

Ohio Aerospace and Aviation Technology Committee, Field Meeting NASA GRC



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Business Development and Global Support

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ENGINEERING YOUR SUCCESS.

Parker Hannifin Corporation



Corporate headquarters • Cleveland, Ohio

Parker Hannifin Corporation



A worldwide, diversified manufacturer of motion and control technologies and systems

- Centrally led, decentralized company
- Broad market exposure
- \$13B in annual sales
- 323 facilities
- 57,500 employees

Parker Aerospace



Aerospace Group headquarters • Cleveland, Ohio

Parker Aerospace

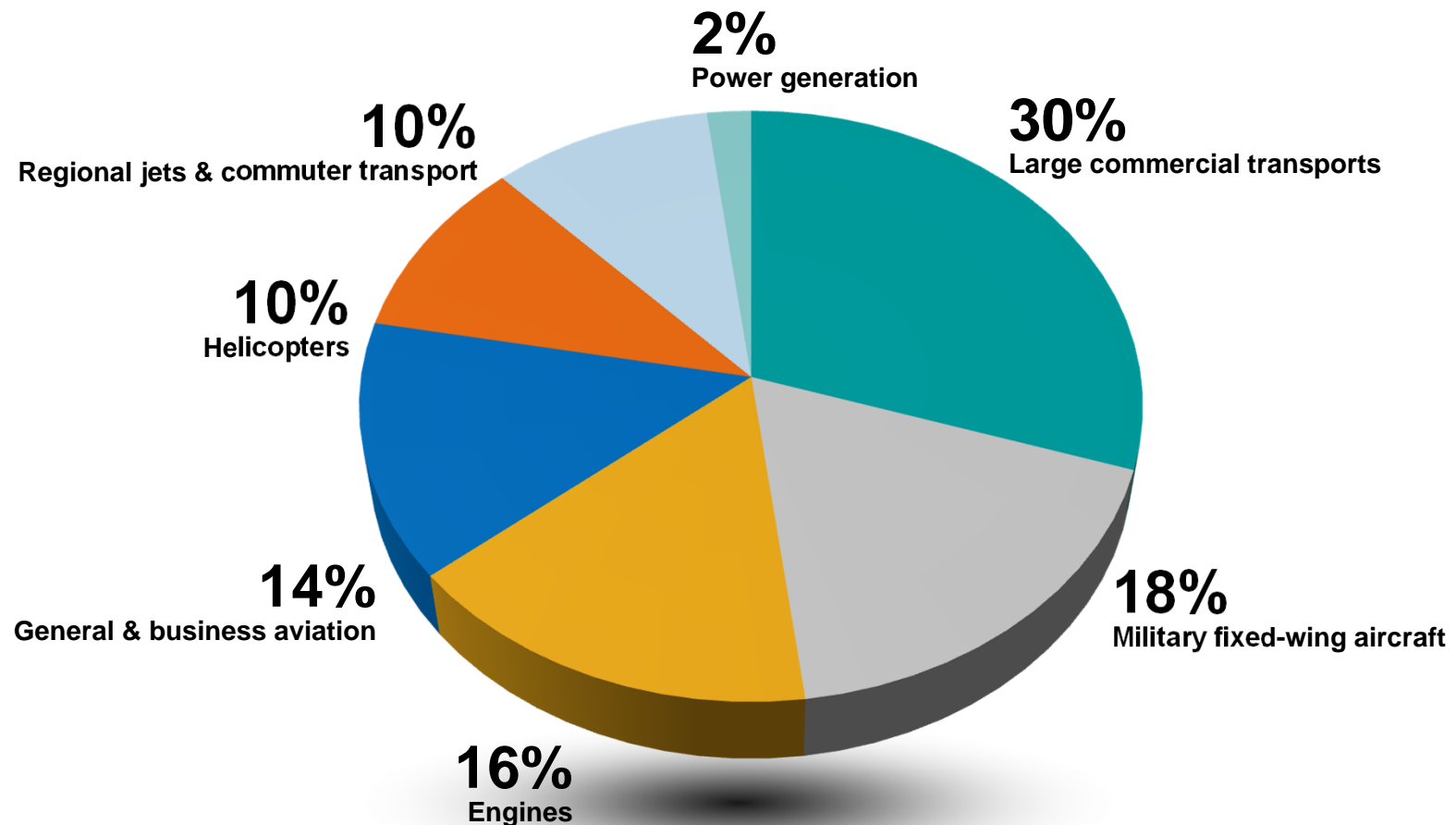


Global leader in flight control, hydraulic, fuel and inerting, fluid conveyance, thermal management, pneumatic, and lubrication systems and components

- \$2.3 billion in annual sales
- 5,800 employees
- Seven divisions, 38 worldwide locations

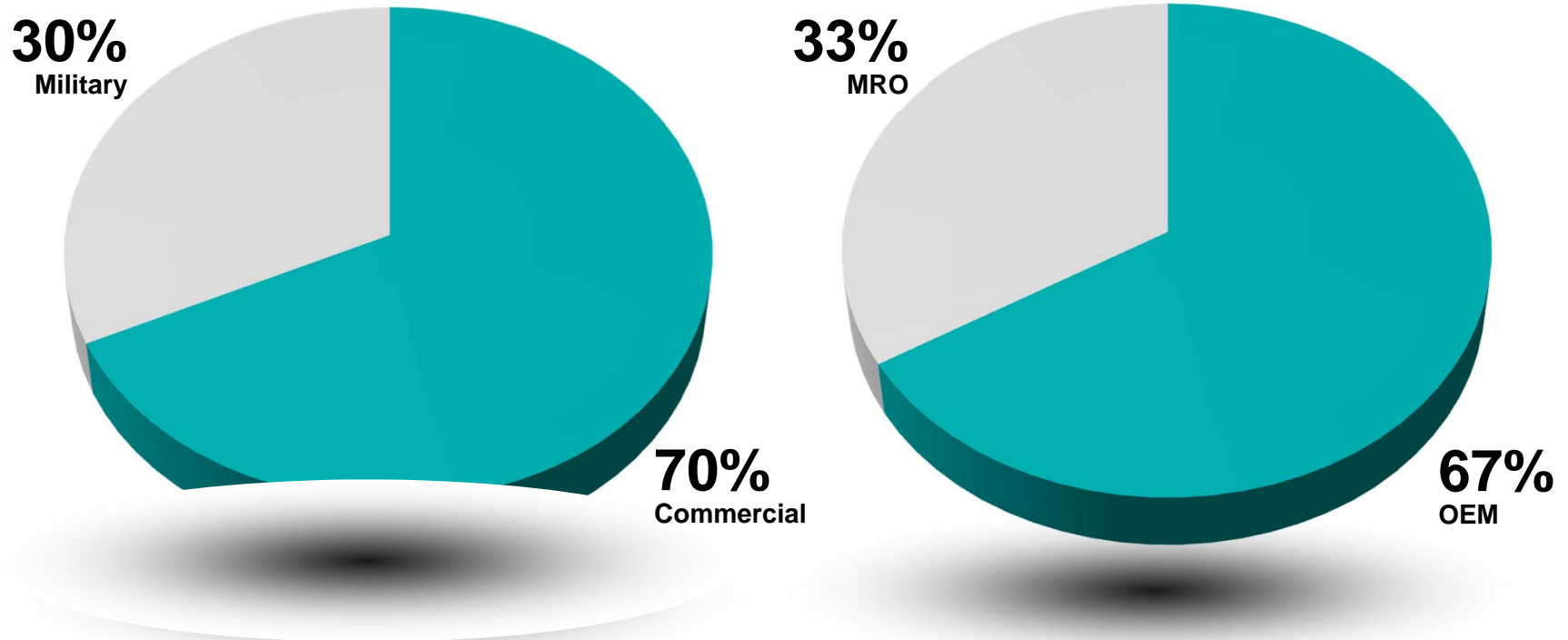
Updated 06/16

Our markets, a balanced portfolio



Fiscal year 2015: 07/01/14 – 06/30/15

Our business split



*Business **strength** and **stability** based on a **diverse** portfolio*

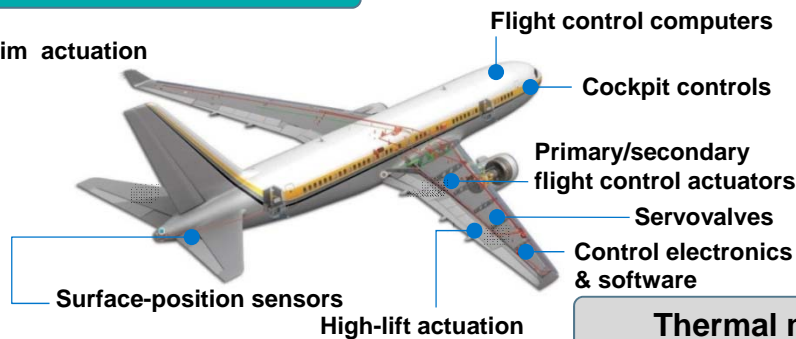
Fiscal year 2015: 07/01/14 – 06/30/15

Broad systems knowledge & experience

Sharing best solutions across all platforms

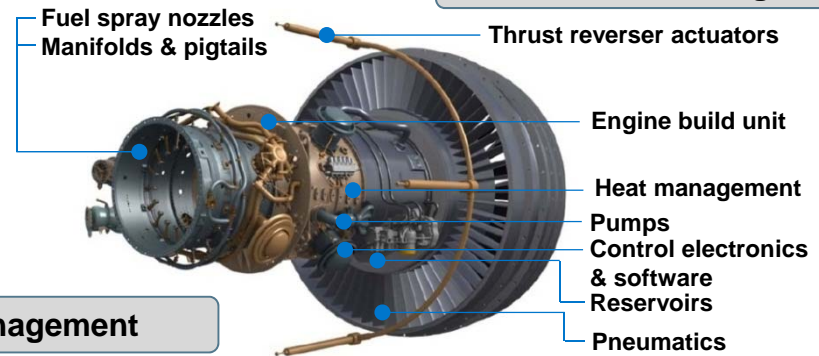
Flight control

Trim actuation



Thermal management

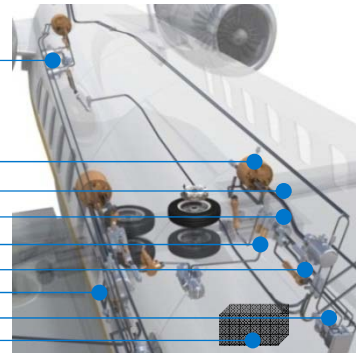
Engine



Hydraulic

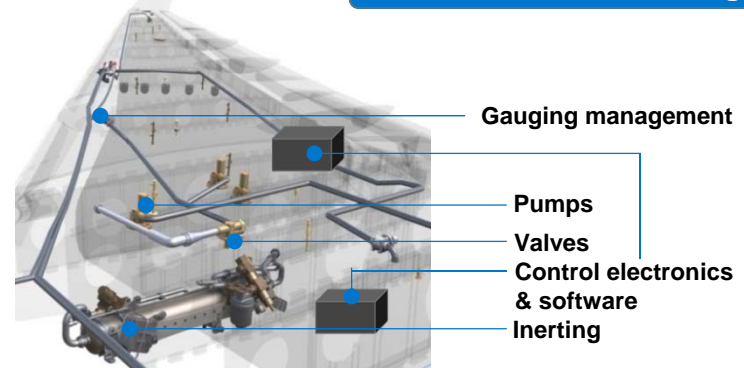
Ground service equipment

Reservoirs
Accumulators
Wheels & brakes
Filters
Valves
Heat exchangers
Pumps
Control electronics & software



Fluid conveyance

Fuel & inerting



Engineering highlights

A brief history of Parker Aerospace's engineering accomplishments

1920s & '30s
The growing
aerospace industry



Liberty main engine crank shaft



Ram air turbine
pump for
Curtis NC-4



Fuel
primer



DC-3
deicer pump



Lycoming VO
engine gerotor



B-52 level
control valve

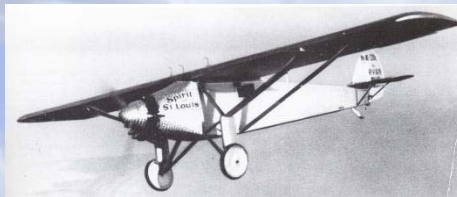
1920

1930

1940

1950

1927
The Spirit of St. Louis



Army/Navy standard fitting



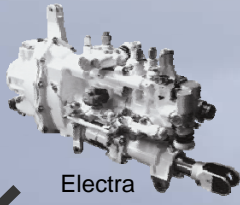
GE1-16 oil pump

Engineering highlights

A brief history of Parker Aerospace's engineering accomplishments



J-79 exhaust nozzle actuator



Electra servoactuator



727 fuel jettison valve



707 rudder power control unit

1969 & 1972

Parker goes to the moon



Dash 6 accumulator

1960

1970s

Inerting systems



Douglas DC-10 fuel gauging system

1970

AH-64 wheels & brakes



Piper Malibu wheel & brake



AH-64 actuator

1975

Parker goes to Mars



B-2 aerial refueling receptacle



CFM56 fuel nozzle

1980



General Electric J-79

UH-1 transmission lubrication pump



Continental 10-520-B

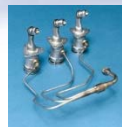


SR-71 inlet spike actuator

1970
Apollo 13 crisis



TF39 fuel nozzles

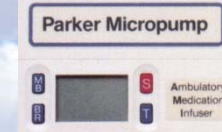


1970s

Medical pump breakthroughs



F27 fuel pump



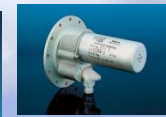
Canadair CL-600 aileron power control unit



Pratt & Whitney PW100



PW100 fuel nozzle



1C64-1 fuel pump

767 outboard aileron servoactuator



A310 AC motor pump



T700 fuel nozzles

Parker Aerospace

Engineering highlights

A brief history of Parker Aerospace's engineering accomplishments

1990

Air Force One



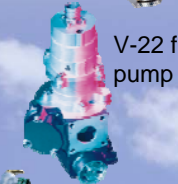
Gulfstream V
reservoir



LHTEC T800



Global Express
horizontal stabilizer
trim actuator



V-22 fuel transfer
pump



777 rudder power
control unit

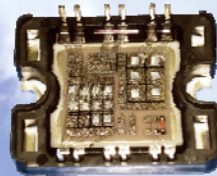


Super 31
cartridge/canister
fuel pump

1990

2000 - present

High-temperature electronics



2010

**Composite fans and
shrouds for electric motors**



2012

**Complete flight control
system integration testing**

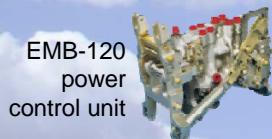


2000

2010

2001 - 2003

Inerting systems evolution



EMB-120
power
control unit



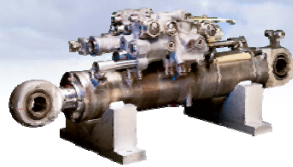
MD-11 fuel management
system

2000 - 2010

**Superior aircraft engine
feed pumps and controls**



C-17 fly-by-wire flight
control module



F-22 flight control actuator



2010

Jam-tolerant actuators



Gas Turbine Fuel Systems Division

Mentor, Ohio



Division headquarters • Mentor, Ohio

*Advanced Turbine
Fuel Nozzle
development with
NASA GRC,
CWRU, OAI,
WPAFB*

Aircraft Wheel & Brake Division

Avon, Ohio



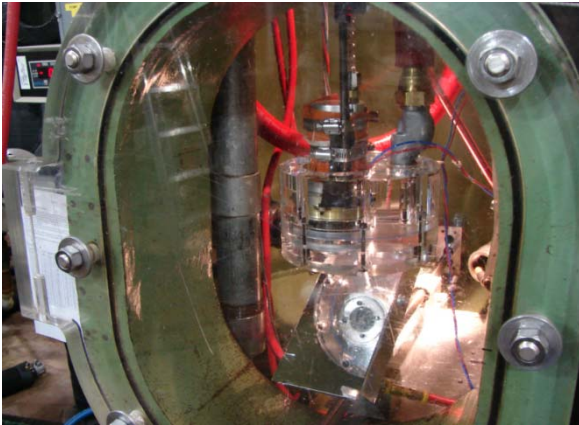
Division headquarters • Avon, Ohio

*Ceramic and
composite friction
material
development with
WPAFB*

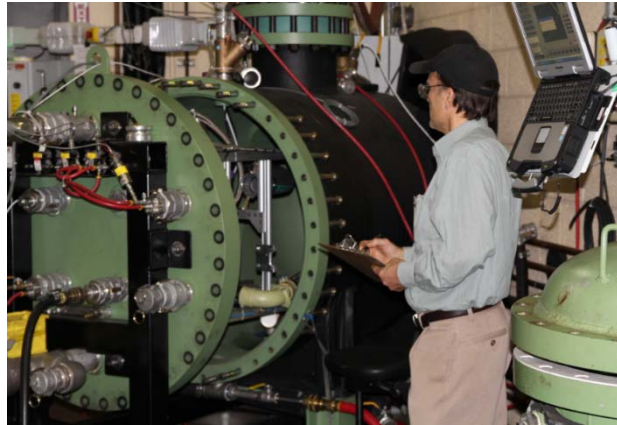
Fluid Systems Division

Elyria, Ohio

Fuel pump certification testing



250-800 gallon test vessels

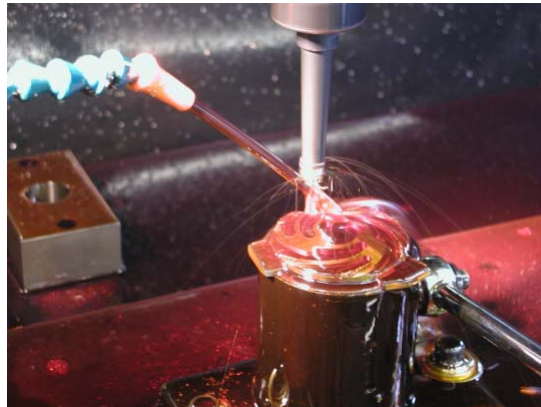


*Pump development
with OAI, NASA
GRC*

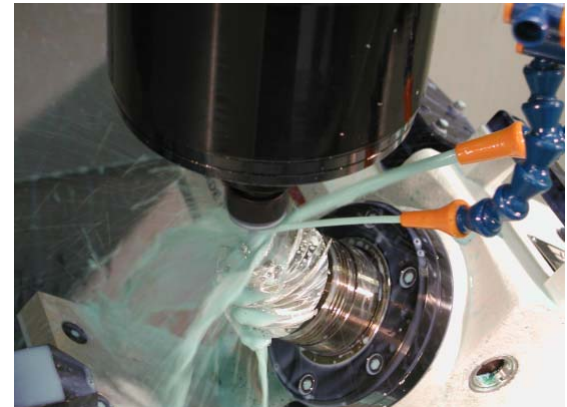
Fuel conditioning for testing



Multi-use model shop



Machining of pump components



Fluid Systems Division

Elyria, Ohio

AC & DC power supplies



Visual inspection tools for qualification testing



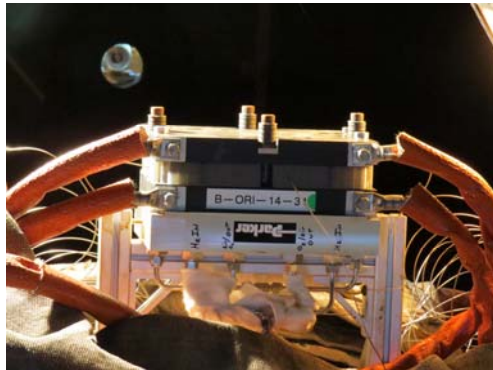
High-flow pump test stand



More Electric Aircraft development with WPAFB, NASA, OAI

Fluid Systems Division

Elyria, Ohio



FAA Failure Modes Test



Federal Aviation
Administration

*More Electric Aircraft –
Fuel Cell system
development with
WPAFB, NASA, OAI*



Parker Lab BERS Test Stand



Parker Lab G500 Test Stand



Parker Lab G200 Test Stand

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