ILS S-Series Day

S4000M
International specification for developing scheduled maintenance programs
S4000M
International specification for developing scheduled maintenance programs

• Introduction to S4000M
• USILS S4000M WG
S4000M

• Provides a procedure that establishes a methodology and decision logic that forms the basis for the development of scheduled maintenance programs, focusing on
  – Safety
  – Reliability
  – Mission accomplishment
  – Legal aspects
  – Ecological aspects
S4000M Specification Structure

• Chapter 1 – General
• Chapter 2 – Systems & power plant analysis
• Chapter 3 – Structure analysis
• Chapter 4 – Zonal analysis
• Chapter 5 – Terms, abbreviations & acronyms
Chapter 1
General

• The specification
  – Background
  – Scope
  – Organization

• Project
  – Organization
  – Steering committee
  – Working groups
  – Policy and procedures handbook (business rules)

• Procedure
  – Series of processes
  – Execution
  – Develop the scheduled maintenance
Chapter 2
Systems & power plant analysis

• 6 step Maintenance Significant Item (MSI) selection process

• Analysis procedure (functions, functional failures, functional failure effects & failure causes)

• 2 levels of analysis
  – Level 1 – 8 Yes/No questions to sort into 8 Failure Effect Categories (FEC)
  – Level 2 – 6 Yes/No questions about the applicability and effectiveness of maintenance tasks
Chapter 2

Systems & power plant analysis

- Determination of task intervals
  - Things to consider (supplier recommendations, previous experience, etc)
  - Task interval parameters (time, operating hours events)

- Extend selectable functional failure effects with law and environmental aspects in Level 1-Analysis
  - Certification maintenance requirements
  - Sampling
  - Military missions/operations
  - Maintenance program updates
Example Analysis Logic Diagram

4) Does this hidden functional failure have a direct adverse effect on safety?

YES

REDESIGN MANDATORY

NO

5) Does the combination of a hidden functional failure and one additional failure of a system related or back-up function have an adverse effect on safety?

YES

Hidden Safety Effects

FEC 6

NO

Hidden Non-Safety Effects

FEC 7

6) Does the combination of a hidden functional failure and one additional failure of a system related or back-up function have an adverse effect on ecology?

NO

No further Analysis required

YES

Hidden Ecological Effects

FEC 8
Chapter 3
Structure analysis

• Definition of a product structure
  – Structure significant item (SSI)
  – Structural detail
  – Other detail
• Scheduled structural maintenance
• Structural maintenance tasks
• Inspection thresholds
  – AD - Accidental damage
  – ED – Existing knowledge (eg potential damage due to corrosion)
  – FF – Fatigue failure
• Repeat inspection intervals
• Concept on harmonizing selected structural related tasks
• Fatigue related sampling
Chapter 3
Structure analysis

• Corrosion prevention and control programs
  – New materials
  – Metal to metal
  – Metal to composite
  – Composite to composite

• Routine and zonal inspections

• Inspection results

• Damage sources and maintenance requirements

• Scheduled structural maintenance development

• Structural analysis procedure
  – Process Steps (S1, S2, S3, etc)
  – Decision Steps (D1, D2, D3, etc)

• Rating systems for SSIs with examples
Example Structural analysis
Chapter 4
Zonal analysis

• Zonal analysis
  – Gives a general guideline for definition and selection of zones
  – Integrates standard zonal analysis, enhanced zonal analysis and Lightening/High Intensity Radiated Field (L/HIRF) analysis into a common zonal analysis process
  – Improves zonal rating for standard zonal analysis (interval determination)
  – Improves enhanced zonal analysis covering specific requirements (eg L/HIRF etc)
Chapter 4
Zonal analysis

• Zonal analysis
  – Provides modularity of enhanced zonal analysis (due to product needs and/or future analysis aspects)
  – Integrates task selection methods from system/power plant analysis and structure analysis
  – Provides the concept how to harmonize all determined tasks and intervals from zonal analysis

• Procedure
  – Single Work Steps (S1, S2, S3, etc)
  – Decisions (D1, D2, D3, etc)
START
ZONAL ANALYSIS

S1
- ESTABLISHMENT OF PRODUCT ZONES (INTERNAL AND EXTERNAL)
- NUMBERING AND LISTING OF PRODUCT ZONES (ZONAL PLAN)

ZONE DETERMINATION

S2
FOR EACH ZONE
- IDENTIFY ZONE CONTENTS (STRUCTURE ITEMS, SYSTEMS COMPONENTS, WIRES, HIRF PROTECTION) AND ACCESS CONDITIONS
- DOCUMENTATION OF RESULTS

ZONE DESCRIPTION

S3
FOR EACH ZONE
- PERFORM STANDARD ZONAL ANALYSIS SEE FIG. 2

S4
NO FURTHER ZONAL ANALYSIS REQUIRED

D1:
DOES ZONE CONTAIN ONLY STRUCTURE ITEMS?

YES

S5
ENHANCED ZONAL ANALYSIS SEE FIG. 3

NO

S6
HIRF PROTECTION ANALYSIS SEE FIG. 4

S7
GVI SELECTED BY SYSTEM/POWERPLANT ANALYSIS

S8
GVI SELECTED BY STRUCTURAL IDEAS
Chapter 5

• Terms, abbreviations & acronyms
  – Chapter 5.1 – Glossary of terms
  – Chapter 5.2 – Abbreviations and acronyms
Future issue

ASD S4000M
future Issue (e.g. 2.0)

Part A

ASD S4000M Issue 1.0
Design & Development Production Phases

Part B

Optimization of Preventive Maintenance (OPM)
In-Service Phase
Design, development and production phases

- **Product Design/Manufacturer**
  - RAMT / Engineering Support
  - Logistic Support Analysis activities
  - Provisioning
  - Technical Documentation
  - Provisioning Data
  - IP Data Subsets
  - Logs Mat and Data
  - IETM other media
  - Other ILS Disciplines (GSTE, Training etc.)

- **Manufacturer/Supplier**
  - Issue1.0
  - Cert. / Qual.
  - Provisioning Data
  - S3000L

- **Logistic Support**
  - Provisioning
  - Order Administration
  - Logs Mat and Data
  - S2000M

- **In-Service Phase**
  - Provisioning
  - Technical Documentation
  - S1000D

- **Before start of Product In-Service Phase (Logistic Support Date LSD)**
  - RAMT / Engineering Support
  - S4000M
  - Issue1.0
  - Cert. / Qual.
  - Provisioning Data
  - S3000L

- **Other ILS Disciplines (GSTE, Training etc.)**

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**Aerospace Industries Association**

**Aerospace and Defence Industries Association of Europe**

**Aerospace and Defence Industries Association of Europe**

**Aerospace Industries Association**
In-service phase

Operational & Maintenance Data Feedback

Product Design
Manufacturer / Supplier

RAMT / Engineering Support
S4000M
Issue2.0

Logistic Support Analysis activities

S3000L

Provisioning

Order Administration

Technical Documentation

S1000D

Product
In-Service Phase

LogsMat and Data

IETM other media

Cert. / Qual.

Other ILS Disciplines (GSTE, Training etc.)

Product / Supplier

In-service phase

Aerospace Industries Association

AeroSpace and Defence Industries Association of Europe

Council
AIA USILSMG

S4000M WG Terms of Reference

• S4000M WG Objectives
• Reporting to USILSMG
• Scope of S4000M WG
• Specific Tasks
• Deliverables
AIA USILSMG

S4000M WG Purpose

• Represent US interests in the ASD S4000M community
  – US S4000M requirements are presented for inclusion in future issues of S4000M
  – Harmonization between S4000M & other S - Series specifications from a US perspective

• Report to the USILSMG
AIA USILSMG
S4000M WG Guiding Principles

• Meet on a regular basis
  – Teleconference
  – WebEx
  – Genesis
  – Face-to-face as required
  – Etc

• Report to USILSMG
AIA USILSMG – S4000M WG

• Recruitment drive
  – Systems analysts
  – Structural analysts
  – Zonal analysts
  – Other S – Series community

• Data Modeling & Exchange Working Group (DMEWG)
  – Data modeler
The End