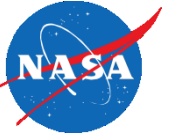




AERoBOND: Adhesive-free BONDing of complex composite structures

Frank Palmieri (PI)

CAS Showcase 2019
Ames Research Center
November 15th, 2019



The AERoBOND Team

Ames Research Center

- Lauren Abbot
- John Lawson
- Chang Woon Jang

Glenn Research Center

- Jon Salem
- Mike Pereira

Langley Research Center

- Frank Palmieri (PI)
- Tyler Hudson (co-PI)
- Austin Smith
- Roberto Cano
- John Connell
- Yi Lin
- Glenn Hrinda
- Carlos Davila

Global Growth in Aviation

Opportunities and Challenges



2017

4 BILLION

PASSENGER TRIPS

41,030
New Aircraft Deliveries

\$6.1 Trillion
Market Value

Bombardier /
Canada

Embraer /
Brazil

Global Competitors

Airbus /
Europe

78%
of New Aircraft
Deliveries are
Single Aisle Class
(including Regional
Jets)

2036

7.8 BILLION

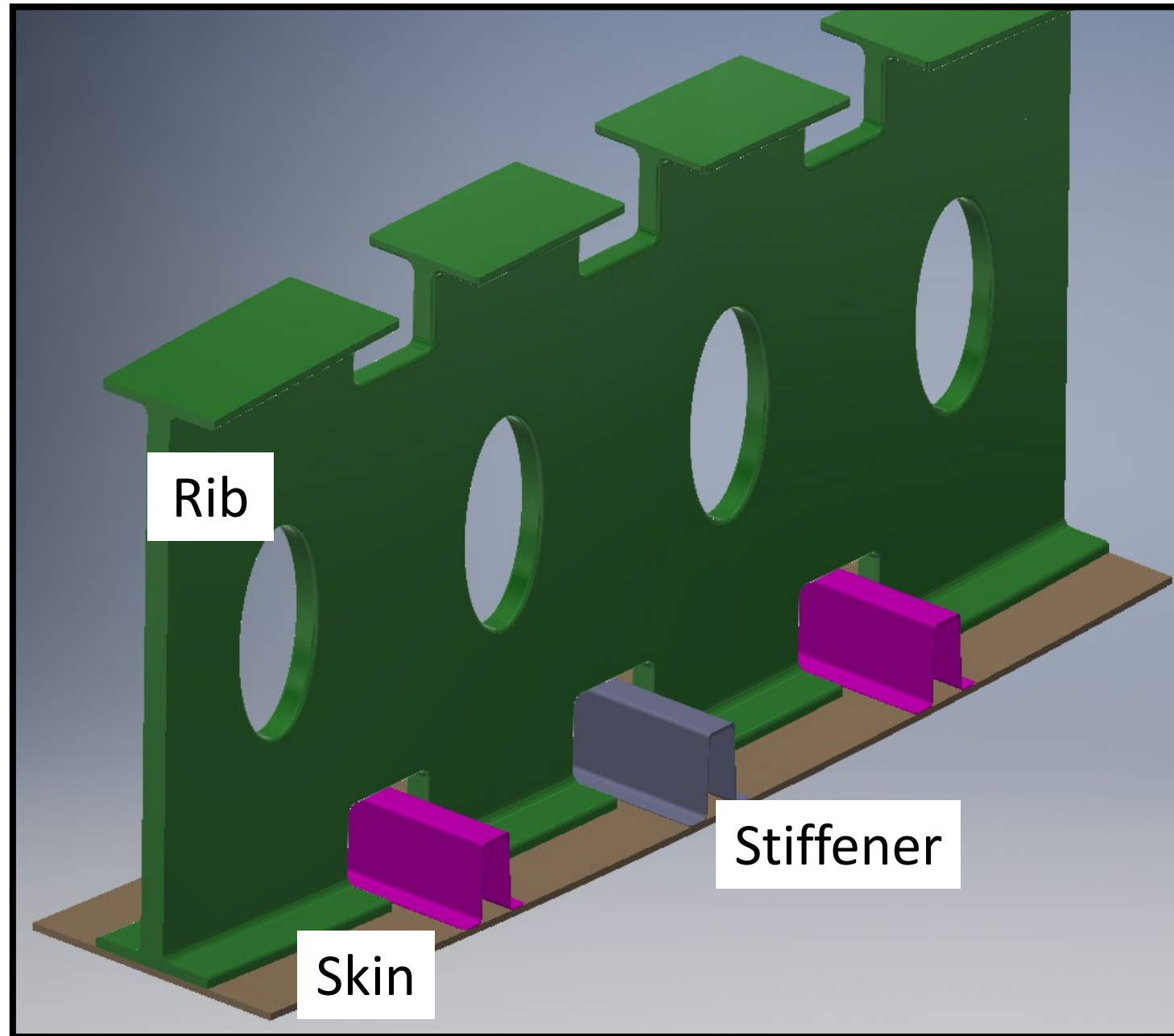
PASSENGER TRIPS

Irkut /
Russia

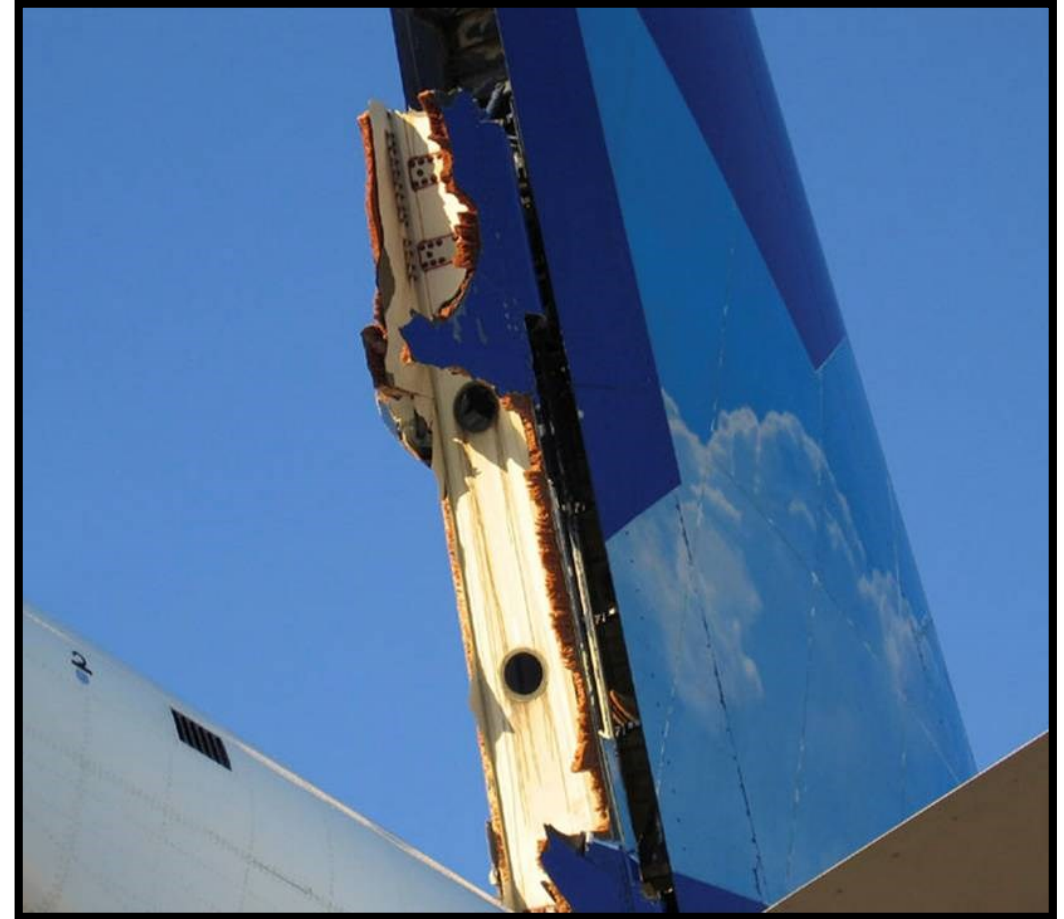
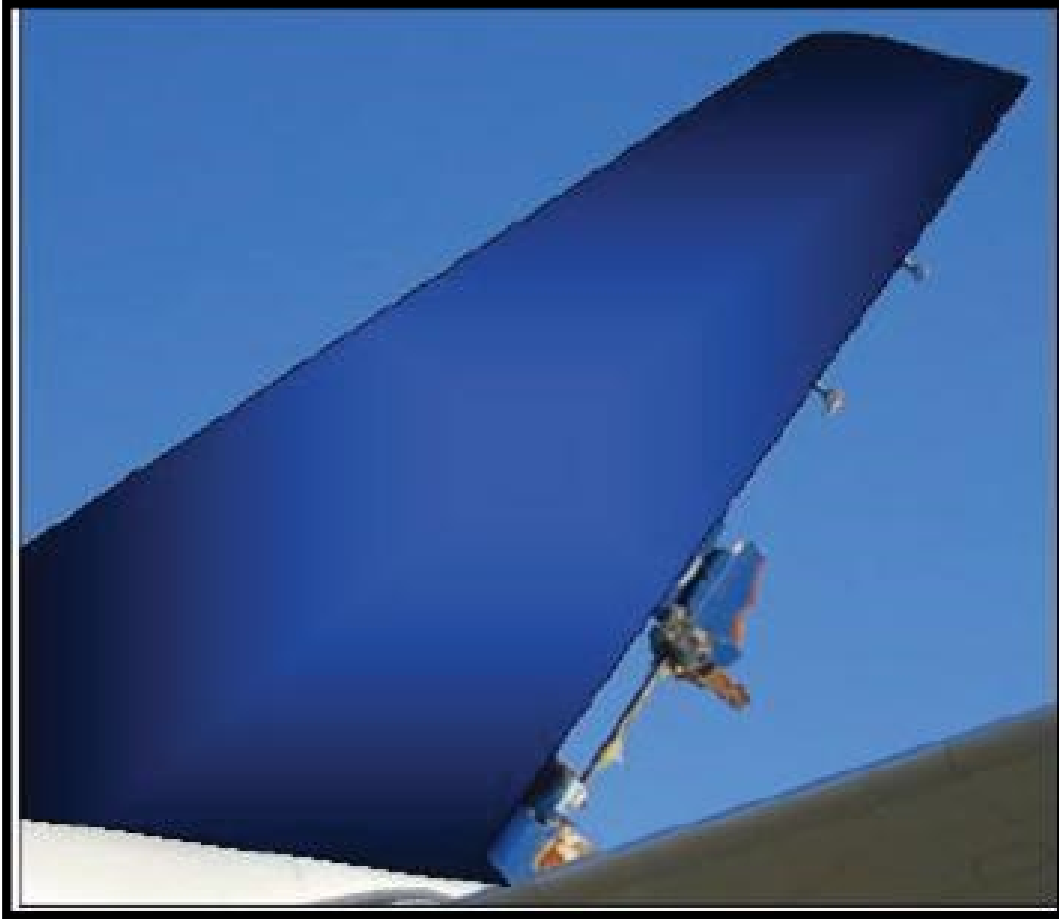
Comac /
China

Asia-Pacific
Market is Nearly
40%
of New Aircraft
Deliveries



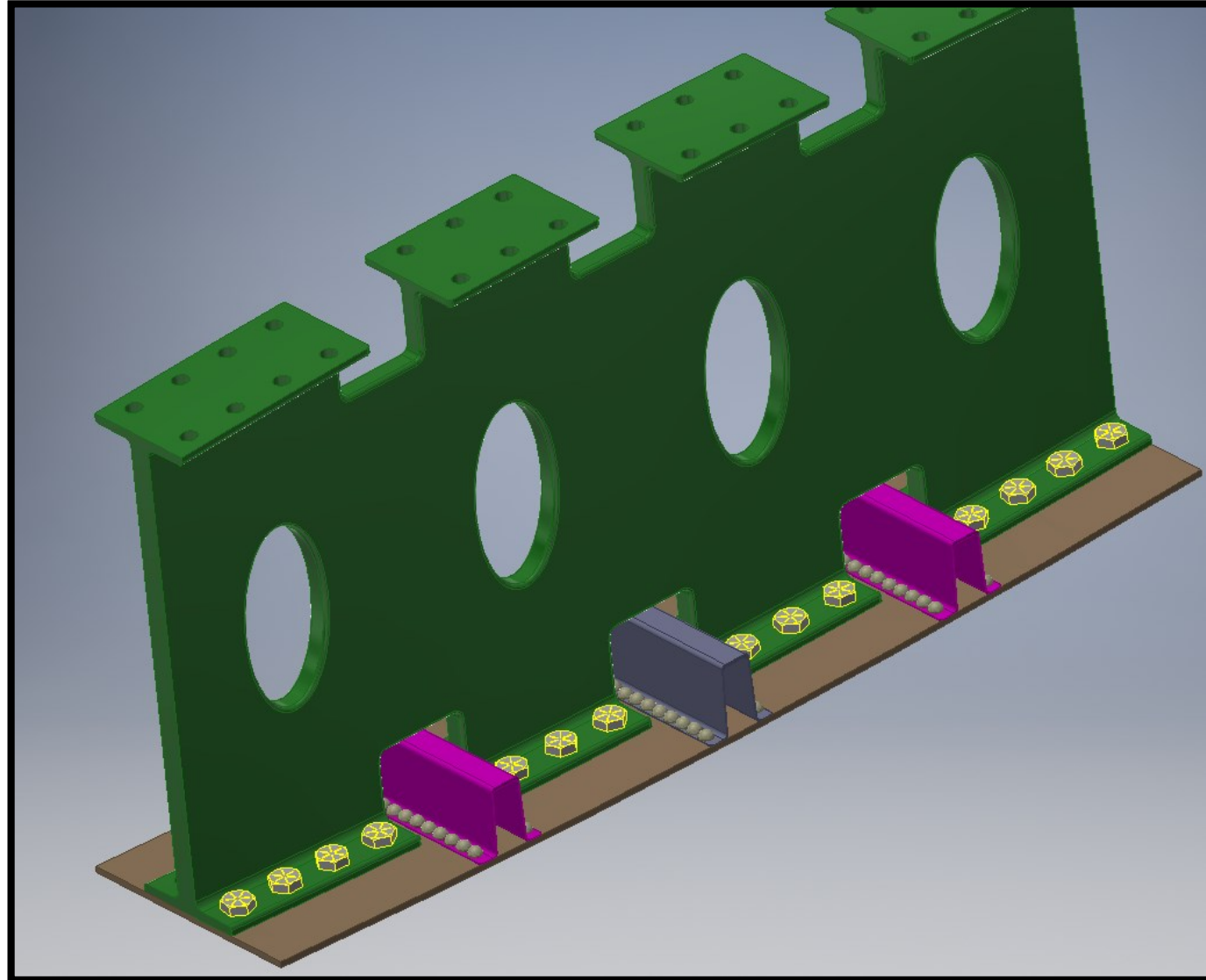
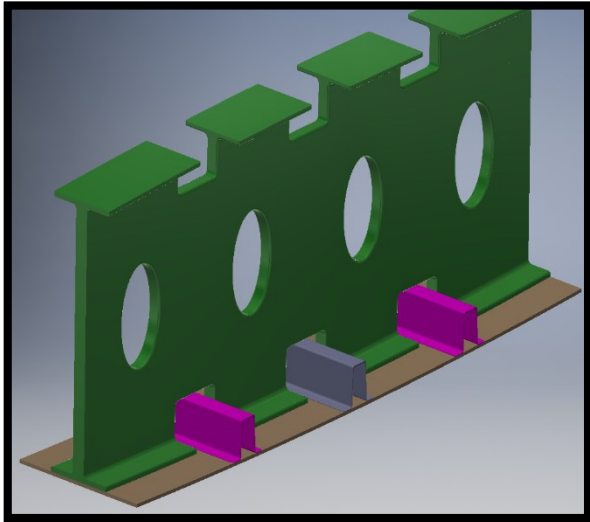






Composite Rudder Delamination 2005, Air Transat Flight 961 (Airbus A310)







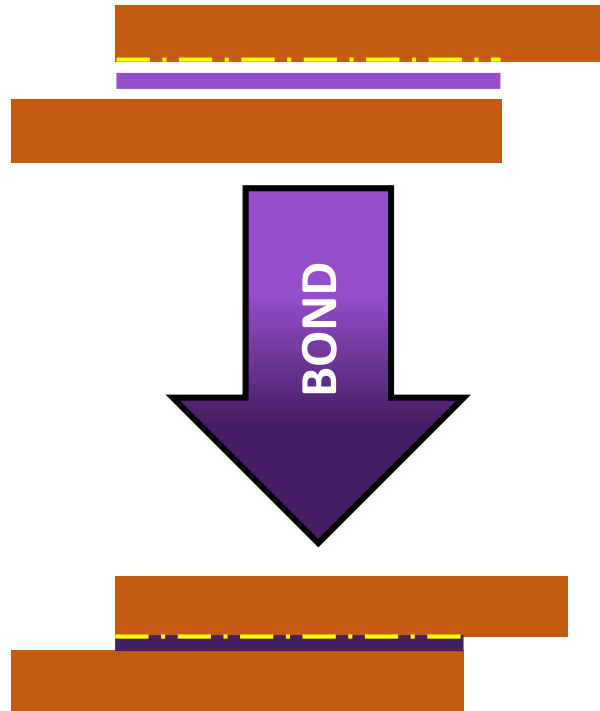
Wing 1
~21,000 bolts

Fuselage
~70,000 bolts

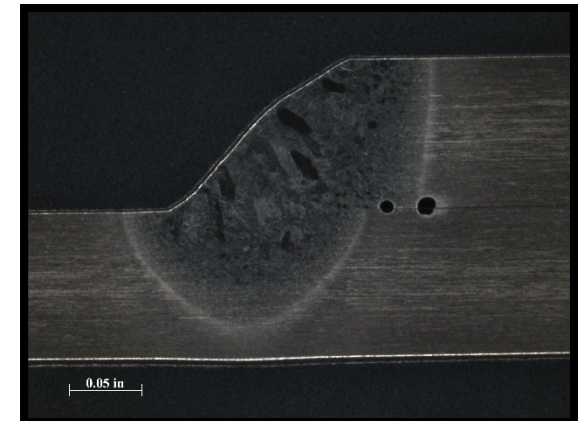
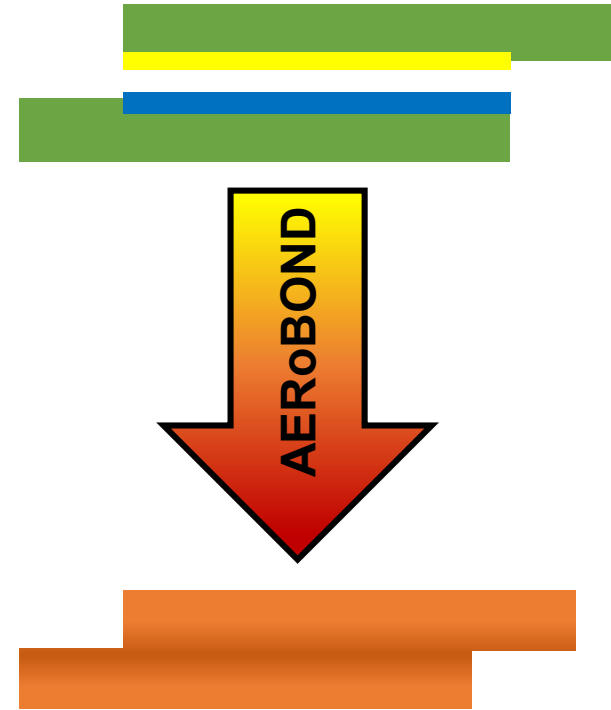
Wing 2
~21,000 bolts

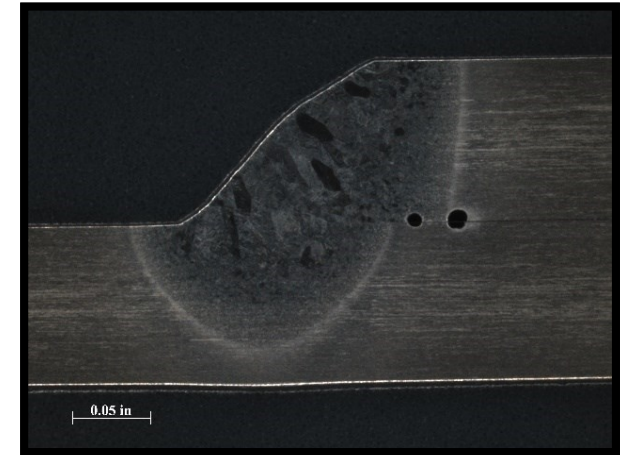
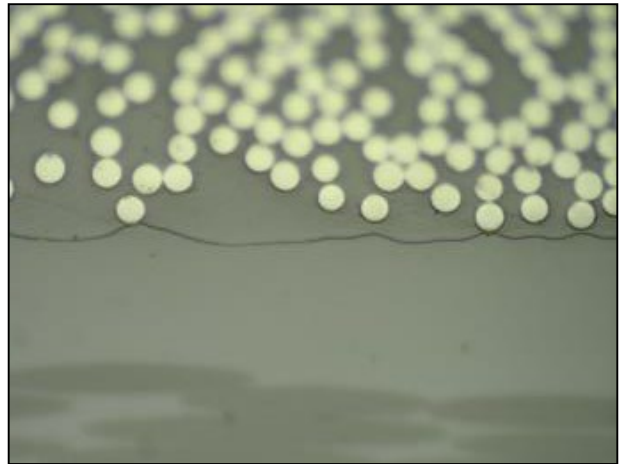
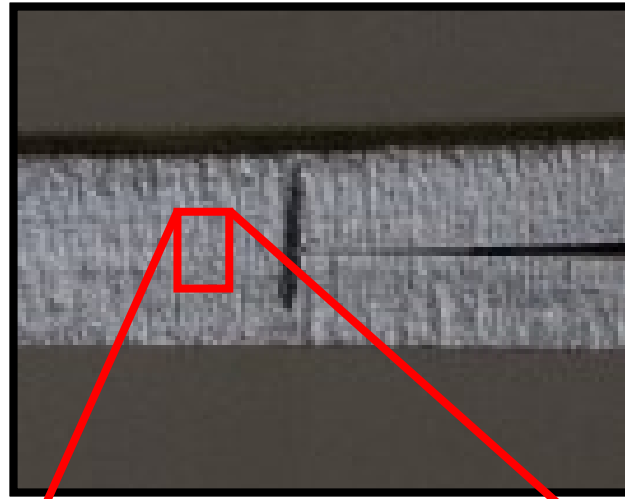
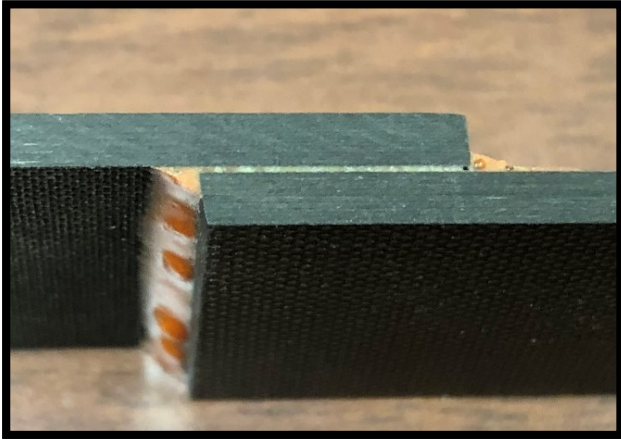


Bonding

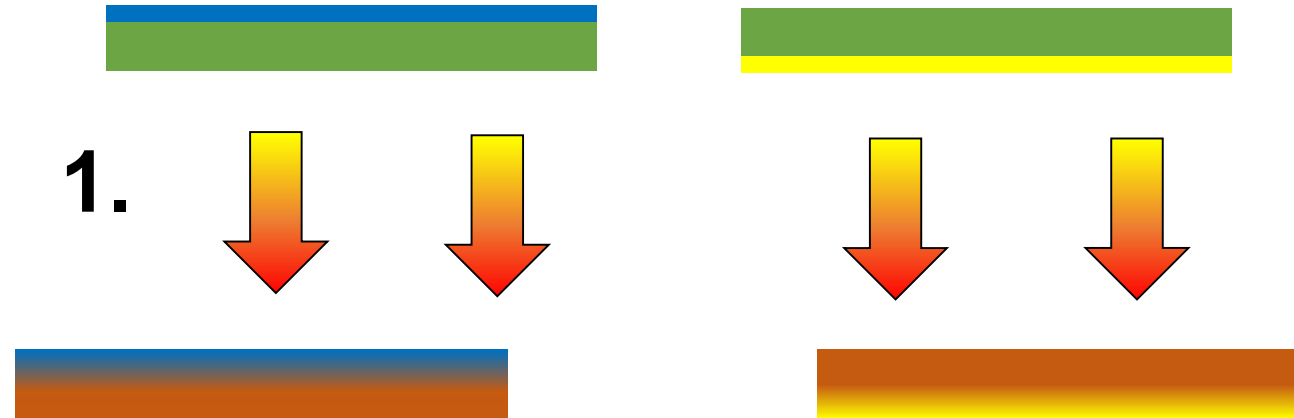


AERoBONDing

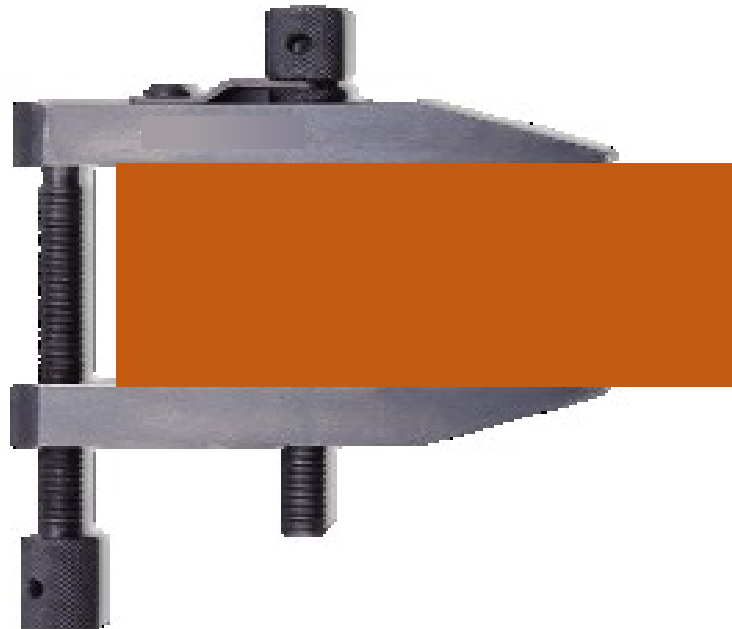




The AERoBOND Process



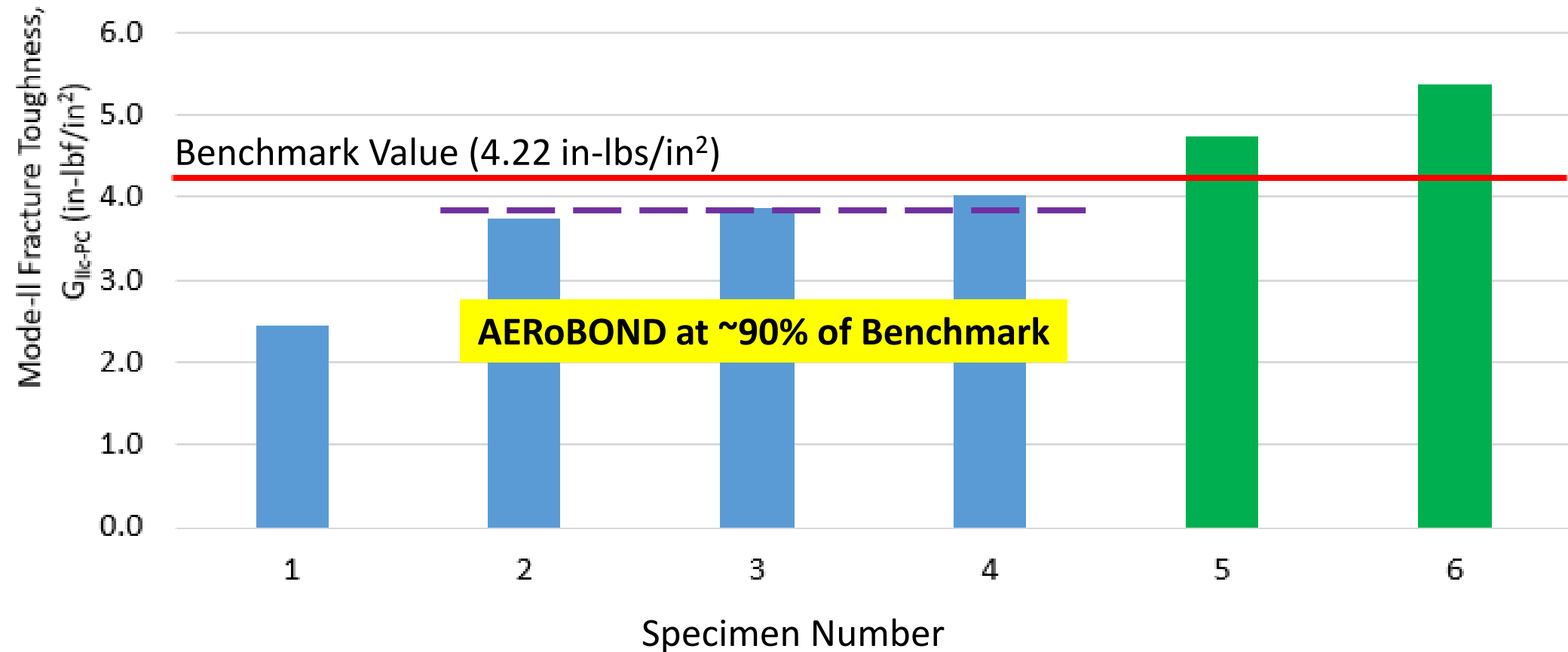
2.





Mechanical Performance

(End Notch Flexure Test)



Bond Failure



AERoBOND Failure



Cohesive Failure

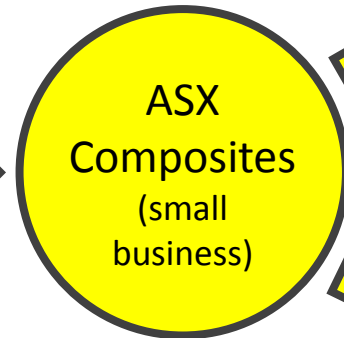


Adhesive Failure

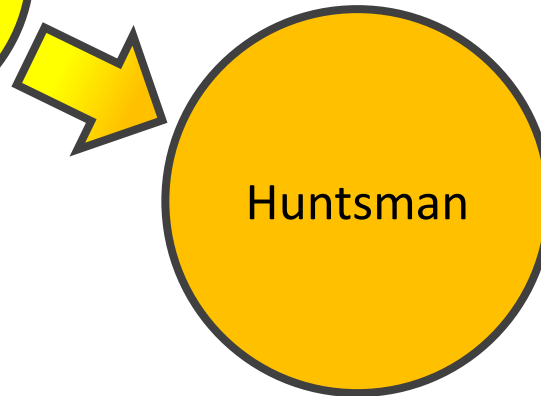
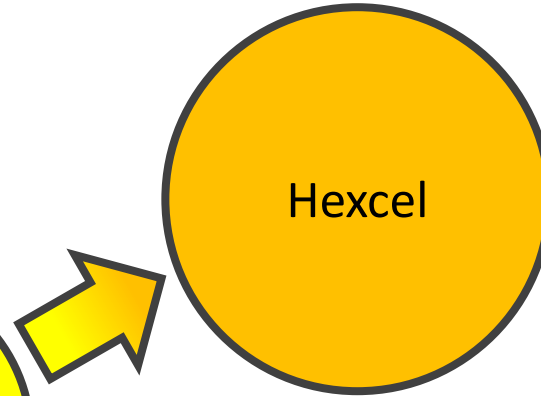


Cohesive Failure

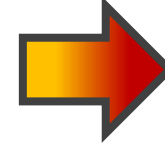
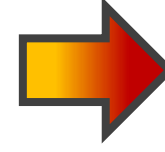
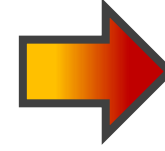
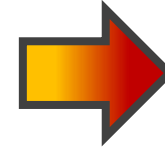
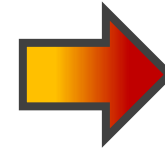
Research

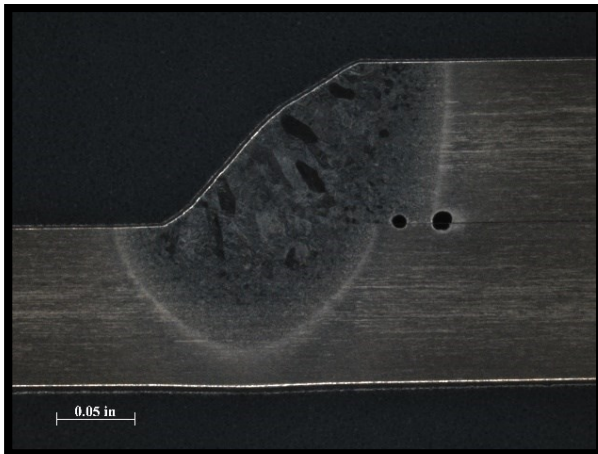
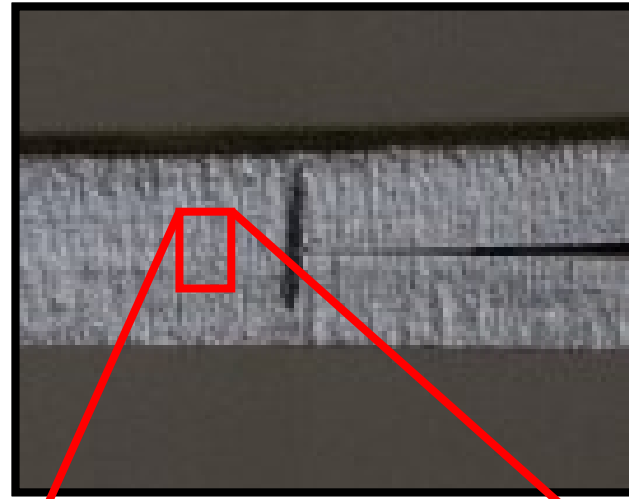


Material Suppliers



OEMs





Questions?