



Benefits of Optimizing Maintenance Intervals

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October 17-19, 2012

Atlanta, GA

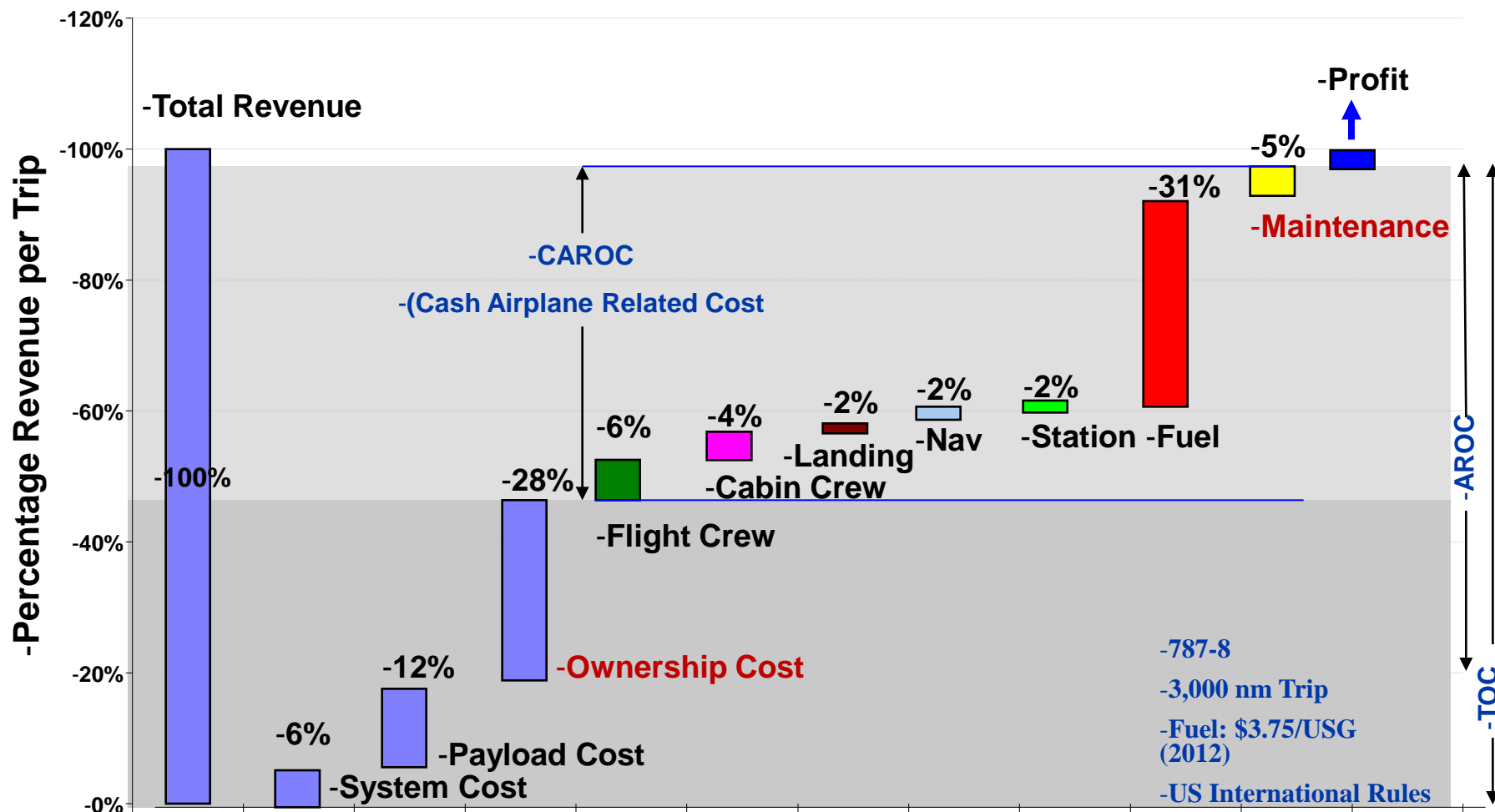
IATA 8th Maintenance Cost Conference

Outline

- Perspective on Maintenance Check Intervals and Cost
- Check Intervals can be optimized beyond MPD
- Boeing's new Statistical Analysis (SASMO*) Technology
- Benefits of Optimizing your Check Intervals



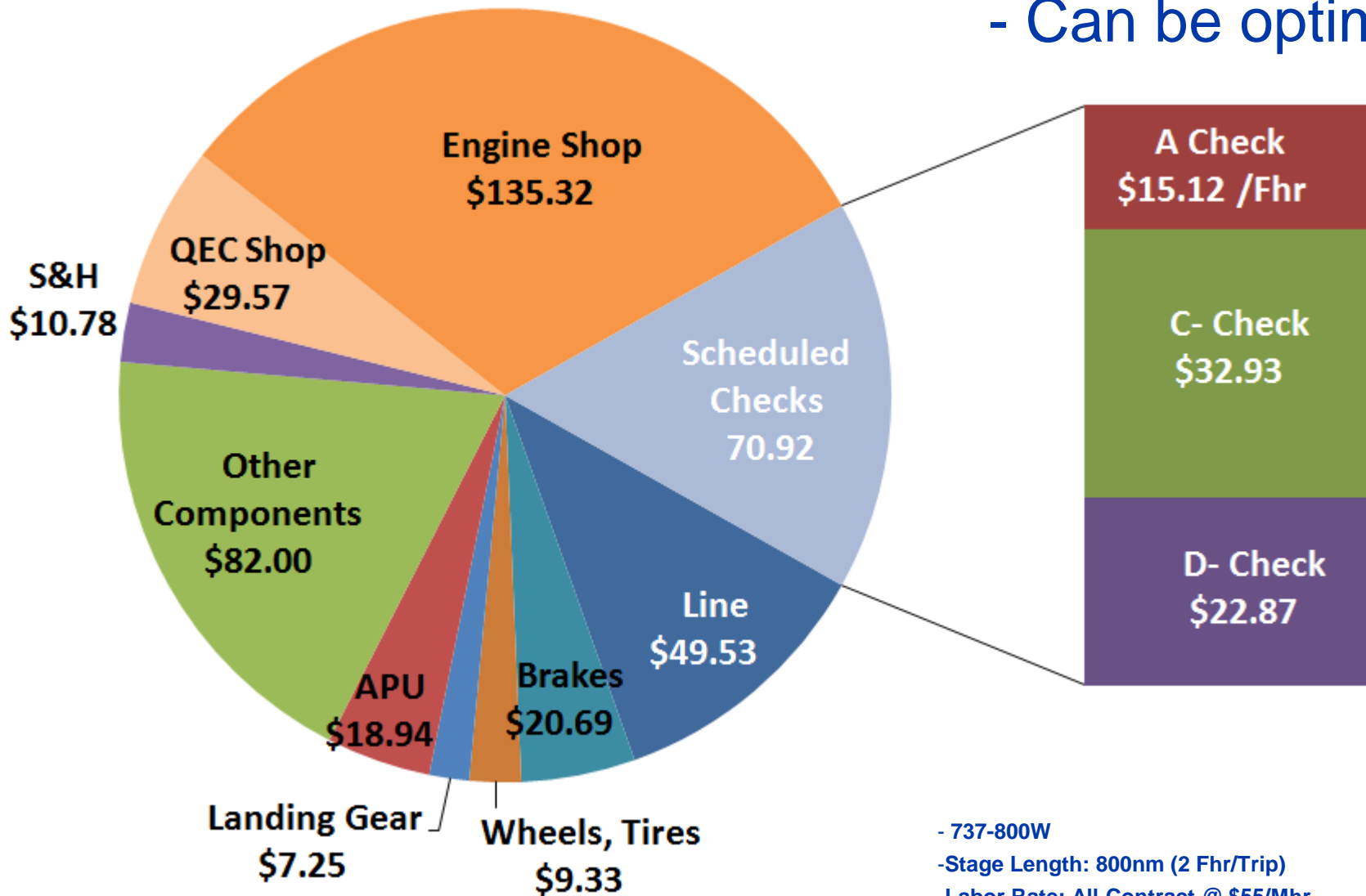
Sample Operating Cost Distribution



Maintenance check interval optimization can significantly improve profit

Scheduled Checks are 16% of Total Maintenance Cost

- Can be optimized



- 737-800W
- Stage Length: 800nm (2 Fhr/Trip)
- Labor Rate: All Contract @ \$55/Mhr
- No LLP, No Overhead

Can Operator Check Intervals be optimized ?

Yes!

Requires:

- FAA allows and operators do it for their benefit
- Requires Operator In-Service data analysis

Benefits:

- Maintenance Cost reduction
- Airplane availability for revenue generation



Leveraging In-Service Data to Drive Maintenance Efficiency



Optimized Airline Operation



Airplane Production & Retrofit

Operator Maintenance Data

- Scheduled Maintenance
- Delay & Cancellation
- Component Removal
- Log Book
- Shop records
- Maintenance Cost

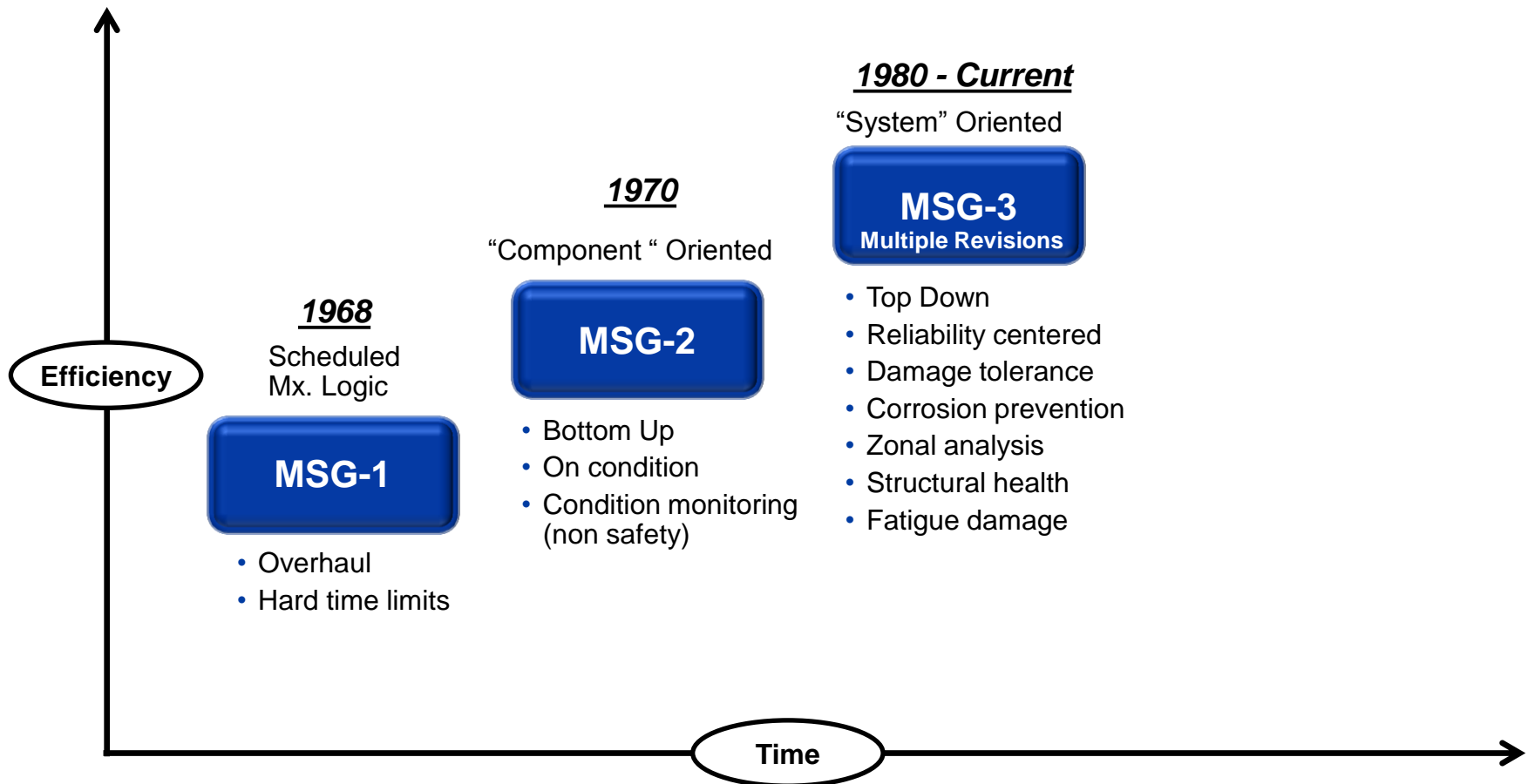
ISDP Data

Data Analysis

- Predictive Modeling
- Economics Analysis
- Risk Analysis
- Age Analysis
- Utilization Analysis
- Root Cause Analysis

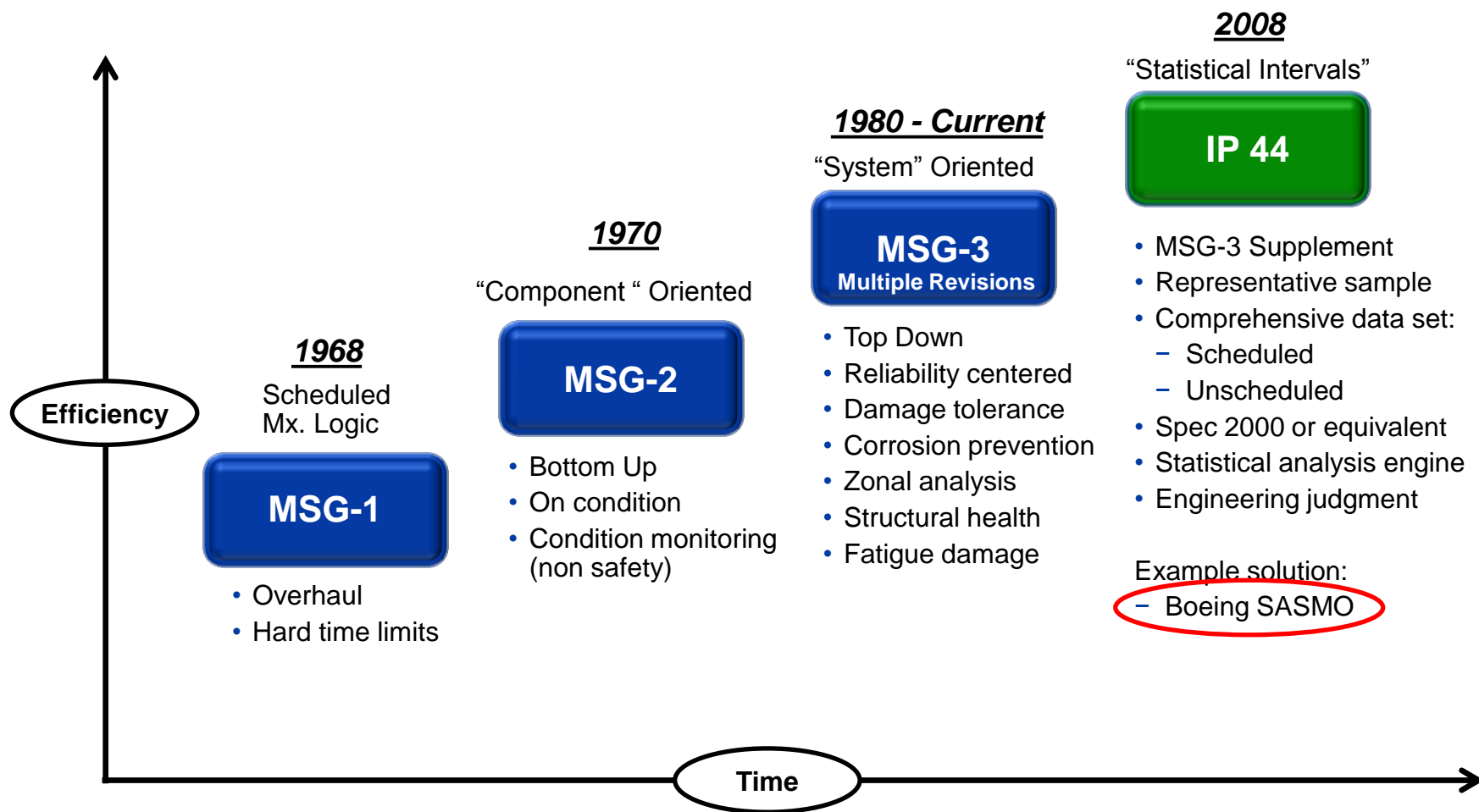
Note: (1) Boeing Patent 2010070237 (3/10)

Aircraft Maintenance Philosophy Evolution



History of Continuous Improvement

Aircraft Maintenance Philosophy Evolution



History of Continuous Improvement



Outline

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- **Boeing's new Statistical Analysis (SASMO) Technology**
- Benefits of Optimizing your Check Intervals



How Does SASMO Work?

SASMO Application + OEM Engineering

ISDP Data



- Scheduled Maintenance
- Log Book
- Component Removal
- Delay & Cancellation
- Shop records
- Maintenance Cost

Task Intent / Mapping

- MSG-3
- Task Procedure

Data

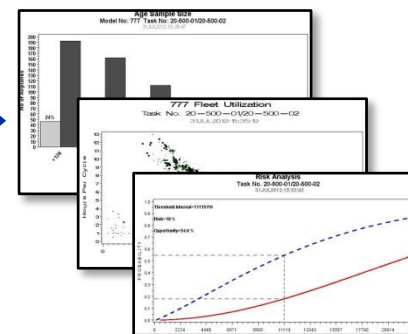


- Processing
- Mining
- Categorization

SASMO⁽¹⁾ Statistical Analysis Engine

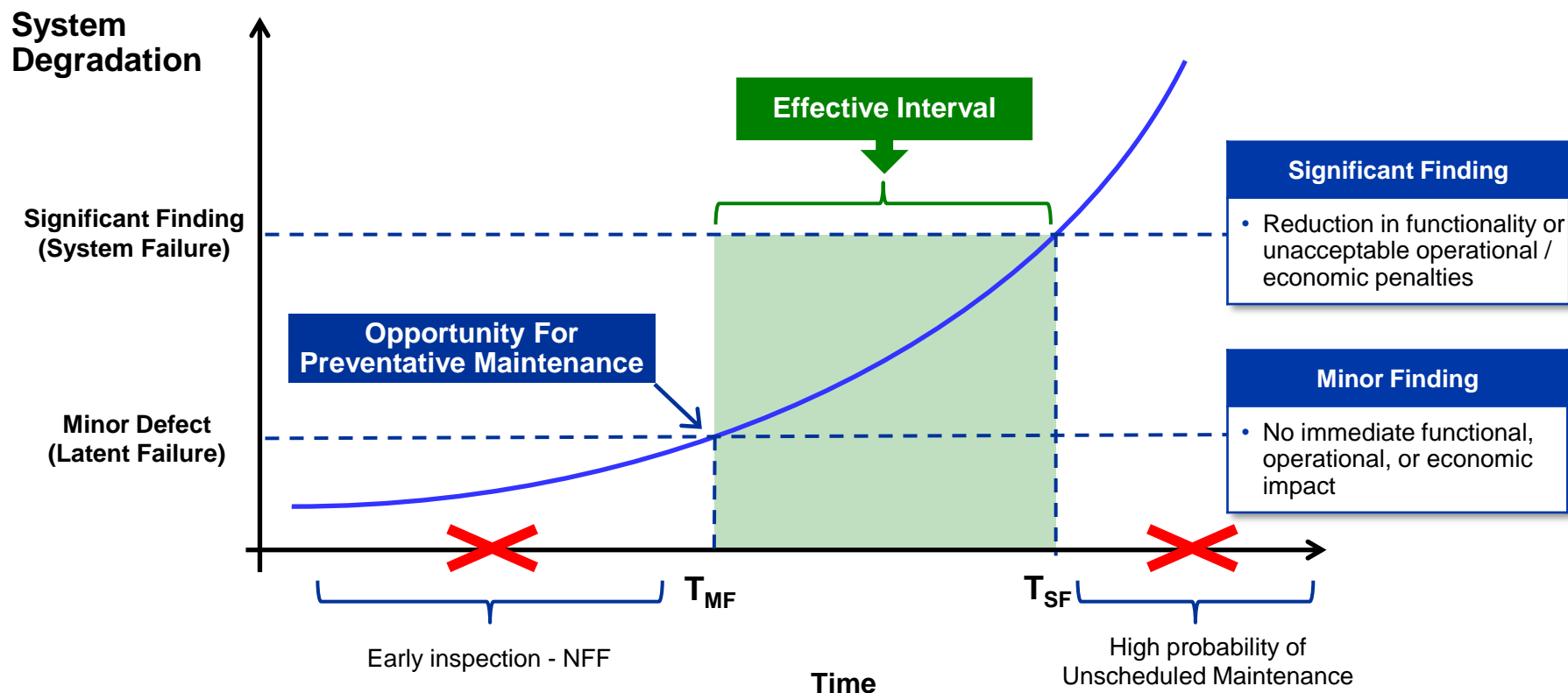


SASMO Statistical Output



- IP-44 Compliant
- Optimal intervals
- Regulatory justification

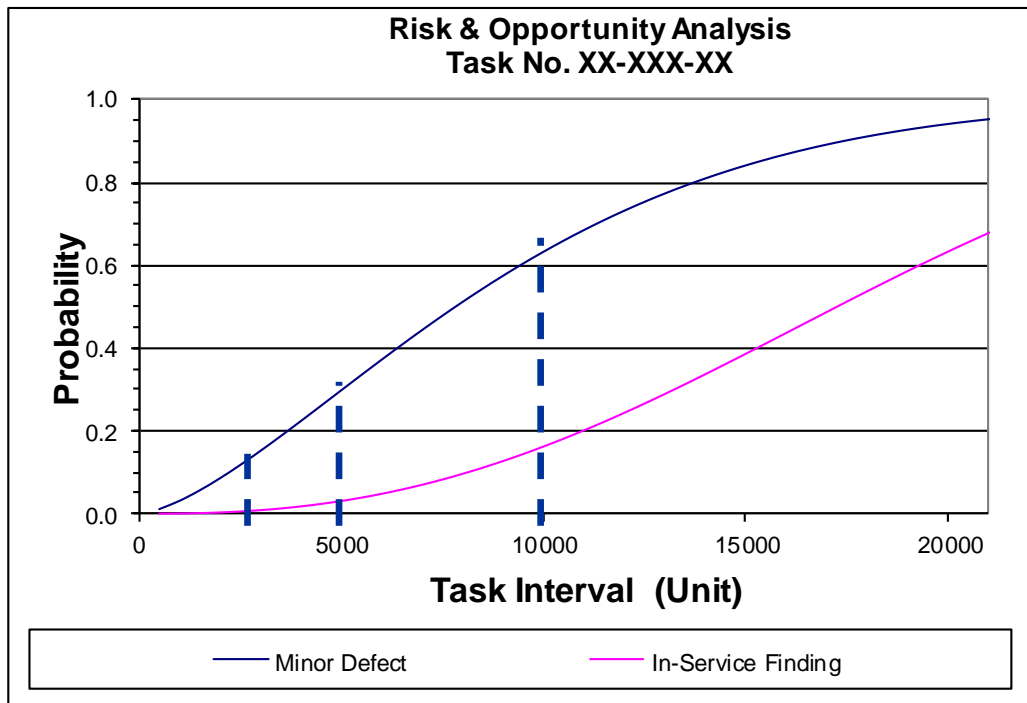
Setting Optimal Maintenance Intervals



Minimize Looking Too Early (NFF) and Too Late (In-Service Failures, Unscheduled Maintenance)

Interval Selection Example

Boeing SASMO Maintenance Statistical Analysis Engine

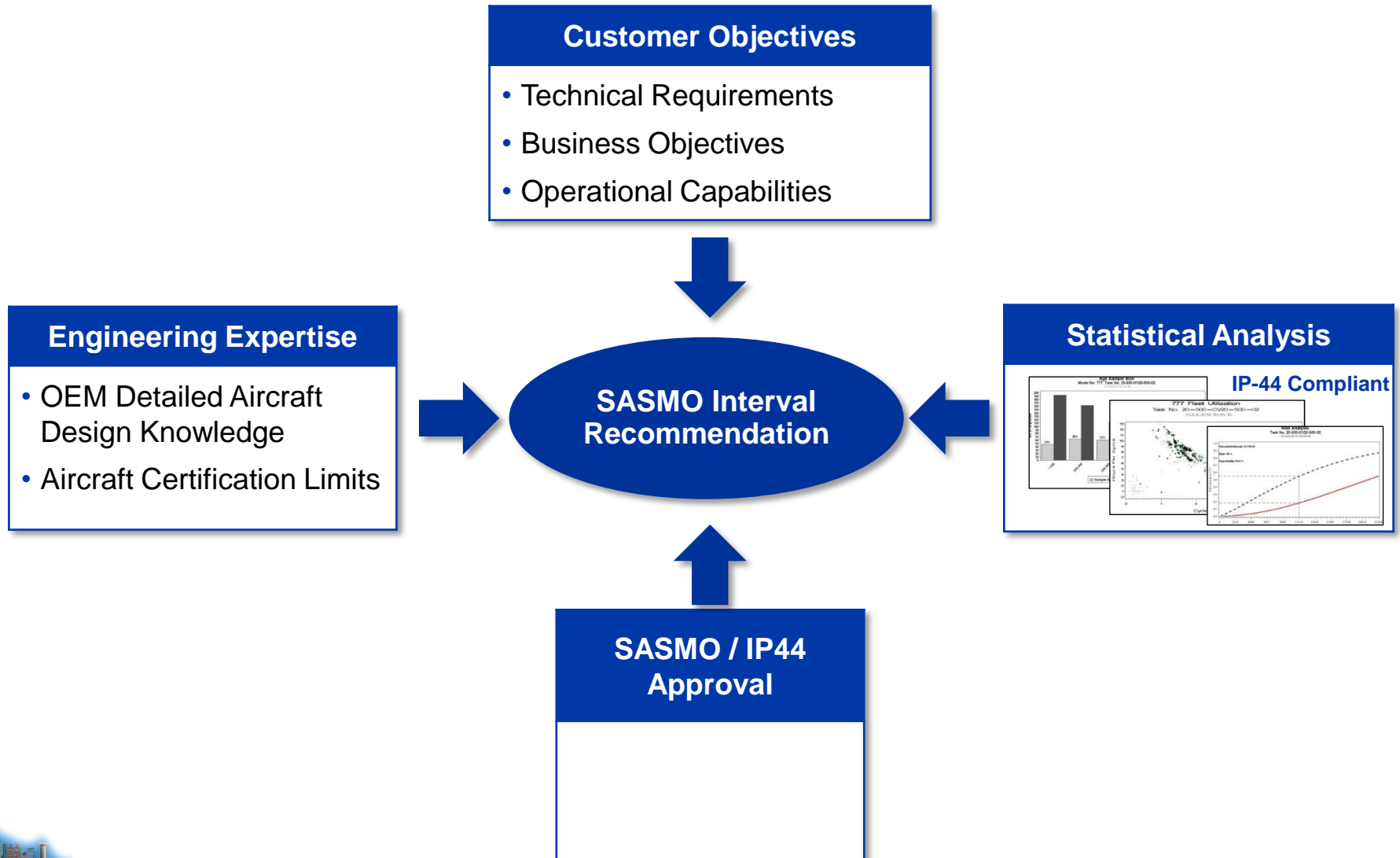


| Interval | Opportunity | Risk |
|----------|-------------|------|
| 2,500 | 10% | 1% |
| 5,000 | 31% | 4% |
| 10,000 | 68% | 15% |

**Balance For
Lowest Cost
Solution**

As Opportunity increases, Risk increases (though not at the same rate)

Boeing SASMO Interval Recommendations



SASMO Optimization Process

SASMO Engagement



- Operator specific
- Reliability program
- Mx. planning
- Schedule data
- Non-routine

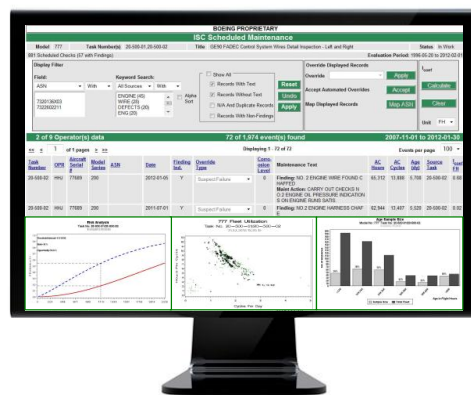
- Rationalize tasks
- MPD correlation
- Task escalation / de-escalation
- Statistical rigor

- Customer objectives
- Unique tasks
- Mx. program packaging

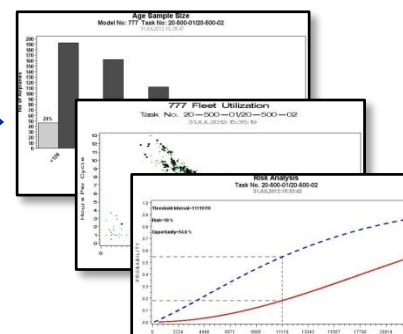
- OEM Support
- Review of analysis
- SASMO justifications
- APM approval

- Transition package to new AMP
- Training customer staff
- Re-bridge as needed

SASMO Statistical Analysis Engine



SASMO Statistical Output



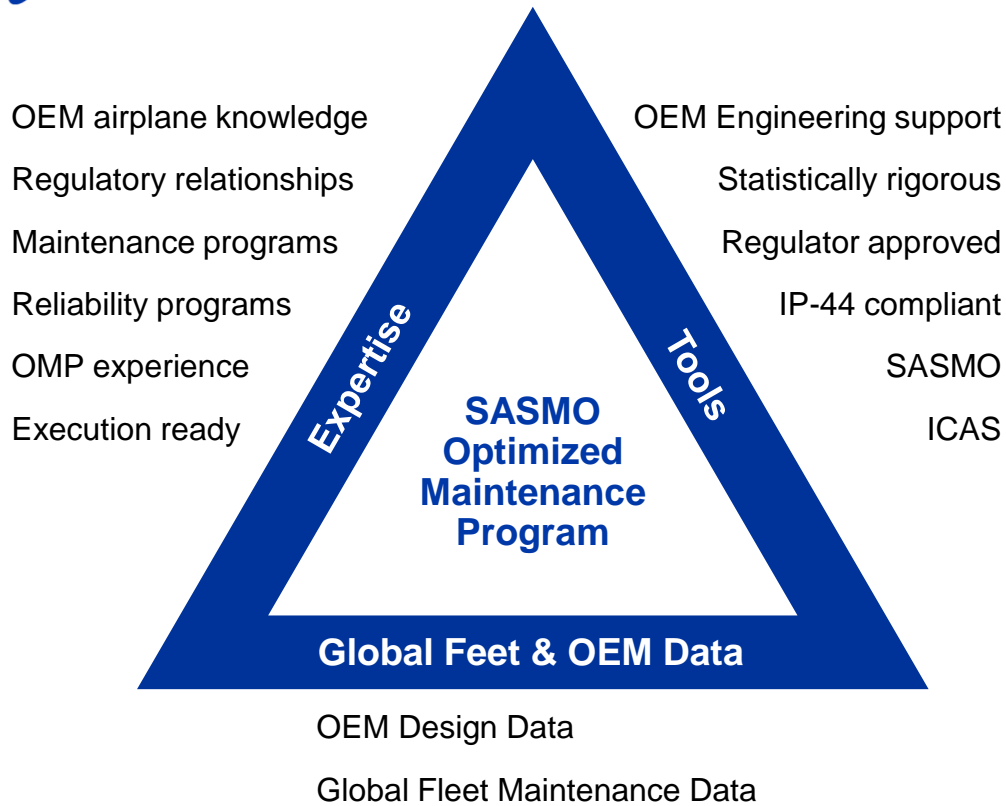
- Accelerated process
- Optimal intervals
- MPD tailored to your capabilities & operation
- Regulatory justification and support

Airline Benefits of Boeing SASMO

| | | | |
|-------------------------|-----------|--------------------------|--------|
| Task Intervals | Optimized | Airplane Bridging | Yes |
| Maintenance Labor Hours | ↓ | Reliability Program | Review |
| Aircraft Availability | ↑ | Maintenance Program | Review |
| <hr/> | | | |
| Reliability | ↔ | Add'l. Revenue Potential | ↑ |
| Implementation Speed | ↑ | Maintenance Cost | ↓ |

A Tailored Opportunity Assessment Can Be Created For Your Airline

Why Partner With Boeing?



| | Airline | Boeing |
|-----------|--|---|
| Expertise | <ul style="list-style-type: none"> Multiple fleets Typically many responsibilities | <ul style="list-style-type: none"> 50+ fleets Focused and ready |
| Data | <ul style="list-style-type: none"> Airline fleet Airline engineering | <ul style="list-style-type: none"> Global fleet OEM engineering |
| Tools | <ul style="list-style-type: none"> ? | <ul style="list-style-type: none"> SASMO IP-44 Compliant |

Get Further, Faster With an OEM-backed Maintenance Program



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- **Benefits of Optimizing your Check Intervals**



Check Interval Optimization

| | Original Check Interval | After Optimization (25%) | Checks Saved in 24 Years |
|------------------------|-------------------------|--------------------------|--------------------------|
| A-Check (Days) | 90 | 113 | 24 |
| C-Check (FHRS) | 6,000 | 7,500 | 3 |
| D-Check (Years) | 8 | 10 | 1 |

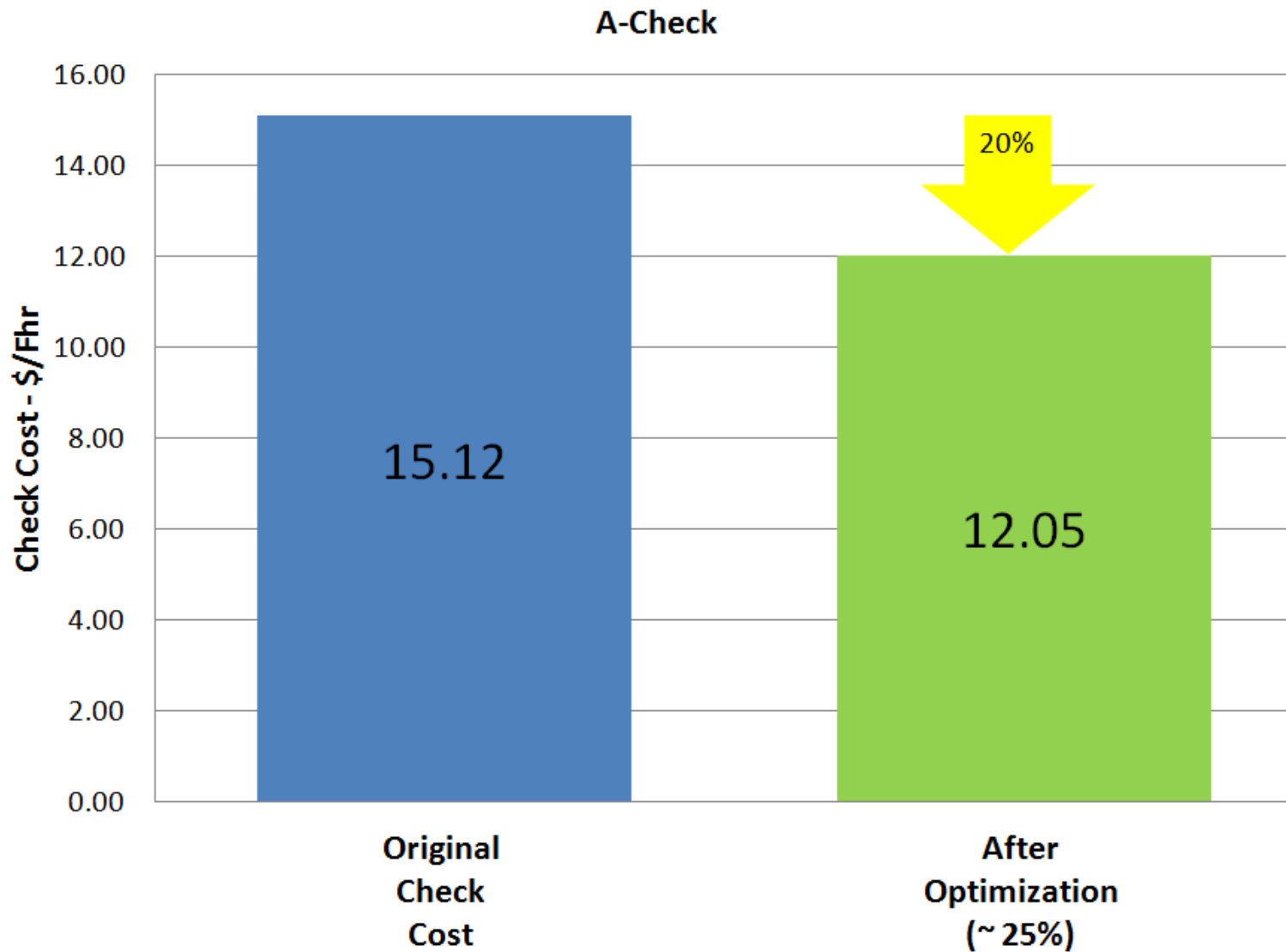
Per Airplane!



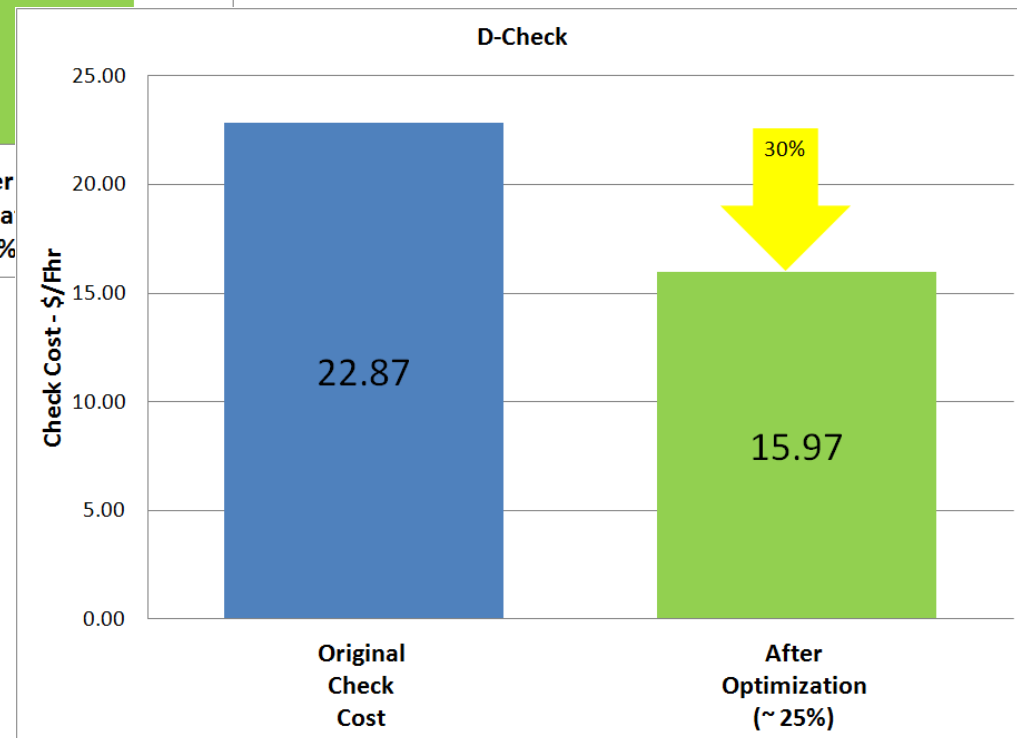
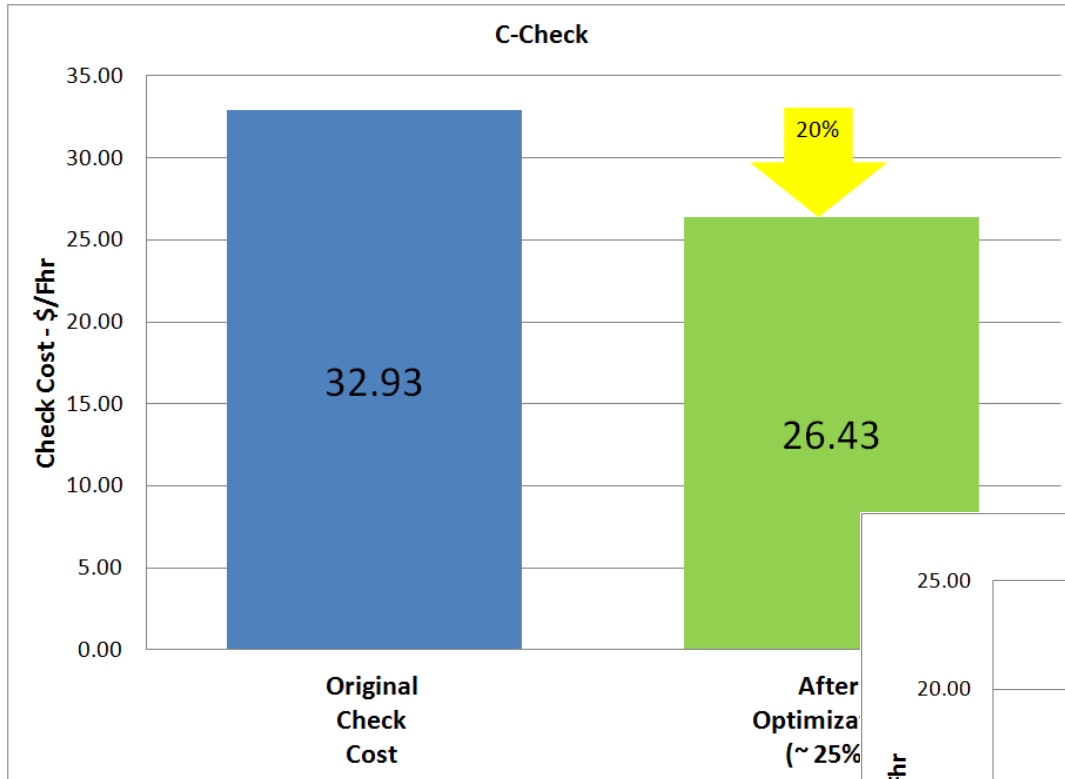
**INTEGRATED
COST
ANALYSIS
SYSTEM**

**First
Public
View**

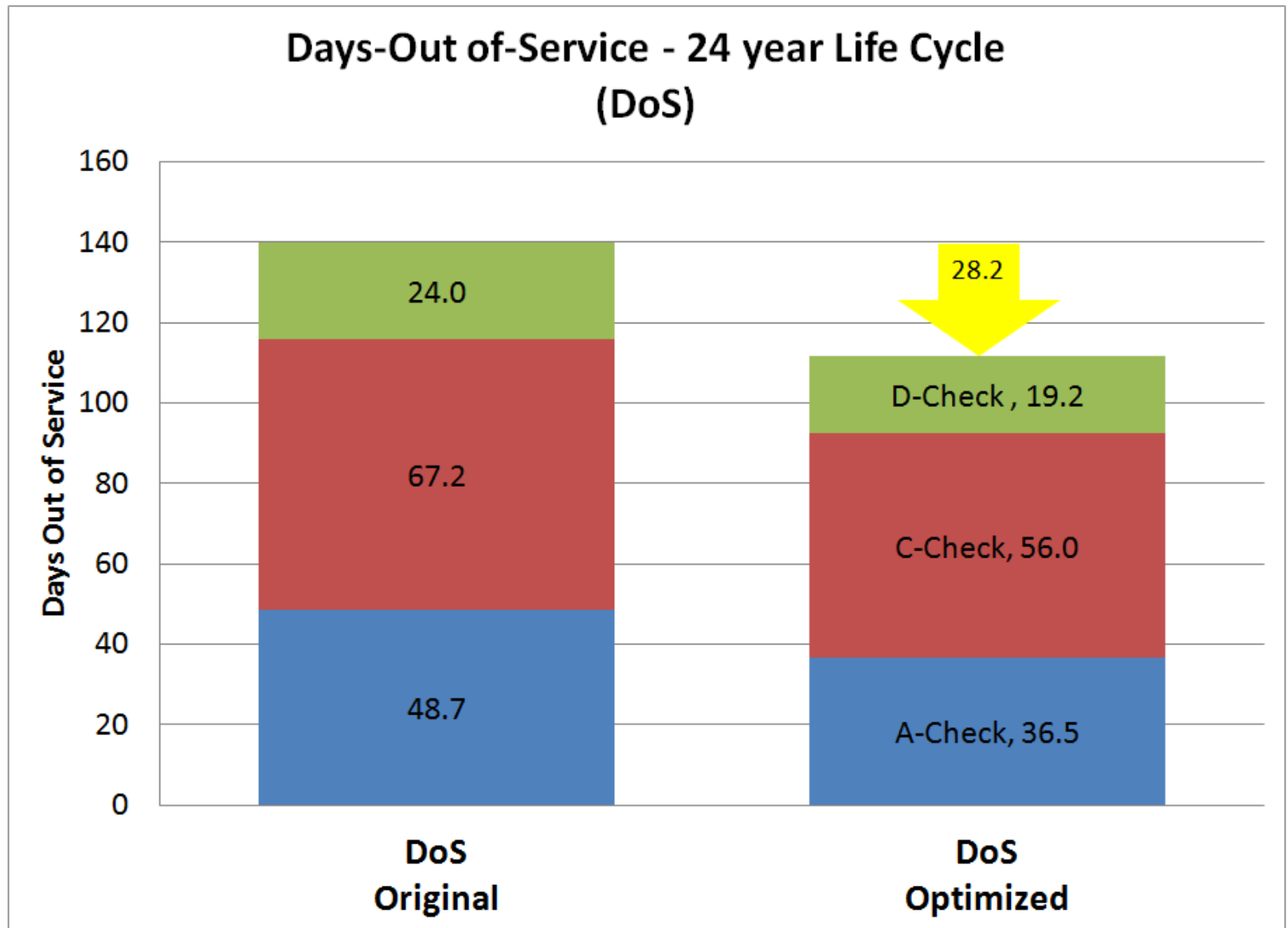
With Optimization unit A-Check cost reduces 20%



All Checks unit costs reduces ~ 25%



1.2 additional days per year for revenue service



For a Fleet, Cost Saving are tremendous

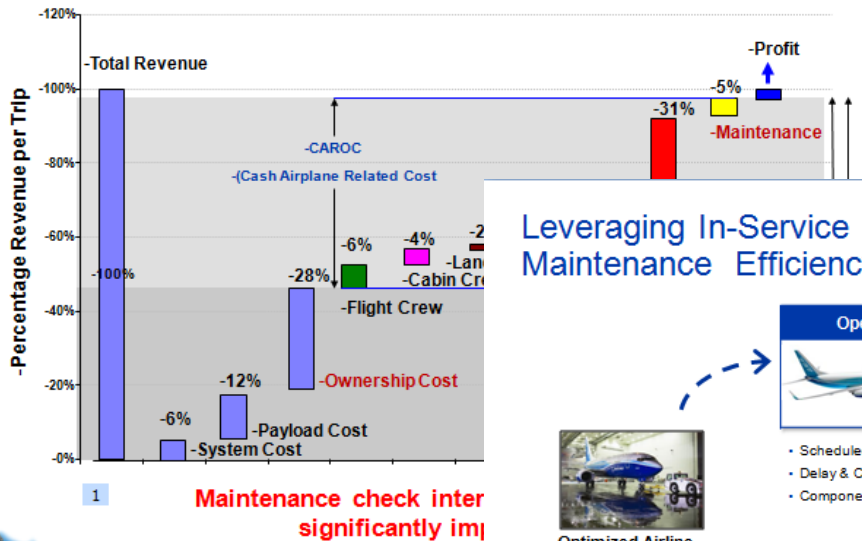
- Check cost saving of \$16.42/Fhr = \$0.5 million
(@3,020 Fhrs/Year over 10 year)
- Profit Opportunity: 1.2 days/Year = \$0.4 million
(@ \$36,000 per day over 10 year)
- Benefit for Fleet of 30 737-800W = \$28 million

Minimum Expenses – estimated \$ 5 million for bridging checks and data analysis



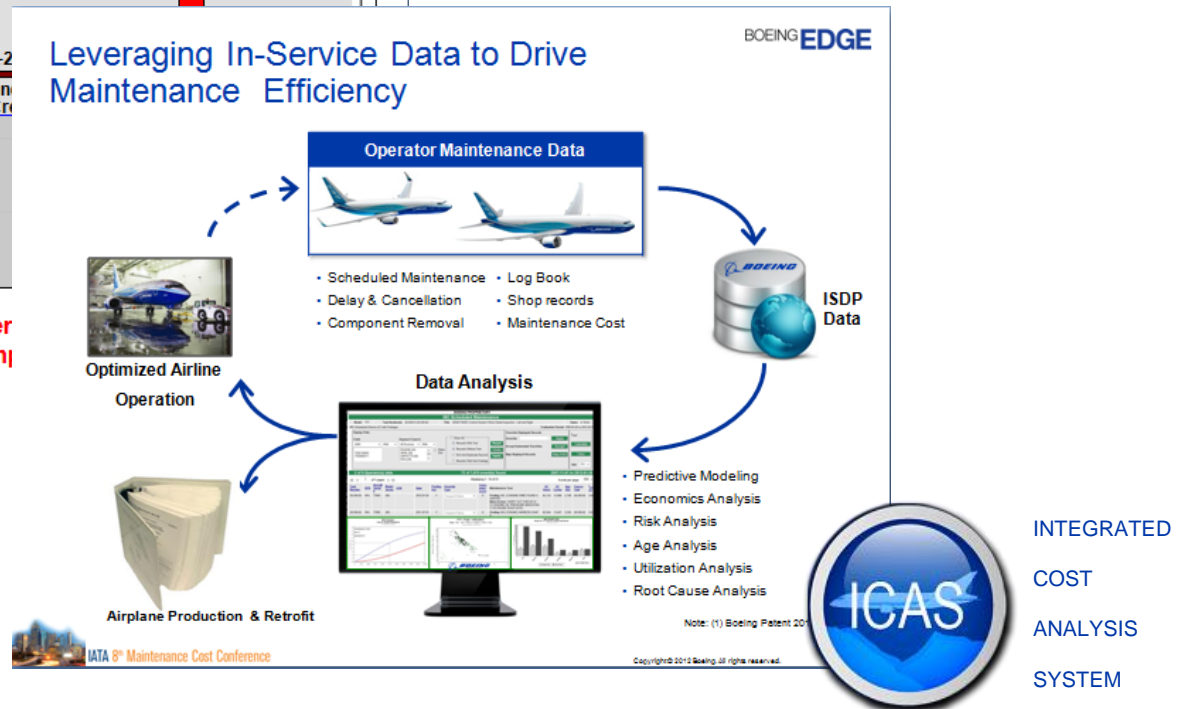
Summary:

Sample Operating Cost Distribution



IATA 8th Maintenance Cost Conference

Leveraging In-Service Data to Drive Maintenance Efficiency



IATA 8th Maintenance Cost Conference

Benefit for Fleet of 30 737-800W = \$28 million

Lower Maintenance Cost & more Revenue Service

IATA 8th Maintenance Cost Conference

Questions?

For more information

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