Sustainability Analysis to Determine the Sustainable Aspects of Alternative Coatings

Jack Benfer, NAVAIR Fellow, CAF
Senior Corrosion Engineer
NAVAIR Jacksonville

Luzmarie Youngers, CEF
Aeronautics S&T Lead
NAVAIR Jacksonville

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2019 | Enhancing DoD's Mission Effectiveness

OUTLINE

- **Fleet Readiness Center Southeast (FRCSE) Industrial Facility**
- **FRCSE Environmental Management System (EMS)**
- **What is the Sustainability Analysis Process?**
  - Cost
  - Lifecycle
- **Case Studies**
  - Sustainability Analysis Process used
  - Post-Transition: Advanced Anodize
  - Pre-Transition (Beta Testing): Zinc-Nickel
  - Pre-Transition (SOW Requirement): Selective Brush Electroplating
  - Pre-Transition (CDRL Requirement): Reactive Pigmented Coatings
- **Benefits**
- **Improvements**

Department of Defense Guidance

Sustainability Analysis Guidance:

Integrating Sustainability into Acquisition Using Life Cycle Assessment

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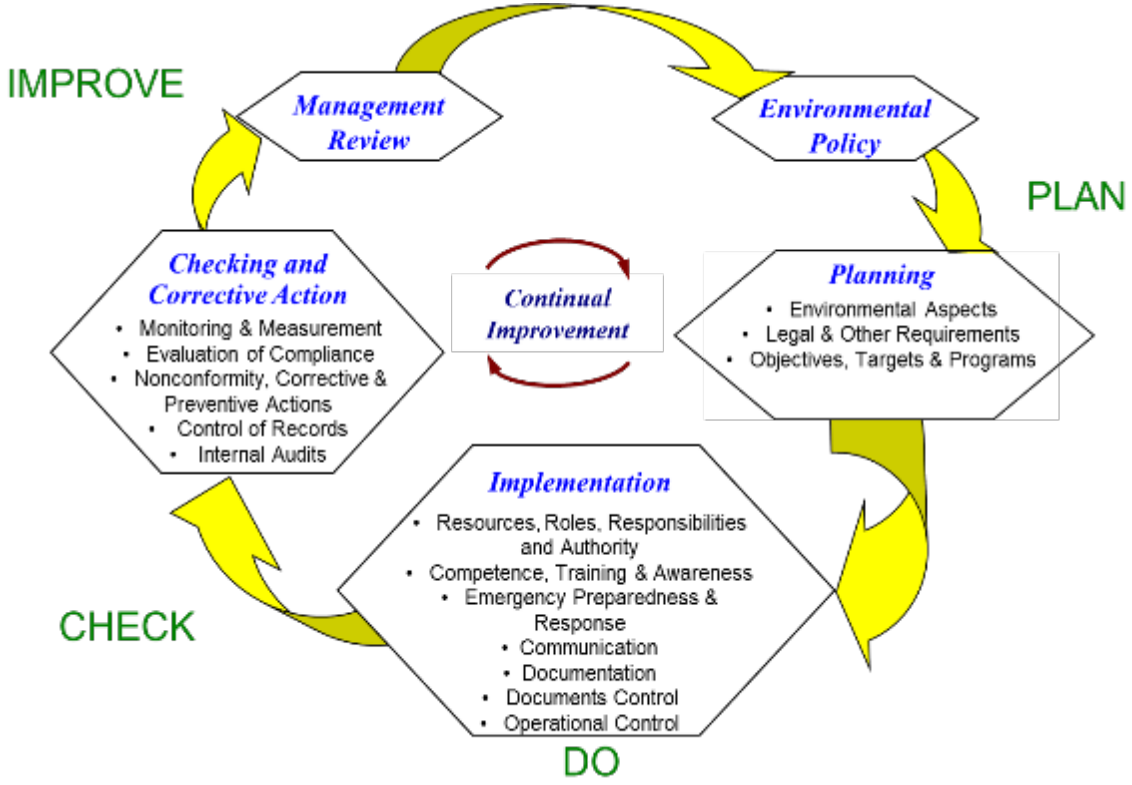
FRCSE Industrial Facility

FRCSE performs phased and planned maintenance and repairs, conversion, modernization, integrated maintenance and in-service repair on F/A-18 Super and Legacy Hornets, T-6/T34/T-44 Trainers, P-3 and EP-3 MH-60R, SH-60, HH-60 (Pavehawk) helicopters, MQ-8 aircraft and A/C components. In addition, FRCSE provides complete overhaul capabilities for most repairable engine components, assemblies accessories and avionics systems.

FRC Southeast Plating Facility

ISO 14001 Environmental Management System

IPT APPROACH



ISO 14001:2015 specifies the **requirements** for an environmental management system that an organization can use to **enhance** its environmental performance.

ISO 14001:2015 is intended for use by an organization seeking to manage its environmental responsibilities in a **systematic** manner.

Fleet Readiness Center Southeast – Environmental Management System

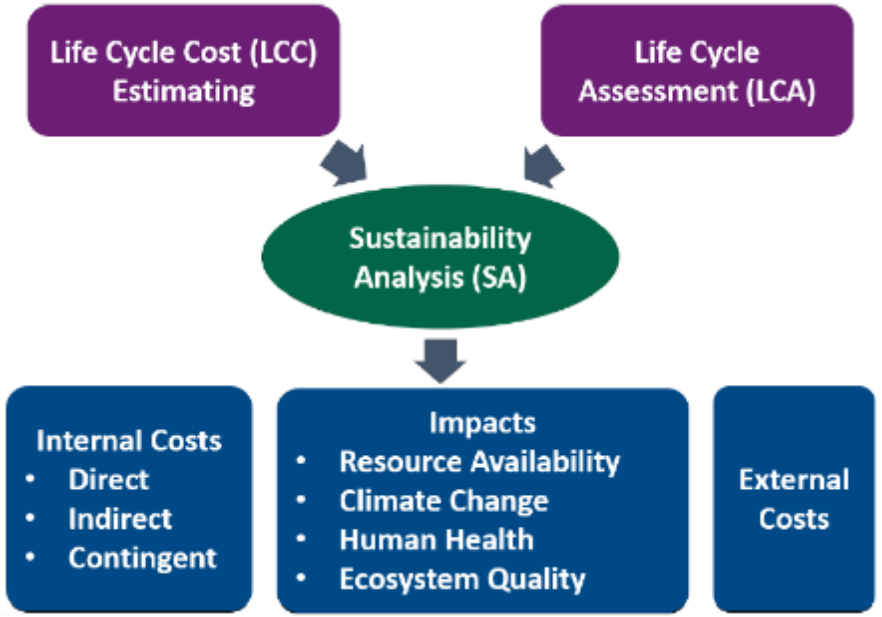
Environmental, Safety, Facilities, Engineering, Production

WHAT IS THE SUSTAINABILITY ANALYSIS PROCESS?

Sustainability Analysis = LCA + LCC

Life Cycle Assessment
Gives Relative Impacts
and "External Costs"

Life Cycle Costs
Compatible DoD cost structure
"Internal Costs"



COST CATEGORIES

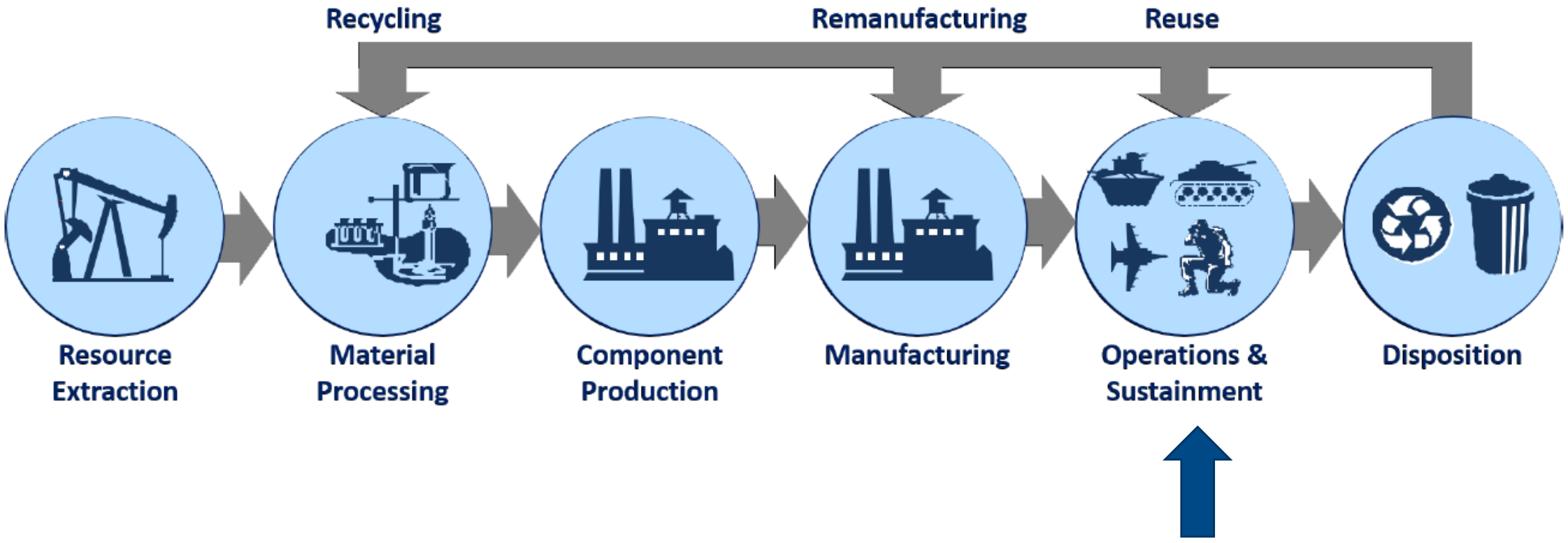
Direct Internal Cost
- Procurement cost of material
- System manufacturing

Indirect Internal Cost
- Procurement cost of PPE
- Hazardous waste management

External Cost
- Damage to human health
- Damage to ecosystem quality

Contingent Cost
- Clean up of pollution
- Medical cost for DoD personnel
- Substitute development and testing

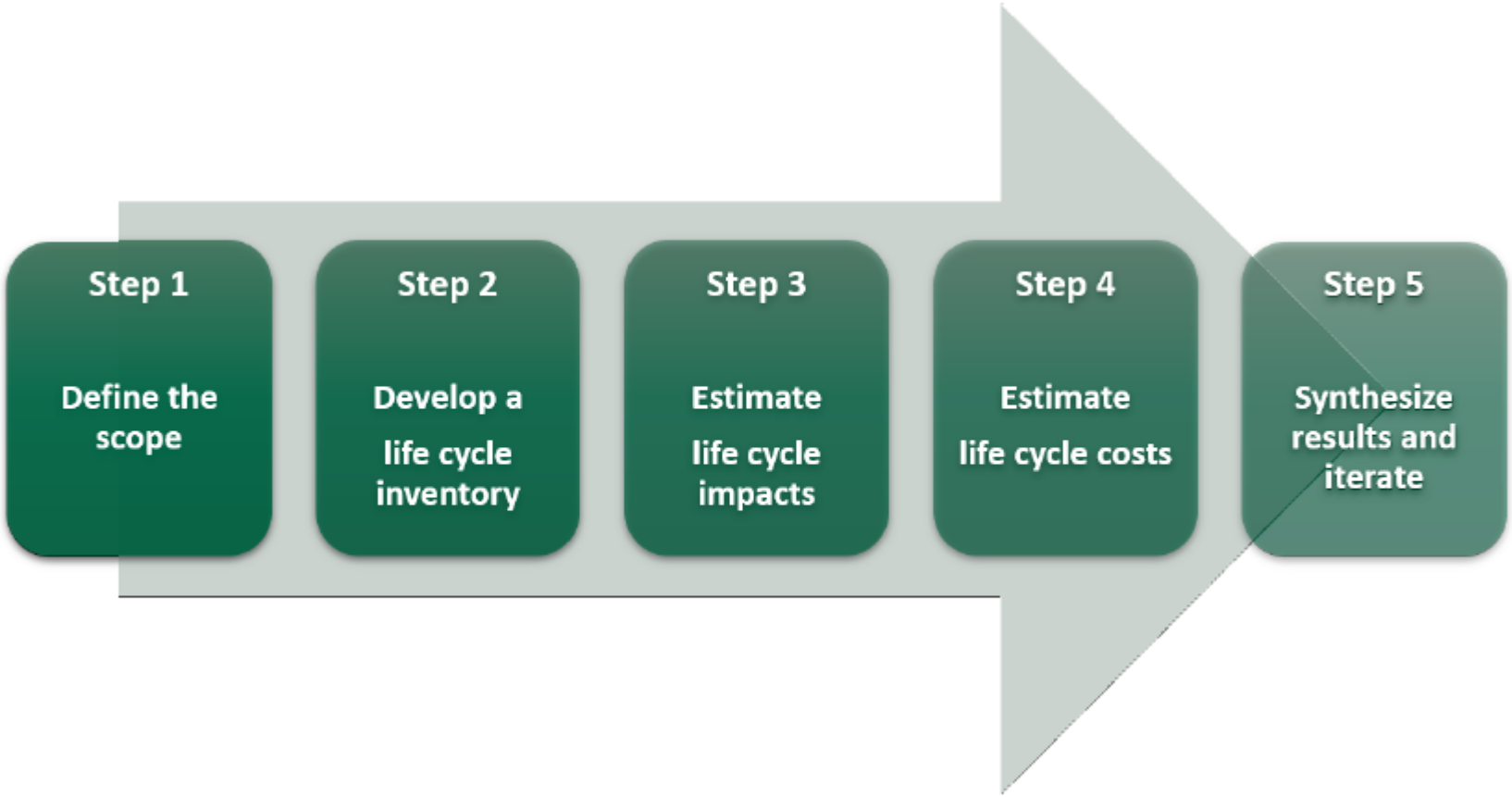
TECHNOLOGY LIFECYCLE



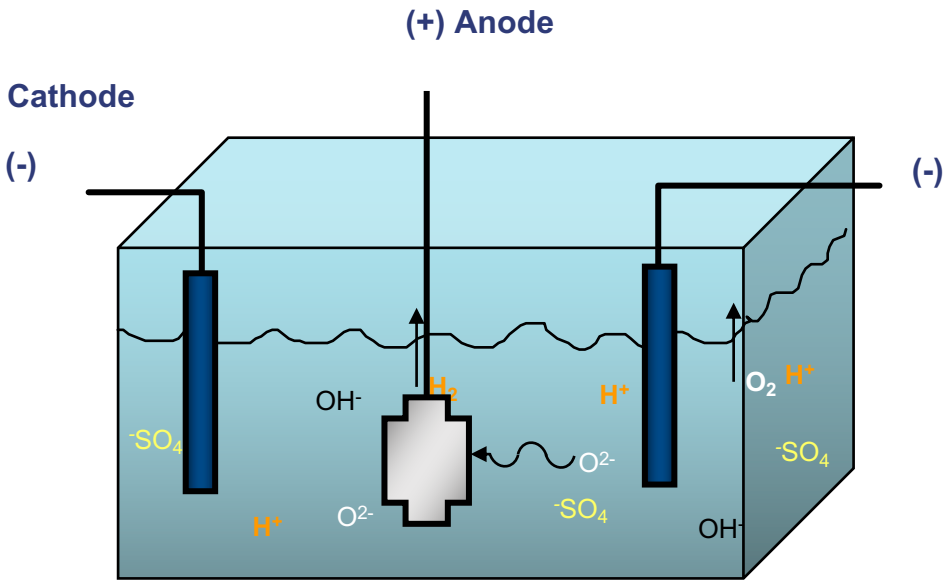
Traditional Approach

CASE STUDIES

SUSTAINABILITY ANALYSIS PROCESS STEPS



POST TRANSITION: ADVANCED ANODIZE



Performed after project completion to evaluate SA process benefits at depot.

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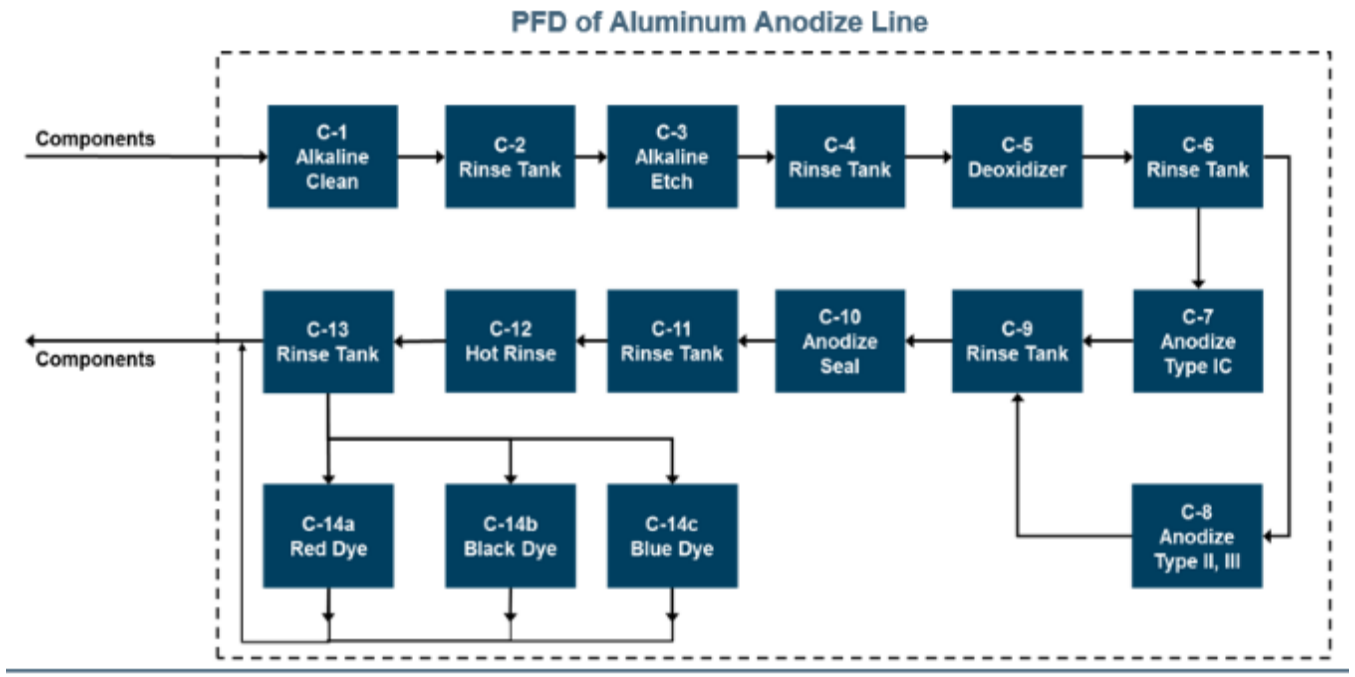
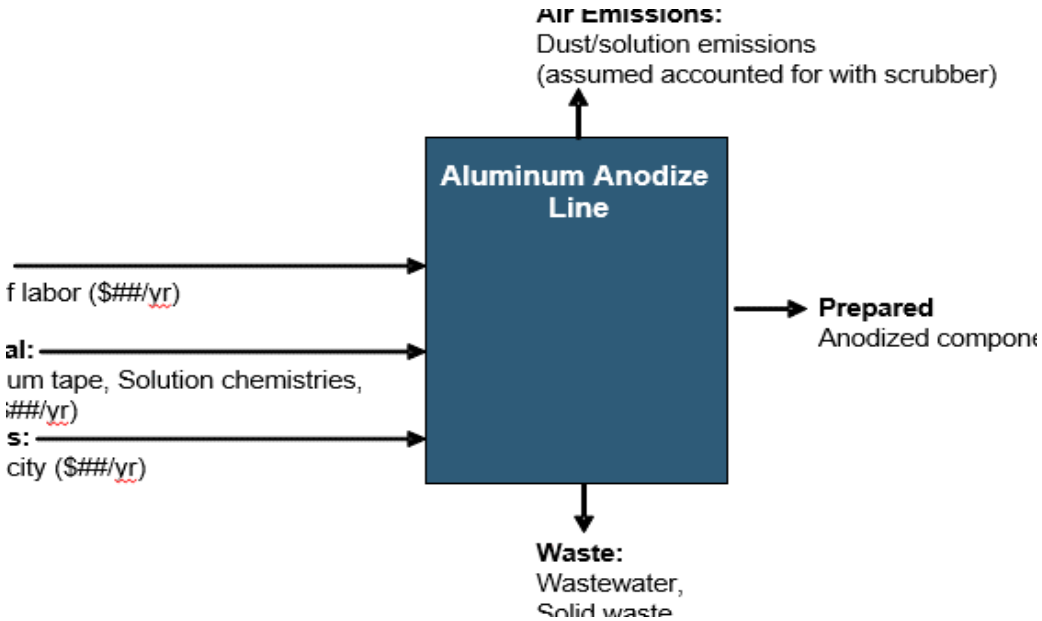
POST TRANSITION: ADVANCED ANODIZE





FRCSE provided process details and data for analysis

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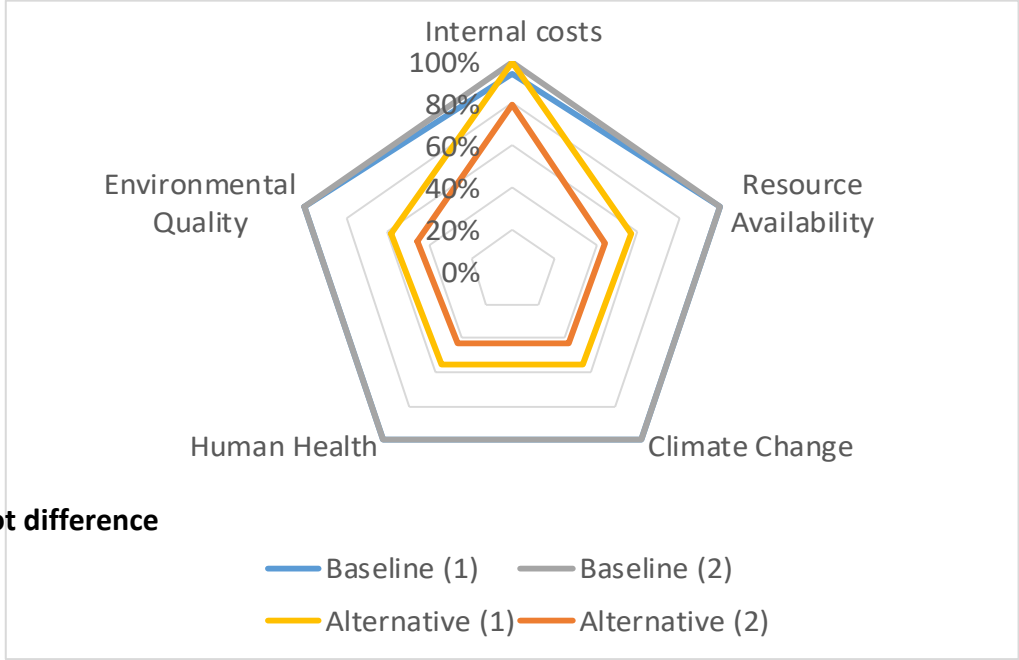
POST TRANSITION: ADVANCED ANODIZE

Net Present Value (NPV) Results

	Baseline (1)	Baseline (2)	Alternative (1)	Alternative (2)
Initial Costs				
Eqipment & Materials	$ -	$ 1.88	$ 29.22	$ 22.47
Labor	$ -	$ 1.06	$ -	$ -
Annual Costs				
Labor	$ 6.94	$ 6.94	$ 5.90	$ 4.77
Materials	$ 0.11	$ 0.11	$ 0.08	$ 0.06
Utilities	$ 1.05	$ 1.05	$ 0.52	$ 0.40
Waste Management	$ 0.17	$ 0.17	$ 0.11	$ 0.11
NPV	**$ 113.70**	**$ 119.51**	**$ 120.18**	**$ 95.96**

$23.55 per square foot difference



Internal Rate of Return (IRR) and Discounted Payback Period

Analysis	Results
Internal Rate of Return	14%
Discounted Payback Period	6 years

Alternative (2):

- **Results in a $3M cost savings over 15 years**
- **Can process 15 years of workload in 11 years**

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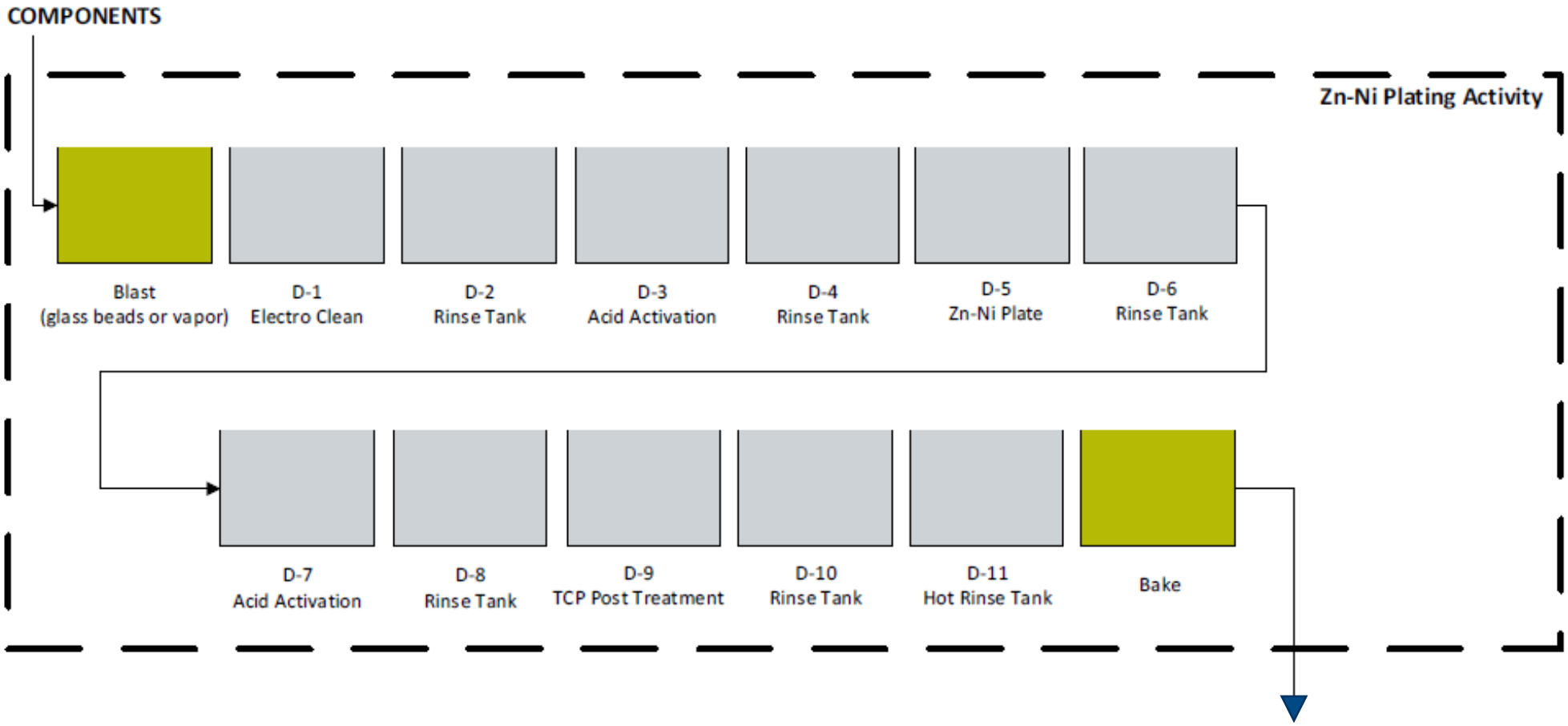
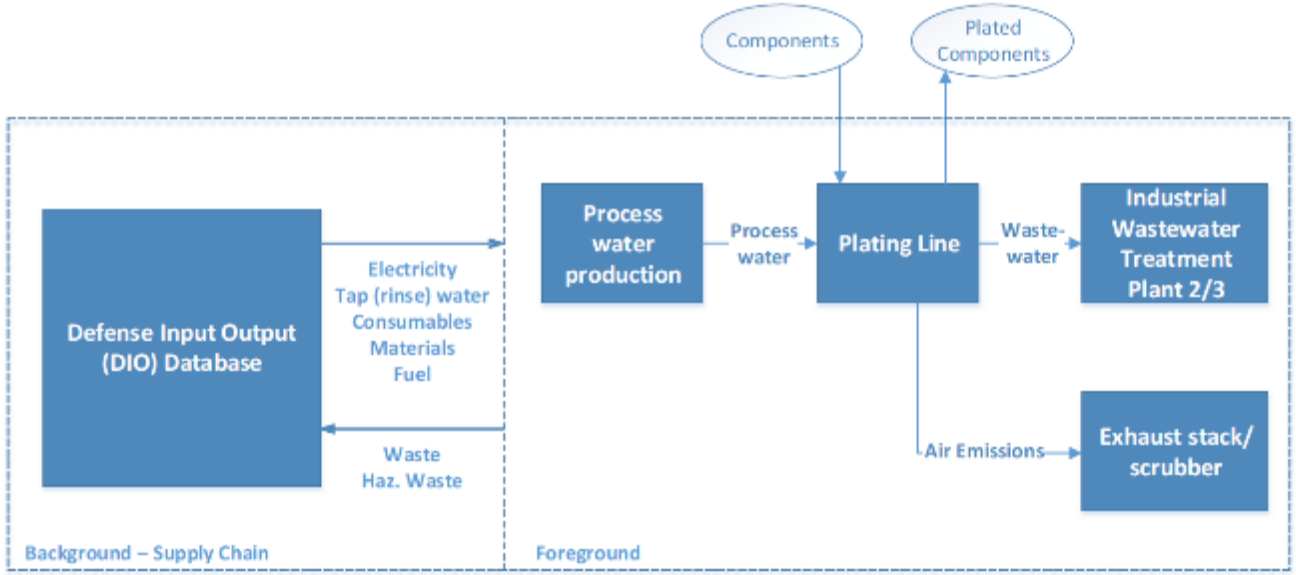
PRE-TRANSITION: ZINC-NICKEL ELECTROPLATING

Plating Line Process Flow

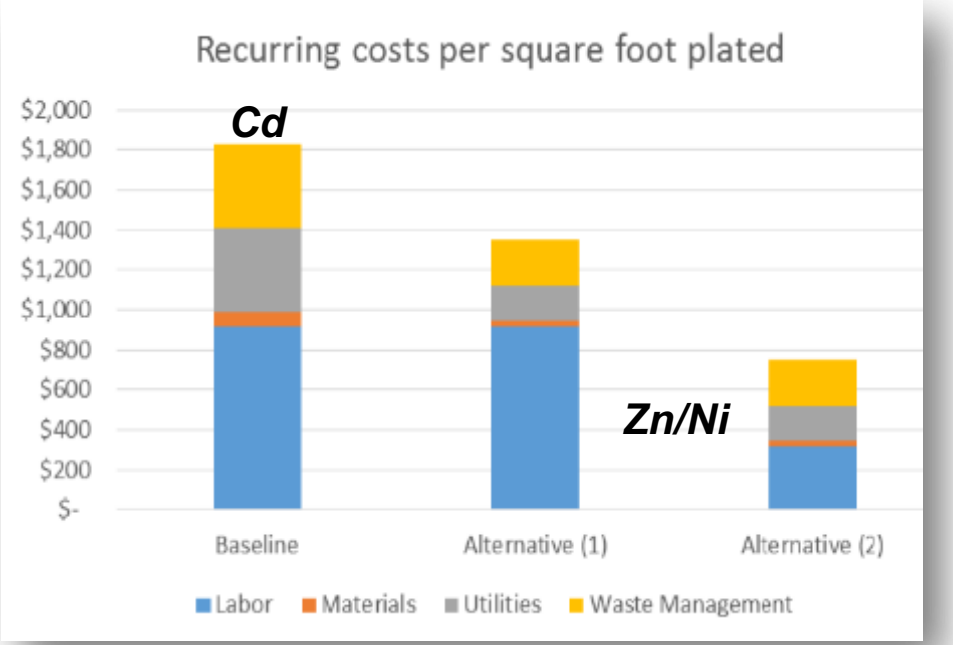


PRE-TRANSITION: ZINC-NICKEL ELECTROPLATING



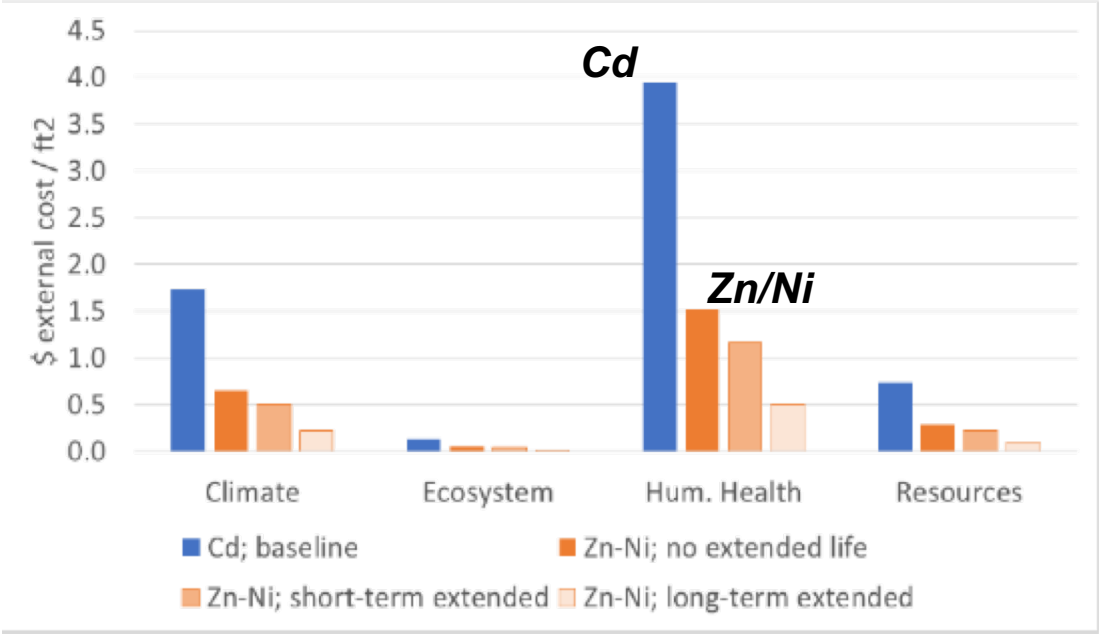
Costs and environmental impacts are compared per ft² of plating over a 15-year line life span. The analysis system boundary includes the plating line, support infrastructure, and the supply chain.

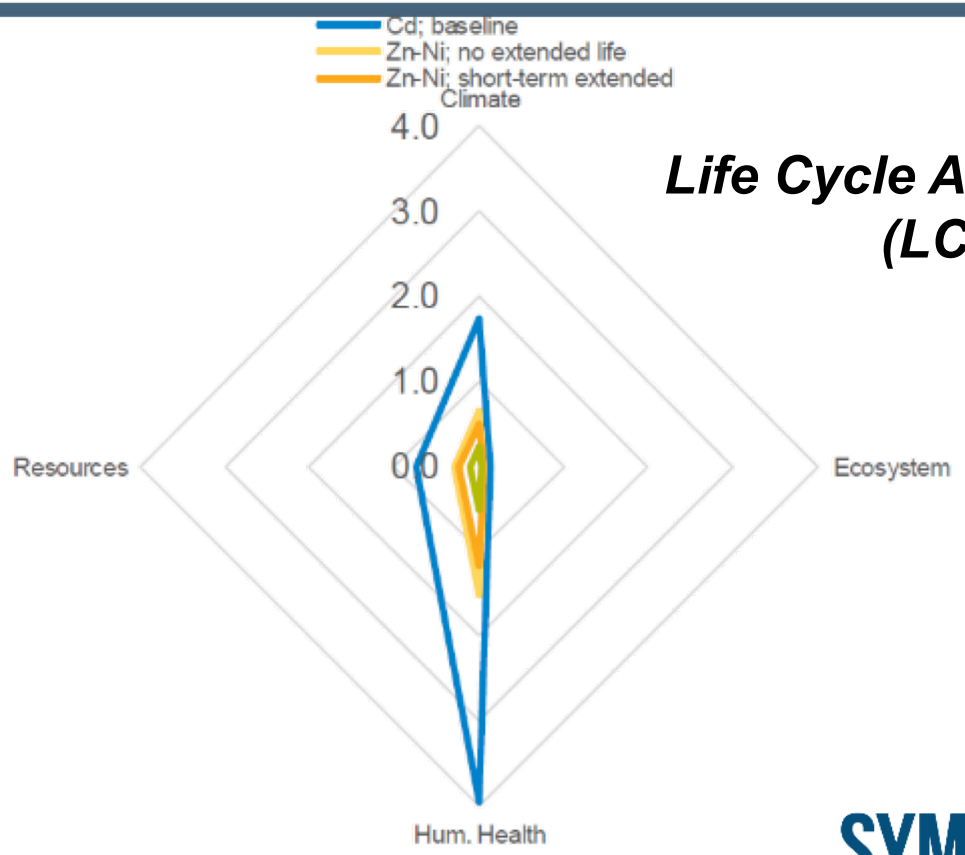
Life Cycle Cost (LCC)



PRE-TRANSITION: ZINC-NICKEL ELECTROPLATING

Life cycle impacts and external costs





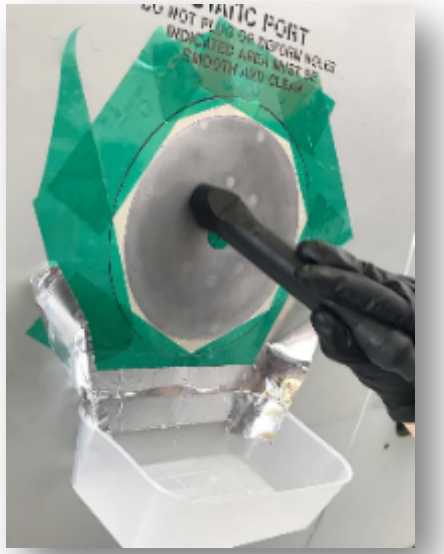
Life Cycle Assessment (LCA)

PRE-TRANSITION: BRUSH ELETROPLATING & ANODIZE

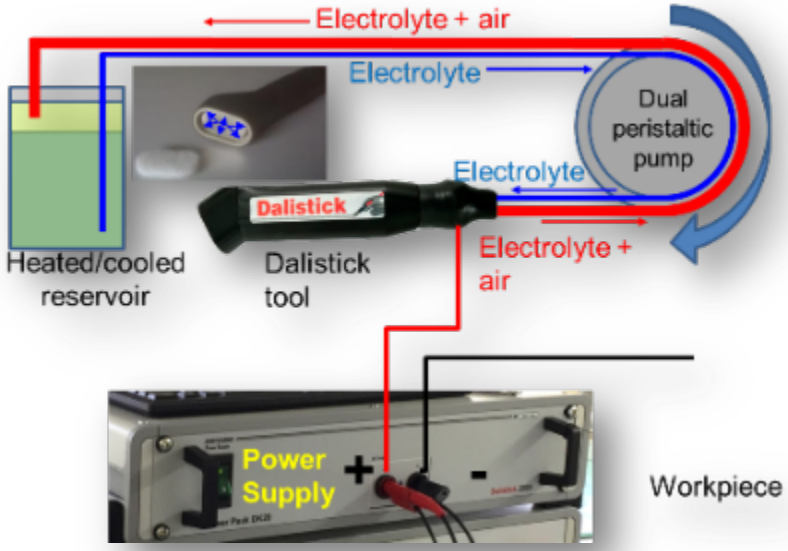
COMFRC SBIR Phase II.5

- Project Task with SOW
- Performed by SBIR Contractor (w/ Noblis Support)

F/A-18 EMI Door Repair

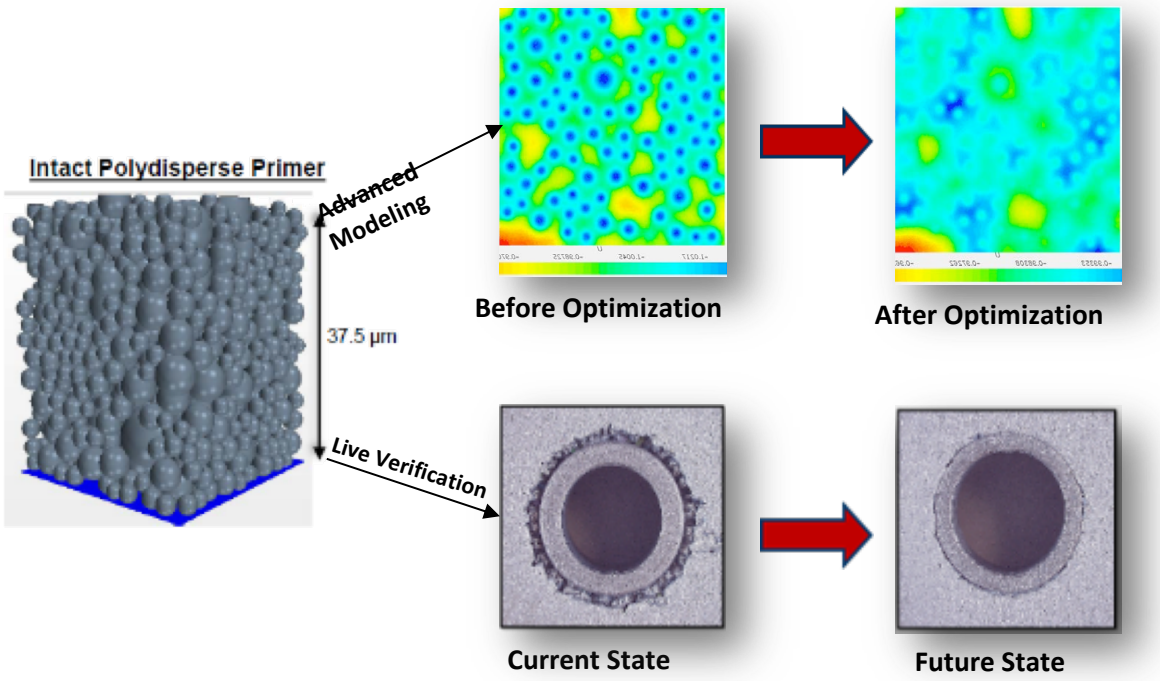


P-8 Dem/Val



System Configuration

PRE-TRANSITION: REACTIVE PIGMENTED COATINGS



PROBLEM STATEMENT

- In FY18 FRCSE processed a total of 1,341 bushings through IVD-Al and Cadmium processes for a total TAT of 1,149 days and 351 labor hrs.
- FRC detachment sites do not have capability of cadmium electroplating and IVD-Aluminum due to facility and certification training costs.

- Increased readiness
- Improved corrosion prevention
- Reduces cost and man-hours

PRE-TRANSITION: REACTIVE PIGMENTED COATINGS

SBIR Contractual Requirement – CDRL A009

CONTRACT DATA REQUIREMENTS LIST *(1 Data Item)*	*Form Approved* *OMB No. 0704-0188*

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A. CONTRACT LINE ITEM NO.	B. EXHIBIT	C. CATEGORY: TDP _____ TM _____ OTHER _____

D. SYSTEM/ITEM	E. CONTRACT/PR NO.	F. CONTRACTOR
RP Coatings for Galvanic Corrosion		Corrdesa, LLC

1. DATA ITEM NO.	2. TITLE OF DATA ITEM	3. SUBTITLE
A009	Sustainability Analysis	Sustainability Analysis

BENEFITS

- ✓ Improved communication of technology
- ✓ Improved prioritization for technology approval
- ✓ Improved prioritization of technology investment for transition
- ✓ Accelerated technology transition

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RECOMMENDED IMPROVEMENTS

Incorporate Readiness Metrics into analysis model

- TAT
- MMHR
- Reduced Defects
- Supportability
- Performance

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