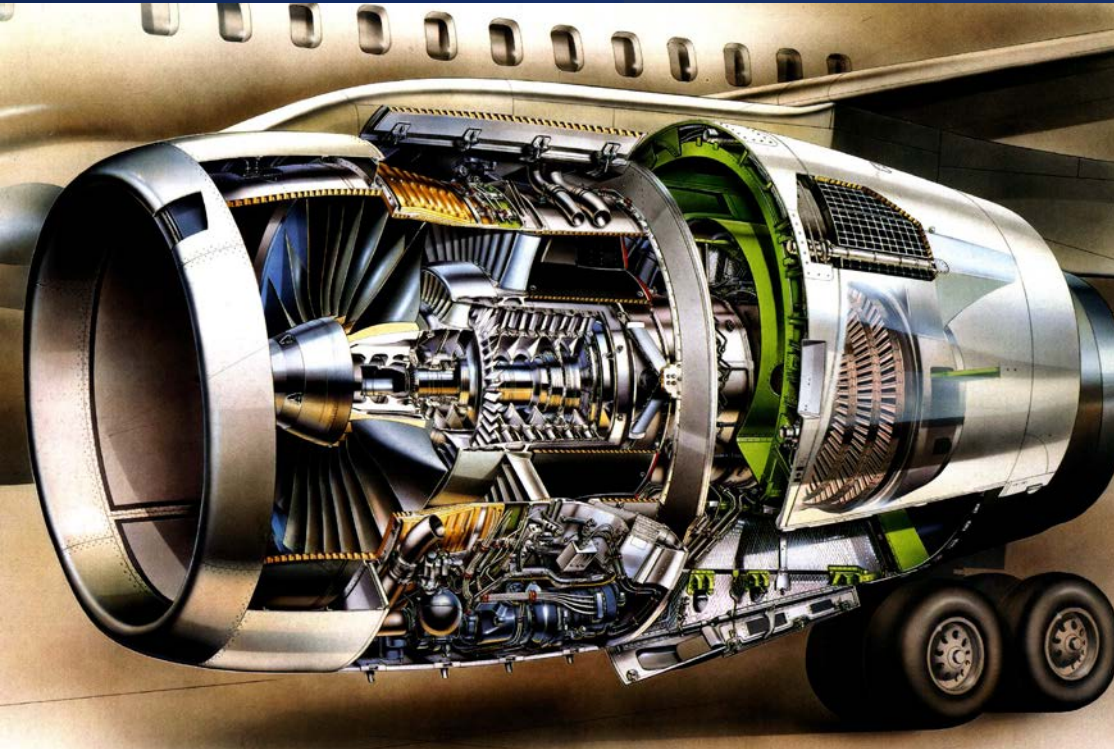
**V-Blade Ring, B777**



**V-Blade Ring, B787**



**V-Blade Ring, B737**

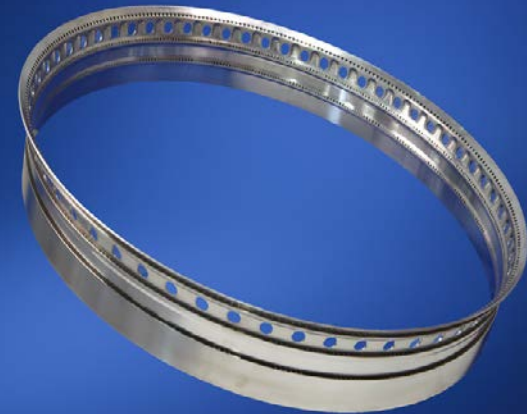


**Torque Box Ring, A350**

**Engine Attach Ring, B737**



**Combustion Chamber Rings, B777**



THE POWER  
OF FLIGHT



**Inner Annulus Assembly, A330**

# Machine Capabilities





32 ft gas fired forming furnace.





Custom roll-form machines, near-net shape.

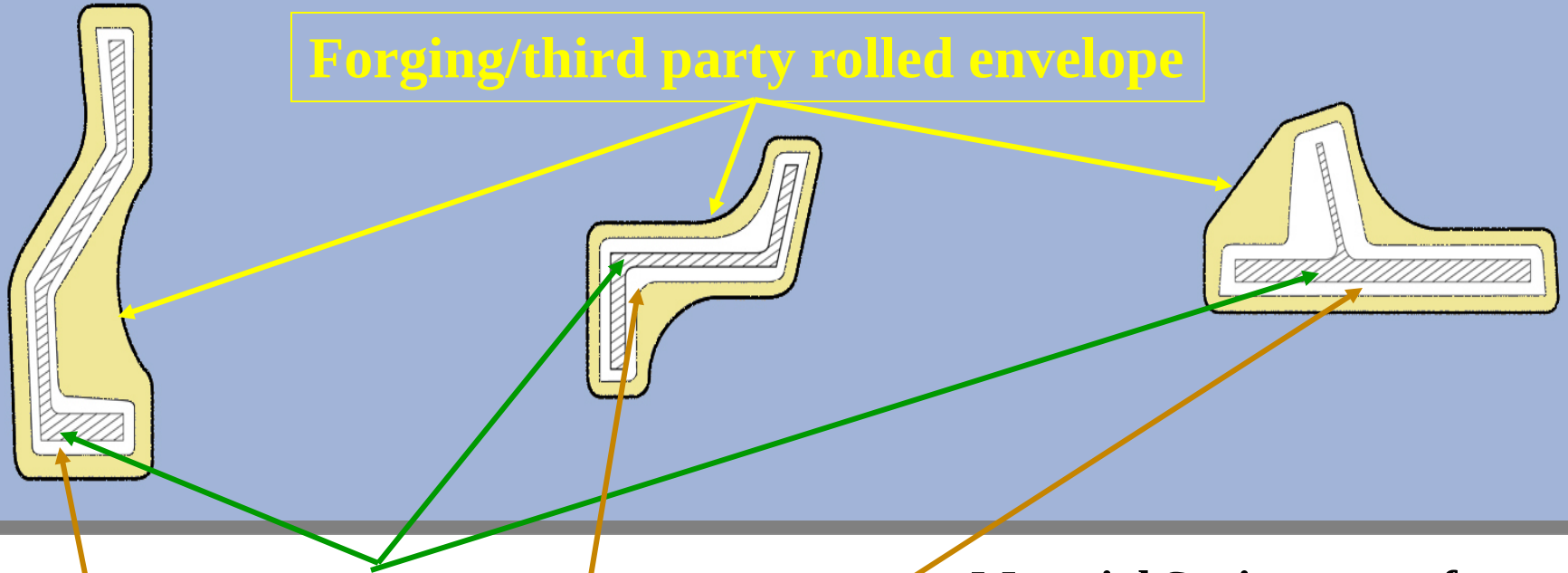
**senior**  
Aerospace



Custom roll-form, 100 ton, CNC controlled.

# Net Shape or Extrusion

Forging/third party rolled envelope



Finished part

*Jet Products envelope*

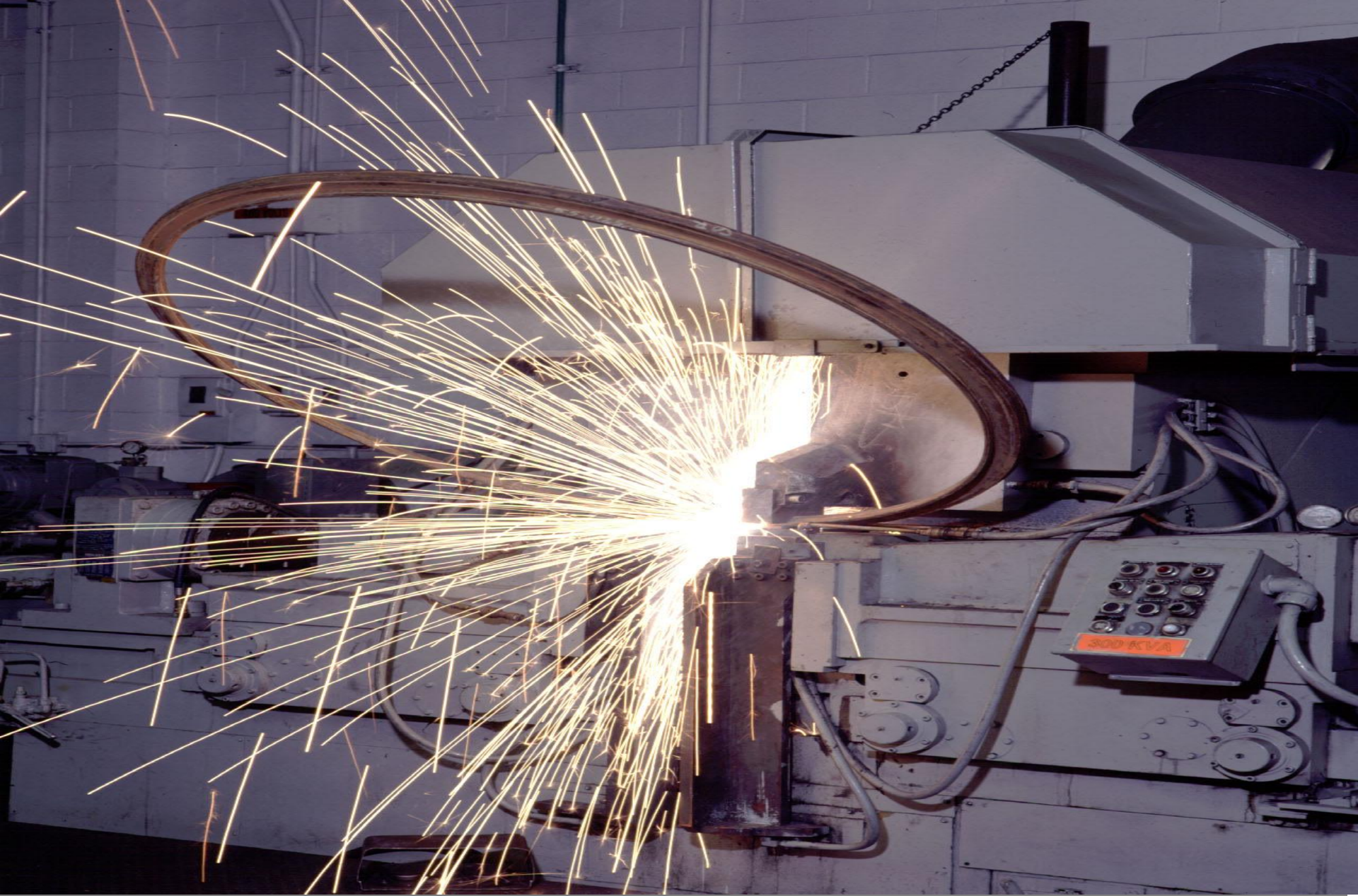
Material Savings can often  
be 20-30% compared to  
standard forgings or mill rolled  
shaped bar



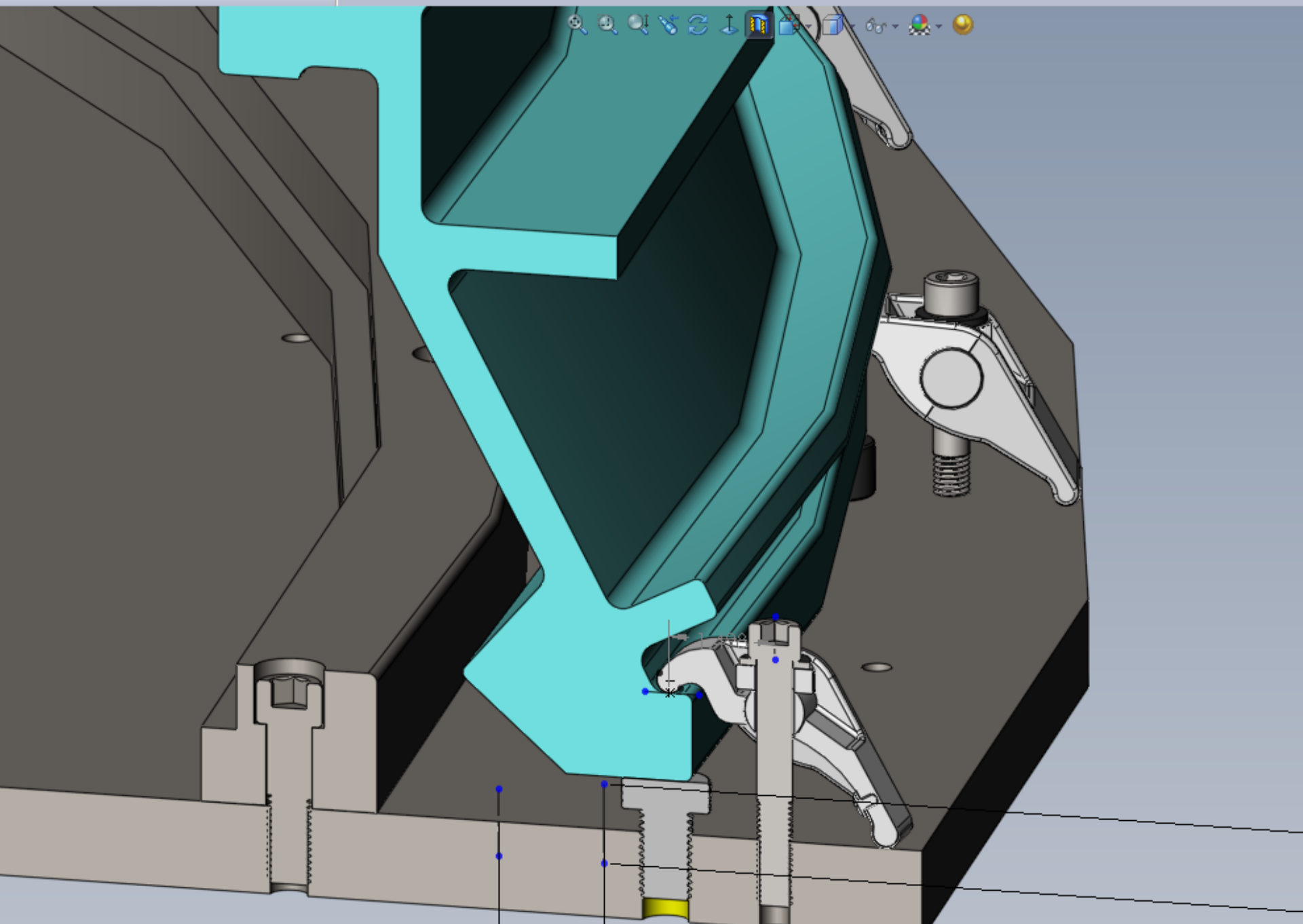
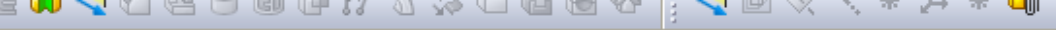


CNC controlled 4-roll rounder  
& 700 ton expansion, with 800 ton clamp.

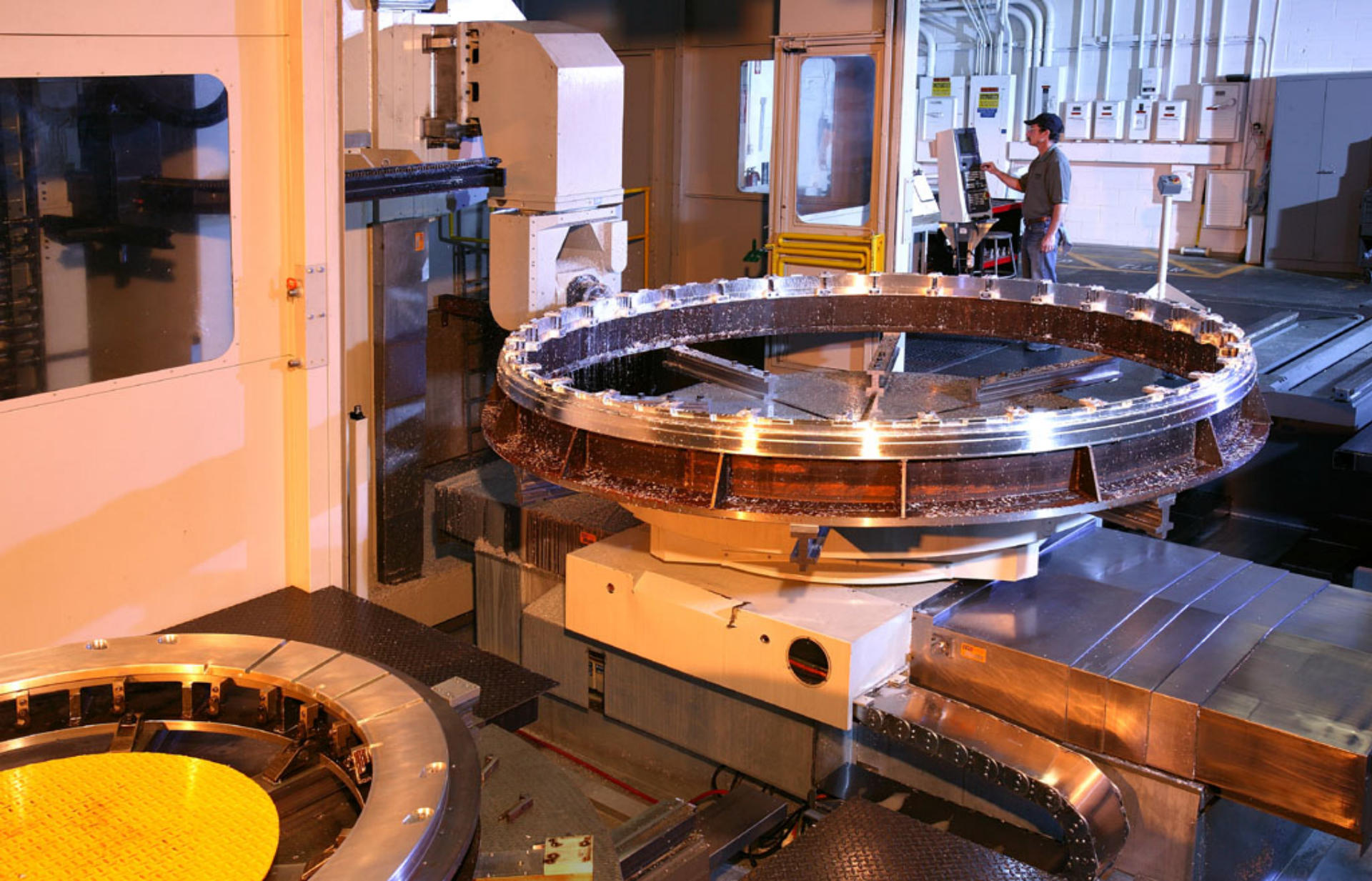




600 kva flash-butt welder.







Wotan 15k rpm 5-axis rotary mill,  
161" x 98" working envelope.





Makino Mag3H, 5-axis 33k rpm,  
118" x 72" x 40" working envelope.



Mazak #1, 10k rpm 5-axis milling w/200 rpm mill-turn table,  
92" x 70" working envelope.





Dual pallets, reduced NVA.





G & L high-speed 200 rpm, 106" dual head VTL,  
with 24 position tool changers and Renishaw probe.



High-speed 150 rpm, 90" dual head VTL w/mill head,  
dual 12 position tool changers.





High speed 100 rpm, 180" dual head VTL,  
dual 12 position tool changers.

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Aerospace





New 5,600 sq/ft assembly area.

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B777 & B737 hardware in work.

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Aerospace



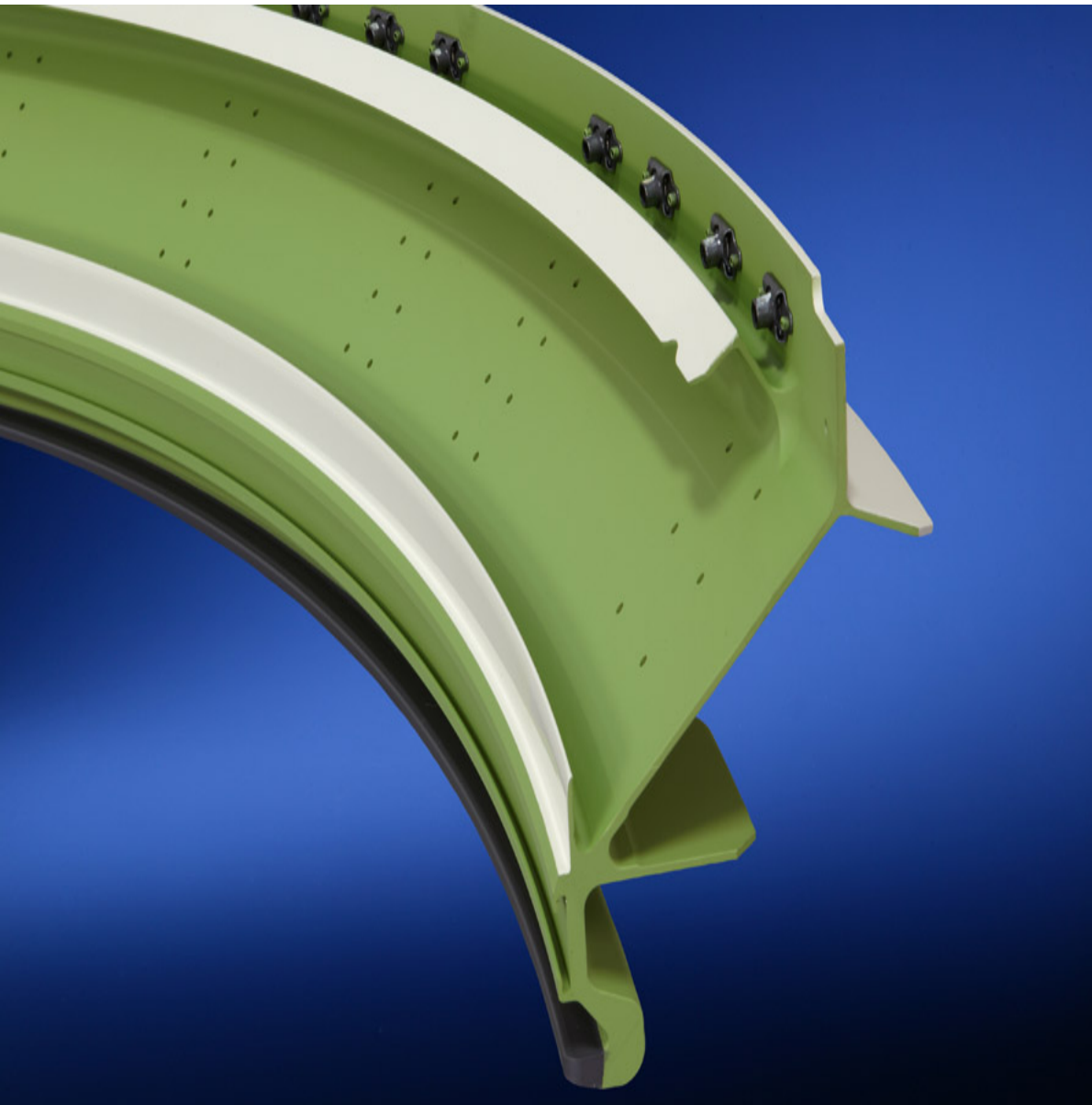
# Assembly/Kitting



- V2500 inner annulus (A321)
- Trent 700 inner annulus (A330)
- Trent 700 plug assembly (A330)
- RB211-535 nacelle kit (B747)
- RB211-535 skin assembly



# Assembly/Kitting



- CFM56-7 V-blade/Cascade sub-assembly. (B737)
- GE90-115 V-blade sub-assembly. (B777)
- GenX-1b V-blade sub-assembly. (B787, GE)
- T1000 V-blade sub-assembly. (B787, RR)
- XWB Torque Box sub-assembly. (A350, RR)
- GenX-2b Torque Box/Cascade/Load Share/IVG sub-assembly. (B747-8)

# Customers

- Spirit Aerosystems
- Middle River Aircraft Systems
- Goodrich Aerostructures
- Rolls Royce
- GE Aircraft Engines
- Aermacchi
- Aircele
- Volvo Aero
- Boeing
- Unison
- US Government (Tinker)
- Delta Industries
- Turbo Combustion Tech
- ATK - Alliant Techsystems
- Timet (Armor Plating)

# Active Programs

- Boeing
  - B737
  - B777
  - B787
  - B747 / B747-8
  - B767
- Airbus
  - A319/320/321 Family
  - A330
  - A340
  - A350
- Regional Jet
  - Bombardier - CRJ 700/900
  - Embraer – ERJ 140/170/190
  - Falcon 7X
  - China Regional
- Military
  - F16
  - Eurofighter
  - Striker (Armor Plate)



