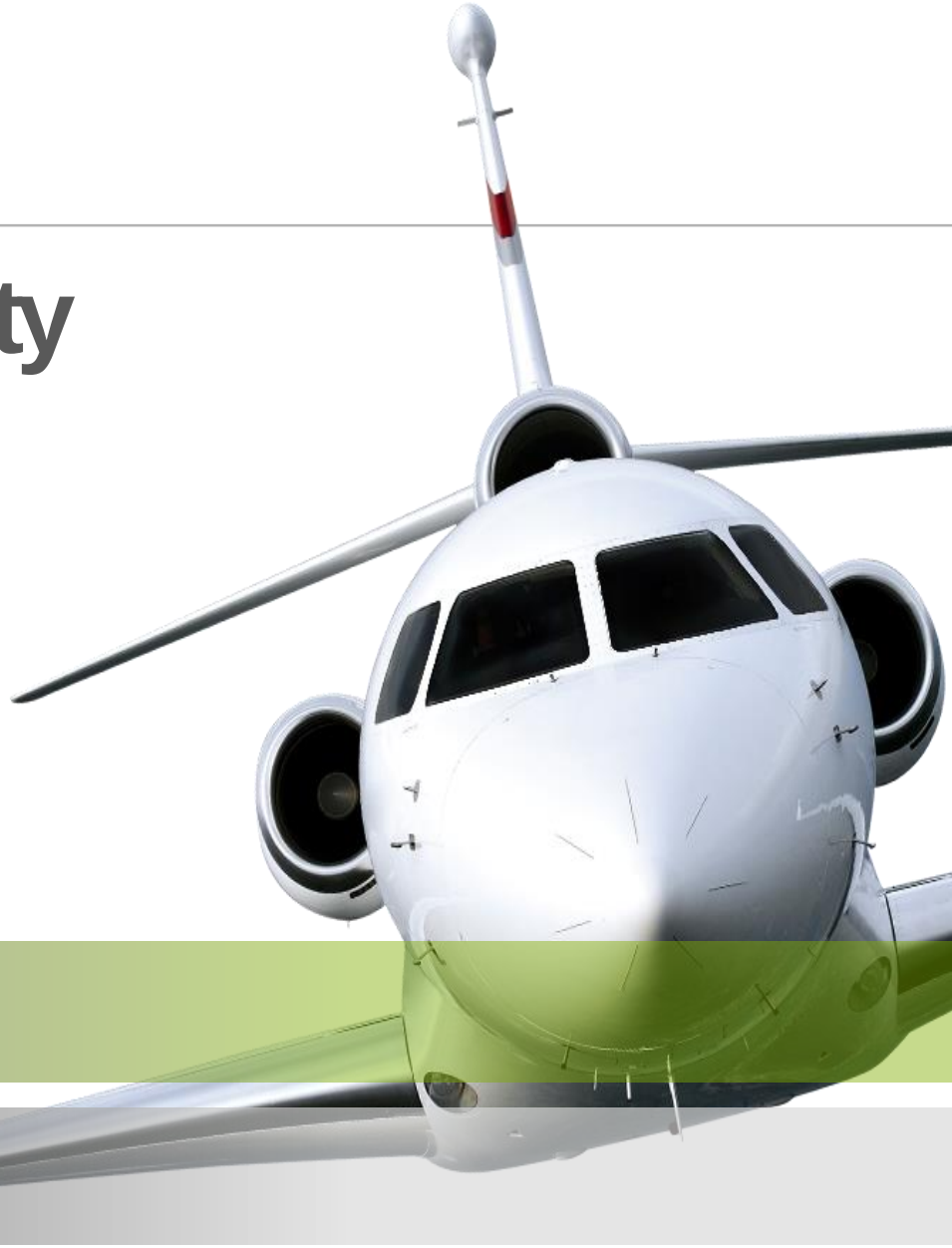
NDT PoD vs. Reliability
In the Sustainment Environment



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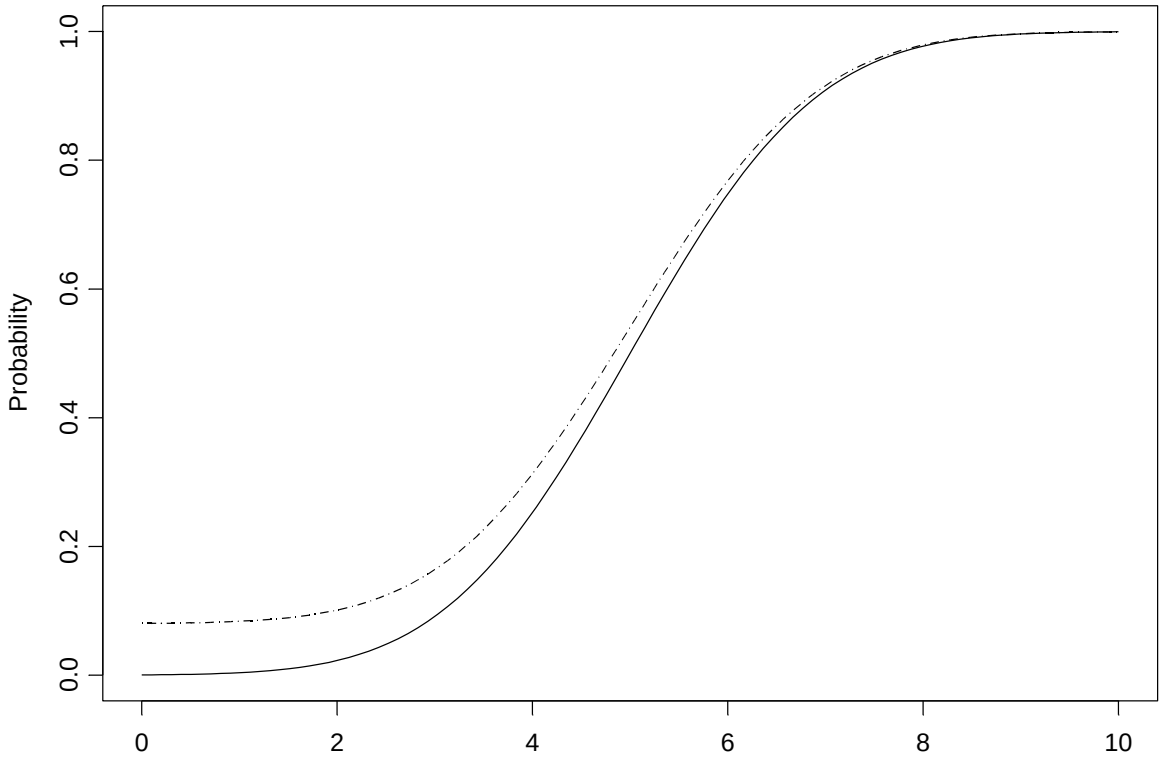
What is POD?

POD is a statistical measure of the detection of a defect that is present



POD - probability that a defect with specific properties will be detected, under specific inspection conditions, given that there is such a defect in the material scanned

What Does POD Tell Us?

- Determines size of defects inspection method is capable of finding
- Indicates proportion of defects that are detected
- Compares performance of system, inspector, technique, etc.
- Allows comparison of two or more methods

How Do We Use the Info?

- Optimize an inspection
- Select an inspection method(s)
- Determine effect of inspection on life as part of overall life management system
- Define schedule for in-service inspection

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But . . .

How are we actually doing in the field with regard to the likelihood of something really bad happening?

. . . This is reliability

Robert Sumwalt of the NTSB quoted safety expert Jim Schultz who says,
"Don't ever believe that a lack of accidents means you're safe."

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Variables

- **Inspector –** disciplined or complacent?
- **Equipment –** what is equivalent?
- **Environment -** wide variations, not always an opportunity to use all techniques certified for
- **Procedures -** wide variations
- **Communication –** many people involved
- **Business pressures –** cost & schedule
- **Flaw variations –** no two flaws are alike
- **Training –** Focuses on industrial NDT

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Which variables can we influence?

- **Inspector –** disciplined or complacent?
- **Equipment –** what is equivalent?
- **Environment -** wide variations, not always an opportunity to use all techniques certified for
- **Procedures - wide variations**
- **Communication – many people involved**
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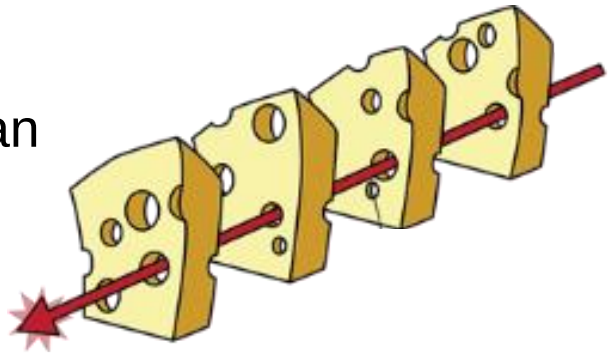


NDT PoD vs. Reliability
In the Sustainment Environment

In order to maximize real world performance we need to address:

Reliability

Proficiency
Hands-on, practical

Currency
General & Specific
NDT Knowledge

Risk Assessment
Stress & Failure
Damage Tolerance
Maintenance System
Aircraft Operation

NDT PoD vs. Reliability
In the Sustainment Environment

Proficiency
(Hands-on, practical)

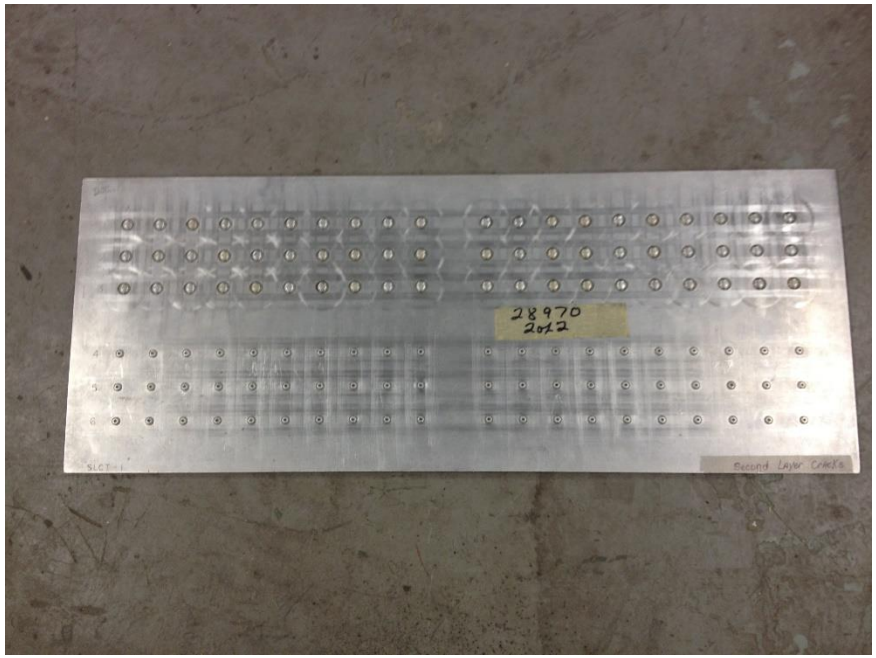
So how do we do this?

- **Individual performance**
  - ✓ **Hit / Miss**
  - ✓ **PoD curves**
- **A sample of POD specimens inspected by a variety of experienced technicians using their own equipment**

NDT PoD vs. Reliability
In the Sustainment Environment

Hit / Miss Data from POD Specimens

- 420 sites
- 68 defects
- 29–71% detection rate
- 0.058” – 0.286” missed
- 3 missed were over 0.100”



NDT PoD vs. Reliability
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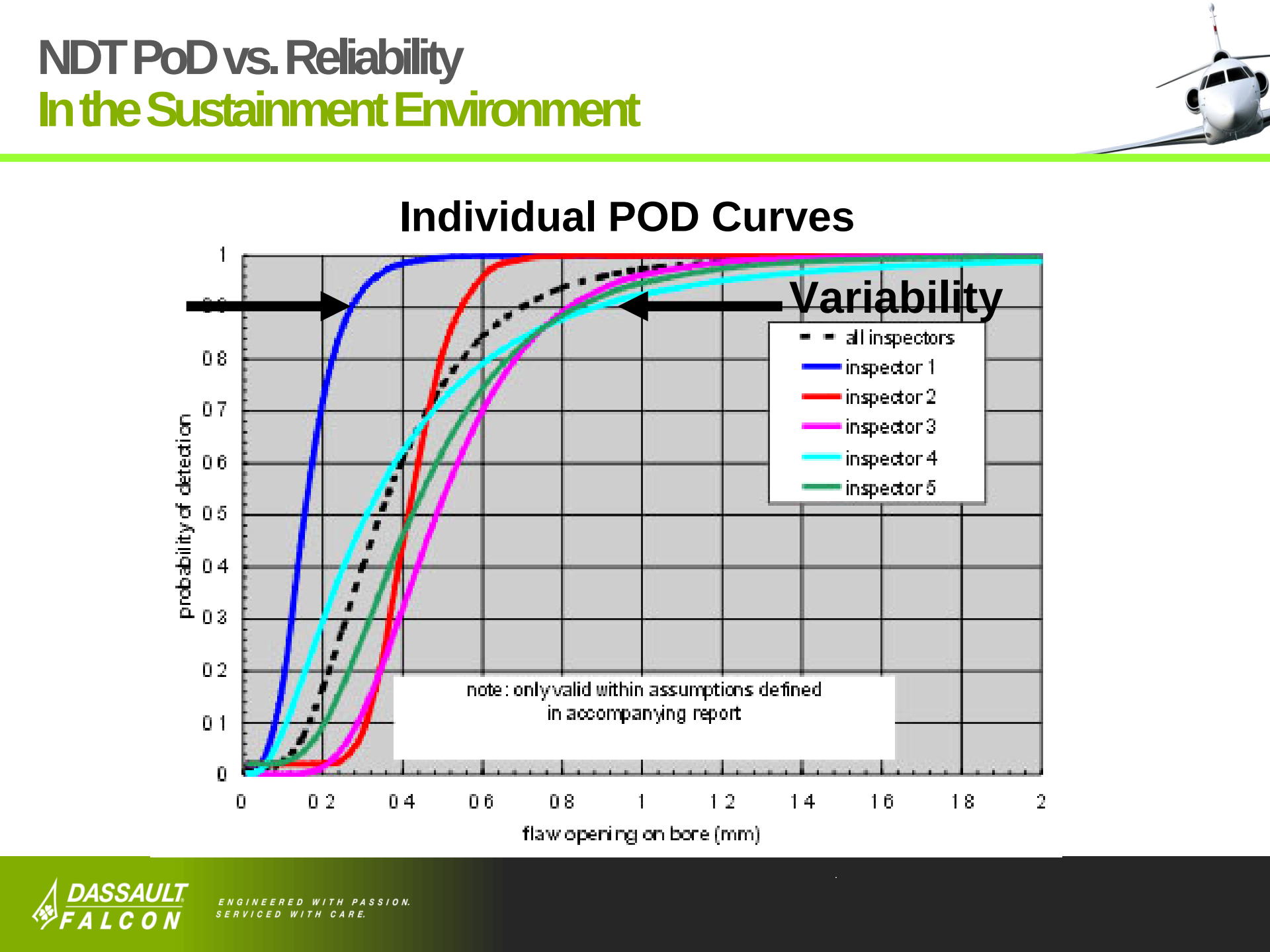

Currency

(General & Specific NDT Knowledge)

Quizzes

- **Unannounced quizzes were given at the beginning of several refresher seminars. Questions were taken from published general exams.**
- **Only one or two in each class passed, most scores were in the 40s and 50s.**

NDT PoD vs. Reliability
In the Sustainment Environment

So what does all this tell us?

- **This does not imply that technicians don't know what they are doing.**
- **Flaws are being missed that are significantly larger than the accepted POD values.**
- **There is considerable variation in the performance of individual technicians.**
- **Our general knowledge gets stale when years pass since our certification exams.**

Risk Assessment

- **Aircraft history –** previous inspection results
- **Aircraft mission –** pax, cargo, etc.
- **When is the next inspection –** if you miss, is it likely to be found at the next
- **Safety risk –** what if you accept it and you're wrong

Risk Assessment

Training in:

- **Stress & Failure**
- **Damage Tolerance**
- **Maintenance System**
- **Aircraft Operation**

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Reliability

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Refresher Seminars
Hands-on exercises
Theory review
Aviation general

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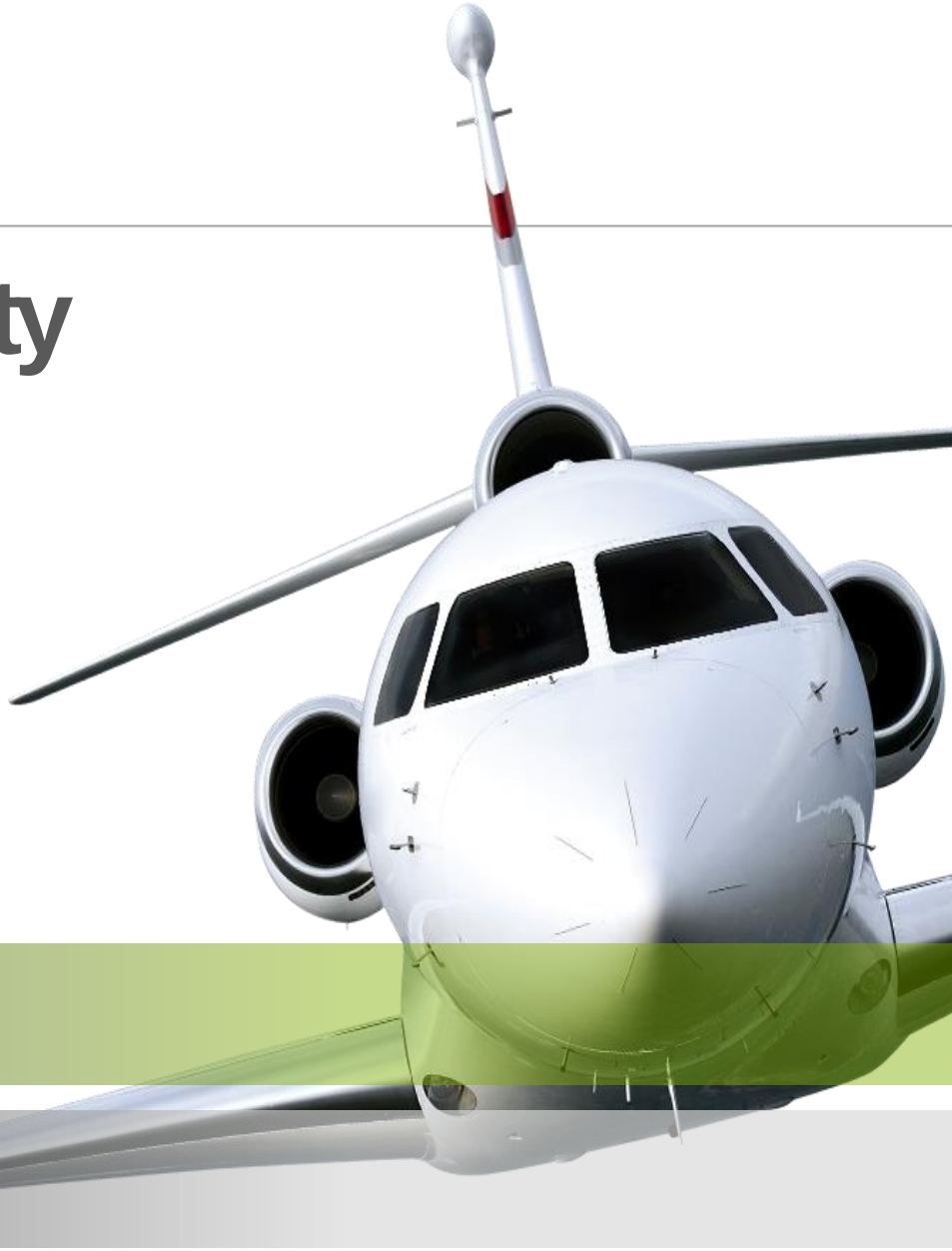
Questions?



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