

# THALES



## **System/Segment Specification**

## **System Subsystem Specification**

**SEA**

**SSS**

**Thales Austria GmbH**

3CC NNNNN NNNN  
MMMMM/01Pr01/PR





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# 1 SCOPE

## 1.1 Identification

This SSS forms the complete functional definition for the Fan Control System as designed for a TCU on a MCC board. It will be designed, developed and tested against the specification described herein.

## 1.2 Document Overview

This document describes all the system requirements for the Fan Control System. The requirements are derived from the Feature List.

The content of this document contains all requirements of the subsystem and are to be used as basis for developing the Fan Control System.

### 1.2.1 Intended Audience

This document is addressed to the following roles:

- Project Design Authority (PDA)
- System Engineering Manager (SEM)
- System Architect (ARC)
- IVVQ manager (IVVQM)
- Quality Assurance Manager (QAM)
- Project Manager (PM)
- Specialty experts (RAMS, Environment, Human Factor..)

### 1.2.2 Evolution of the document

In case of requests for changes of the subsystem (initiated e.g. by the product manager or the customer) the document will be updated accordingly. For type and reasons of changes please refer to the section "History" below.

#### 1.2.2.1 History

##### 1.2.2.1.1 Edition 01

- Initial

#### 1.2.2.2 Distribution

A new edition (proposal) of this document has to be distributed to all functions listed in the section "Intended Audience". A new edition of this document has to be archived (online archive and conventional archive). Due to possible large numbers of involved parties the online archival of proposals is recommended. A copy for information can be downloaded from online archive by everyone in the project, who has read privilege.

#### 1.2.2.3 Configuration Management

This document is written by creating textual building blocks, which are archived within Thales Austria's Subversion repository, where all changes are tracked. Every modification of one of the textual building blocks triggers the generation of this document in both HTML and PDF-format, which are published on the project's web site.

On changes of the document, it is reviewed by the PDA, SEM, IVVQM, QAM and the resulting document is transferred into TAS Platform central document repository both electronically and in paper for further archival.



### 1.3 Relationship to other Plans

The Fan Control System relates to the SEA-SBB project.



## 2 REFERENCES AND TERMS

### 2.1 References

#### 2.1.1 DCA / TAS-FEC Documents

- [1] System Subsystem Design Description  
SEC Software Schweiz  
3BU 62050 0210 DSAPC Ed.01 Pr. 02

#### 2.1.2 Standards

- [2] JAVA Coding Rules 3BU 15000 8010 PWAPA, Ed. 01
- [3] CENELEC EN 50159:2010 Railway applications - Communication, signalling and processing

## 2.2 Terms, Abbreviations and Acronyms

### 2.2.1 Structure of Requirements Definition

This subsection defines the structure of one single requirement. The keywords and their explanations are shown below:

- **Identifier:** Unique identifier of the requirement
- **Type:** A classification of the different requirement types; the following keywords are defined:

CSR Customer Specific Requirement  
DAT Data Requirement  
DOR Document Requirement  
DPR Dependability Requirement  
ECR Environmental Conservation Requirement  
FUR Functional Requirement  
GCR General Constraint Requirement  
MCR Management and Commercial Requirement  
MDR Maintenance and Diagnosis Requirement  
MIR Man-Machine Interface Requirement  
MPR Management and Production Requirement  
OAR Operational Aliveness Requirement  
PER Physical/Environmental Requirement  
PHR Prevention of Hazards Requirement  
PRR Performance and Real-Time Requirement  
PSR Product Startup Requirement  
RSR Resource Support and Consumption Requirement  
SAR Safety Requirement  
SCR Supplier to Customer Requirement  
SER Security Requirement  
TIR Technical Interface Requirement  
TVR Testing and Validation Requirement

- **Synopsis:** A brief and significant description of the requirement.
- **Description:** Complete description of the requirement. Includes, when needed, layouts (screen layouts in principle - no screen dumps), formats, and protocols for interfaces.
- **Satisfies (Origin):** Source of the requirement (feature list, reference to other requirements or internal). It is a precise backward reference of this requirement to its origin. Per convention, references to the Feature List J4S are marked FR:J4S:xxx.
- **Status:** The current status of the requirement, with the following keywords defined:
  - in work: new requirement which is not yet described completely





- draft: requirement is written down and ready to be reviewed, it is not yet approved
- approved: requirement was reviewed by all affected groups and is confirmed
- descoped: requirement delayed to a later release
- to be descoped: requirement is planned to be descoped, no formal approval for changing the state yet
- to be deleted: requirement is planned to be deleted. No formal approval for deleting by CCB yet
- deleted: requirement is no longer valid and will not be implemented at all. Has to be agreed by CCB
- **Stability:** "instable", "stable", "volatile"
- **Target Release:** Scheduled for which release
- **Priority:** Relative importance of fulfilling this requirement from a functional point of view (used for incremental deliveries). The following keywords are defined:
  - Mandatory: Requirement required by applications. If requirement is not provided, the fact and the consequences have to be documented in the validation report. The application has to decide if the product is accepted or not in absence of this requirement.
  - Optional: Enhancement of the product may be implemented in this or a later release. Absence does not make the product unacceptable.
- **Originator:** "Equipment Practice", "Product Management", "Quality", "RAM", "Safety", "Standards/Legal", "Technics (R&D)"
- **Allocation:** Allocates requirements to the system, subsystem, component, or product environment as described in a product breakdown structure. The appropriate keywords have to be defined by the J4S project.
- **Verification Method:**
  - Inspection/review: Verification based on human senses (e.g. sight, touch) or use of straightforward measurement and handling means. No stimuli are necessary.
  - Analysis: Verification based on analytical proof obtained by calculation, without any action on the component.
  - Demonstration: Verification of the operational characteristics observable with regards to the component during operation, without resorting to physical measurements.
  - Test: Verification of the measurable functional characteristics, directly or indirectly accessible with regards to the system during operation. Standard or specific test equipment is usually required. Stimuli may be applied.
- **Verification Step:** The following verification steps are defined:
  - Review
  - Code Reading
  - Analysis
  - Module Test
  - Sublt Test
  - Integration Test
  - System Test
  - Performance Test
  - Load Test
  - Qualification Test
  - Acceptance Test
  - Field Test
  - Tool Test
  - Safety Approval
- **Comment:** Any additional information if necessary. (e.g. reason for deleting a requirement)

## 2.2.2 Abbreviations

HTML	HyperText Markup Language
HWM	High Water Mark
LWM	Low Water Mark
MCC	Multi Channel Controller



System Subsystem  
Specification

SW

TCU

Software

Trackside Controller Unit



## 3 REQUIREMENTS

### 3.1 System Capability Requirements

#### 3.1.1 Optional Fan [FR:COMSYNC:1]

An OEC is optionally equipped with a temperature sensor controlled fan.

##### **COMSYNC:FAN:1**      fan control

The fan control system is controlling the fan of a TCU.

Type:	FUR - Functional Requirement		
Status:	draft	Stability:	stable
Target Release:	1.0	Priority:	mandatory
Originator:	Product Management	Allocation:	SW OEC
Verification Method:	Analysis	Verification Step:	formal approval
Comments:	The main function of the fan control system is to control a fan for a TCU in order to keep the temperature in the TCU in the valid range.		
Satisfies:	FR:COMSYNC:1		

##### **COMSYNC:FAN:2**      temperature sensors and fan speed control device

The fan control system is equipped with one binary temperature sensor and two digital temperature sensors (located at two different places). According to [1], for the digital temperature sensors the LM75 I2C Digital Temperature Sensor is used.

Furthermore, the fan control system comes with a fan speed control device which also measures the fan speed. According to [1], for the speed control device the MAX6650 Fan-Speed Regulator and Monitor with SMBus/I2C-Compatible Interface is used.

Type:	PER - Physical/Environmental Requirement		
Status:	draft	Stability:	stable
Target Release:	1.0	Priority:	mandatory
Originator:	Product Management	Allocation:	SW OEC
Verification Method:	Analysis	Verification Step:	formal approval
Comments:	The system is equipped with two kinds of temperature sensors and a device which controls the rotational speed of the fan.		

- **binary temperature sensor**

A binary temperature sensor has two states: **OFF** and **ON**. If the sensor state is OFF, according to this sensor the controlled device (the fan) may be switched off. If the sensor state is ON, according to the sensor the controlled device shall be on.



The fan control system is equipped with one binary temperature sensor which, in turn, gets its input via "temperature warning" messages of a SIG 12V lamp controller.

- **digital temperature sensor**

A digital temperature sensor indicates approximately the real measured temperature. Whether at a given measured temperature the controlled device shall be on or off is up to the rules of the fan control system.

The fan control system is equipped with two digital temperature sensors LM75 located at two different places in the TCU:

- One is situated at the embedded board of the TCU.
- The other sits nearby the TCU's power supply unit.

So, the digital temperature sensors measure the temperature at these places.

- **fan speed control device**

A fan speed control device MAX6650 can switch the controlled fan on and off. Furthermore, it can digitally measure the actual rotational speed of the fan.

Both, the temperature sensors and the speed control device, are connected to the trackside control unit's embedded computer system via a software/hardware interface I2C.

For the LM75s in the Fan Control System, the Linux HWMON Kernel driver lm75 is used, which is accessed via the SysFS filesystem.

For the MAX6650 in the Fan Control System, the Linux HWMON Kernel driver max6650 is used, which is also accessed via the SysFS filesystem.

Satisfies: FR:COMSYNC:1

**COMSYNC:FAN:3      periodical sensor metering**

All sensors are read out periodically in a fixed (configurable) interval.

Type:	FUR - Functional Requirement		
Status:	draft	Stability:	stable
Target Release:	1.0	Priority:	mandatory
Originator:	Product Management	Allocation:	System
Verification Method:	Analysis	Verification Step:	formal approval

Comments:

- Temperature Sensors are used to control the TCU's fan. (see COMSYNC:FAN:5)
- The Rotational Speed Sensor is used for self-checks of the fan.

Satisfies: FR:COMSYNC:1



## COMSYNC:FAN:5 fan activation and deactivation

The temperature sensors are used to detect whether the fan needs to be activated and deactivated, respectively:

- If the fan is off and if one of the digital temperature sensors measures a temperature above their respective HWM or if the binary temperature sensor is in state on, the fan should be activated
- If the fan is on and if both of the digital temperature sensors measure a temperature below their respective LWM and the binary temperature sensor is in state off, then the fan should be deactivated

Type:	FUR - Functional Requirement		
Status:	draft	Stability:	stable
Target Release:	1.0	Priority:	mandatory
Originator:	Product Management	Allocation:	SW OEC
Verification Method:	Analysis	Verification Step:	formal approval

Comments: For the temperature at the embedded board of the TCU and the temperature nearby the TCU's power supply unit, two threshold temperature values each are defined as system properties:

1. the high watermark HWM. If this temperature value exceeds the HWM at the measurement point, the fan shall be switched on.
2. the low watermark LWM. This is a hysteresis temperature value: If the temperature at the measurement point falls below this value then
  - if the fan is off, no action is required
  - if the fan is on, it has to be checked if the fan has to be activated

According to the temperatures measured by the digital sensors and the state of the binary temperature sensor, the fan is switched on and off, respectively, when the watermarks are crossed.

Satisfies: FR:COMSYNC:1

## COMSYNC:FAN:53 check fan operativeness (online test)

The correct operation of the fan is checked periodically like this:

- if the fan is on then it is switched off (ensures definite state off at start of online test)
- the fan is switched on
- for a certain (configurable) amount of time the rotational speed self-check is carried out in fan state on (see COMSYNC:FAN:0055)
- the fan is switched off
- for a certain (configurable) amount of time the rotational speed self-check is carried out in fan state off (see COMSYNC:FAN:0055)

During online test, no other operation is executed.

Type: FUR - Functional Requirement

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Specification

Status:	draft	Stability:	stable
Target Release:	1.0	Priority:	mandatory
Originator:	Product Management	Allocation:	SW OEC
Verification Method:	Analysis	Verification Step:	formal approval
Comments:	<p>At boot time and 24 hours (configurable) after the last check, the proper functioning of the fan is checked (online test).</p> <p>An online test has two parts, each executed in several steps until online test duration (configurable) has reached:</p> <ol style="list-style-type: none"> <li>1. part: check fan speed when fan is on</li> <li>2. part: check fan speed when fan is off</li> </ol>		
Satisfies:	FR:COMSYNC:1		

**COMSYNC:FAN:0055    periodical rotational speed self-check**

The fan control system executes a self-check of the fan's rotational speed each time the temperature sensors are read out and the fan is switched on or off, potentially.

- If the fan is on, the fan's rotational speed must be greater than `fan_speed_fault` (configurable)
- If the fan is off, the fan's rotational speed must be less than or equal `fan_speed_off` (configurable)

If during speed self-check the rotational fan speed is out of range more than the configured number of times in sequence, the fan is considered broken.

Type:	FUR - Functional Requirement		
Status:	draft	Stability:	stable
Target Release:	1.0	Priority:	mandatory
Originator:	Product Management	Allocation:	System
Verification Method:	Analysis	Verification Step:	formal approval

Comments:

Satisfies: FR:COMSYNC:1

**3.2 Required States and Modes**

According to the Design Rule *J4S:DR:2* [3], the life-cycle of safety-critical applications has three phases: startup, operation, and shutdown.

This section lists requirements on modes of the Fan Control System.

**COMSYNC:FAN:4    fan control modes**

At any time, the fan control system is in one of the following modes:

- Startup Phase



- STARTUP,
- Operation Phase
  - NORMAL,
  - BROKEN,
  - SPEED\_CHECK,
  - ONLINE\_TEST\_ON,
  - ONLINE\_TEST\_OFF,
- Shutdown Phase
  - SHUTDOWN

Type: FUR - Functional Requirement  
Status: draft Stability: stable  
Target Release: 1.0 Priority: mandatory  
Originator: Product Management Allocation: System  
Verification Method: Analysis Verification Step: formal approval

Comments: The fan control modes

Satisfies: FR:COMSYNC:1

#### COMSYNC:FAN:6      **STARTUP mode**

This is the initial mode, i.e. immediately after startup, the fan control system is in STARTUP mode. Furthermore the fan control system gets into STARTUP mode when a runtime exception occurs. and the fan control system is configured to start-over.

Type: FUR - Functional Requirement  
Status: draft Stability: stable  
Target Release: 1.0 Priority: mandatory  
Originator: Technics (R&D) Allocation: System  
Verification Method: Verification Step: formal approval

Comments:

Satisfies:

#### COMSYNC:FAN:7      **NORMAL mode**

NORMAL is the operational mode of the fan control system if no special conditions exist:

- The fan control system gets from SETUP mode into NORMAL mode after setup of all prerequisites for proper functioning.
- It gets from BROKEN mode into NORMAL mode, if the fan speed control device measures a fitting speed during speed checks.
- It gets from SPEED\_CHECK mode into NORMAL mode, if the fan speed control device measures a fitting speed during speed checks.
- Finally it gets from ONLINE\_TEST\_OFF mode into NORMAL mode, when the online test duration for online test phase 2 is elapsed.

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Type:	FUR	Stability:	stable
Status:	draft	Priority:	mandatory
Target Release:	1.0	Allocation:	System
Originator:		Verification Step:	formal approval
Verification Method:			

Comments:

Satisfies:

**COMSYNC:FAN:8      BROKEN mode**

The BROKEN mode indicates fan speed problems:

- The fan control system gets from NORMAL, SPEED\_CHECK, ONLINE\_TEST\_ON, and ONLINE\_TEST\_OFF mode into BROKEN mode, if the fan speed control device measures an improper speed during a number (configurable) of consecutive speed checks.

Type:	FUR	Stability:	stable
Status:	draft	Priority:	mandatory
Target Release:	1.0	Allocation:	
Originator:		Verification Step:	formal approval
Verification Method:	Analysis		

Comments:

Satisfies:

**COMSYNC:FAN:9      SPEED\_CHECK mode**

The SPEED\_CHECK mode indicates that the fan control system is about to execute a speed check:

- The fan control system gets from NORMAL mode into SPEED\_CHECK mode when a speed check is executed.

Type:	FUR	Stability:	stable
Status:	draft	Priority:	mandatory
Target Release:		Allocation:	
Originator:		Verification Step:	
Verification Method:			

Comments:

Satisfies:





### COMSYNC:FAN:10      ONLINE\_TEST\_ON mode

The ONLINE\_TEST\_ON mode signifies that the fan control system executes phase 1 of the online test (fan on):

- The fan control system gets from NORMAL mode into ONLINE\_TEST\_ON when the time elapsed since the last online test exceeds the configured value (default 24 hours).

Type:	FUR - Functional Requirement		
Status:	draft	Stability:	stable
Target Release:		Priority:	mandatory
Originator:	Allocation:		
Verification Method:	Verification Step:		

Comments:

Satisfies:

### COMSYNC:FAN:11      ONLINE\_TEST\_OFF mode

The ONLINE\_TEST\_OFF mode signifies that the fan control system executes phase 2 of the online test (fan off):

- The fan control system gets from ONLINE\_TEST\_ON mode into ONLINE\_TEST\_OFF mode when the online test duration for the online test phase 1 has expired.

Type:	FUR - Functional Requirement		
Status:	draft	Stability:	stable
Target Release:		Priority:	mandatory
Originator:	Allocation:		
Verification Method:	Verification Step:		

Comments:

Satisfies:

### COMSYNC:FAN:0054      SHUTDOWN mode

The system gets into SHUTDOWN mode if an exceptional situation occurs.

Type:	FUR - Functional Requirement		
Status:	draft	Stability:	stable
Target Release:	1.0	Priority:	mandatory
Originator:	Allocation:		
Verification Method:	Analysis	Verification Step:	analysis



Comments:

Satisfies:

### 3.3 System External Interface Requirements

#### 3.3.1 Interface Identification and Diagrams

The following picture shows an overview of external interfaces, which are detailed in the rest of this section.

#### 3.3.2 MsgSource - Message Source Interface

##### COMSYNC:FAN:12 Fan Listener Interface

The fan control system shall provide a listener interface for all components requiring information from the fan, e.g. diagnostics.

Supported features shall be:

- Register fan listeners
- Send diagnostic messages

Type:	FUR - Functional Requirement		
Status:	draft	Stability:	stable
Target Release:	2.0	Priority:	mandatory
Originator:	Product Management	Allocation:	Library
Verification Method:	Demonstration	Verification Step:	design review

Comments:

Satisfies:

#### 3.3.3 OLTSv - OLT Superversion Interface

#### 3.3.4 Config - Configuration Files Support

##### COMSYNC:FAN:14 Configuration Interface

The configuration interface shall support reading property files.

Type:	TIR - Technical Interface Requirement		
Status:	draft	Stability:	stable
Target Release:	2.0	Priority:	mandatory
Originator:	Technics (R&D)	Allocation:	Library
Verification Method:	Demonstration	Verification Step:	design review

Comments:

Satisfies:



### 3.4 System Internal Interface Requirements

Internal interface are transparent to the user and irrelevant for the system design and architecture. Internal interfaces will be specified at component level and are left to the designer.

### 3.5 System Internal Data Requirements

### 3.6 Adaption Requirements

No adaption requirements.

### 3.7 Safety Requirements

#### COMSYNC:FAN:17      Development according to CENELEC standard

The software development process for fan control system has to be compliant with the CENELEC standards (50128:2011 [ref:ST6]).

Type:	GCR - General Constraints Requirement		
Status:	draft	Stability:	stable
Target Release:	2.0	Priority:	mandatory
Originator:	Safety	Allocation:	System
Verification Method:	Inspection/Review	Verification Step:	

Comments:

Satisfies:

### 3.8 Security and Privacy Requirements

#### COMSYNC:FAN:20      Thales confidential

All parts of the fan control system project are confidential (i.e. not open-source)

Type:	SER - Security Requirement		
Status:	draft	Stability:	stable
Target Release:	2.0	Priority:	mandatory
Originator:	Product Management	Allocation:	System
Verification Method:	Inspection/Review	Verification Step:	code reading

Comments: Each source developed in the J4S project has to contain the Thales license header.

Satisfies:

### 3.9 System Environment Requirements

not applicable



### 3.10 Computer Resource Requirements

#### 3.10.1 Computer Hardware Requirements

##### **COMSYNC:FAN:23      TAS Platform MCC**

J4S has to support TAS Platform 2.x on MCC hardware.

Type:	FUR - Functional Requirement		
Status:	draft	Stability:	stable
Target Release:	2.0	Priority:	mandatory
Originator:	Product Management	Allocation:	System
Verification Method:	Test	Verification Step:	integration test

Comments:

Satisfies:

#### 3.10.2 Computer Hardware Resource Utilization

##### **COMSYNC:FAN:24      Hardware resource utilization**

The hardware resource utilization of the fan control system integration test shall be documented.

Type:	DOR - Documentation Requirement		
Status:	draft	Stability:	stable
Target Release:	2.0	Priority:	mandatory
Originator:	Technics (R&D)	Allocation:	System
Verification Method:	Demonstration	Verification Step:	integration test

Comments:

Satisfies:

#### 3.10.3 Computer Software Requirements

TODO: reference to COTS components document [ref:S14] + software versions

##### **COMSYNC:FAN:25      Java Programming Language**

Java components shall be implemented using the Java 7 language.

Type:	FUR - Functional Requirement		
Status:	draft	Stability:	stable
Target Release:	2.0	Priority:	mandatory
Originator:	Technics (R&D)	Allocation:	System
Verification Method:	Inspection/Review	Verification Step:	

Comments:

Satisfies:



**COMSYNC:FAN:26 Configuration Management**

The fan control system shall use Subversion for configuration management.

Type:	FUR		
Status:	draft	Stability:	stable
Target Release:	2.0	Priority:	mandatory
Originator:	Technics (R&D)	Allocation:	System
Verification Method:	Inspection/Review	Verification Step:	

Comments:

Satisfies:

**COMSYNC:FAN:27 Build Tool**

The fan control system shall use Maven 3 as build tool.

Type:	FUR - Functional Requirement		
Status:	draft	Stability:	stable
Target Release:	2.0	Priority:	mandatory
Originator:	Technics (R&D)	Allocation:	System
Verification Method:	Inspection/Review	Verification Step:	

Comments:

Satisfies:

**COMSYNC:FAN:28 Continuous Build**

The fan control system shall use the Thales Continuous Build System (i.e. Hudson).

Type:	FUR - Functional Requirement		
Status:	draft	Stability:	stable
Target Release:	2.0	Priority:	mandatory
Originator:	Technics (R&D)	Allocation:	System
Verification Method:	Inspection/Review	Verification Step:	

Comments:

Satisfies:

**COMSYNC:FAN:29 Code Quality Assurance Tool**

The fan control system shall use the Thales toolchain with their recommended configuration for code quality assurance.

Type:	FUR
-------	-----



Status:	approved	Stability:	stable
Target Release:	2.0	Priority:	mandatory
Originator:	Technics (R&D)	Allocation:	System
Verification Method:	Inspection/Review	Verification Step:	review

Comments:

Satisfies:

#### COMSYNC:FAN:30 Toolchain on Linux

The fan control system shall use the toolchain provided by Thales on a Linux OS.

Type:	FUR - Functional Requirement		
Status:	draft	Stability:	stable
Target Release:	2.0	Priority:	mandatory
Originator:	Technics (R&D)	Allocation:	System
Verification Method:	Inspection/Review	Verification Step:	

Comments:

Satisfies:

#### COMSYNC:FAN:31 Package Management System

The fan control system shall use the package management system provided by Thales, i.e. Nexus Professional.

Type:	FUR - Functional Requirement		
Status:	draft	Stability:	stable
Target Release:	2.0	Priority:	mandatory
Originator:	Technics (R&D)	Allocation:	System
Verification Method:	Inspection/Review	Verification Step:	

Comments:

Satisfies:

#### COMSYNC:FAN:32 Regression Tests

The fan control system shall use JUnit for it's automated regression tests.

Type:	FUR - Functional Requirement		
Status:	draft	Stability:	stable
Target Release:	2.0	Priority:	mandatory
Originator:	Technics (R&D)	Allocation:	System
Verification Method:	Inspection/Review	Verification Step:	

Comments:



Satisfies:

#### COMSYNC:FAN:33 Code Coverage Tool

The fan control system shall use the code coverage tool provided by the Thales infrastructure, i.e. Cobertura.

Type:	FUR - Functional Requirement		
Status:	draft	Stability:	stable
Target Release:	2.0	Priority:	mandatory
Originator:	Technics (R&D)	Allocation:	System
Verification Method:	Inspection/Review	Verification Step:	

Comments:

Satisfies:

#### COMSYNC:FAN:34 Profiling Tool

The fan control system shall use the profiling tool provided by the Thales infrastructure.

Type:	FUR - Functional Requirement		
Status:	draft	Stability:	stable
Target Release:	2.0	Priority:	mandatory
Originator:	Technics (R&D)	Allocation:	System
Verification Method:	Inspection/Review	Verification Step:	

Comments:

Satisfies:

### 3.10.4 Computer Communication Requirements

Not applicable; depends on the application which uses J4S.

### 3.11 System Quality Characteristics

#### COMSYNC:FAN:35 Development according to the chorus 2.0 process

The fan control system project development process shall adhere to Chorus 2.0

Type:	GCR - General Constraints Requirement		
Status:	draft	Stability:	stable
Target Release:	2.0	Priority:	mandatory
Originator:	Quality	Allocation:	System
Verification Method:	Inspection/Review	Verification Step:	

Comments:

Satisfies:



### COMSYNC:FAN:36 Test coverage

The test coverage achieved by the automated module tests shall be

- line coverage  $\geq 90\%$
- branch coverage  $\geq 90\%$

Type:	TVR - Testing and Validation Requirement		
Status:	draft	Stability:	stable
Target Release:	2.0	Priority:	mandatory
Originator:	Technics (R&D)	Allocation:	System
Verification Method:	Demonstration	Verification Step:	module test

Comments:

Satisfies:

### COMSYNC:FAN:37 Quality metrics

The fan control system software shall adhere to the RSS checkstyle rules.

Type:	GCR - General Constraints Requirement		
Status:	draft	Stability:	stable
Target Release:	2.0	Priority:	mandatory
Originator:	Technics (R&D)	Allocation:	System
Verification Method:		Verification Step:	

Comments:

Satisfies:

### COMSYNC:FAN:38 Sample code and examples

Provide sample code and usage examples for the customers.

Type:	FUR		
Status:	draft	Stability:	stable
Target Release:		Priority:	mandatory
Originator:	Technics (R&D)	Allocation:	System
Verification Method:	Inspection/Review	Verification Step:	

Comments:

Satisfies:





### 3.12 Design and Implementation Constraints

#### COMSYNC:FAN:39      Component documentation

The scope and usage of the all fan control system components shall be documented (e.g. safe, non-safe, labor, tool).

Type:	DOR - Documentation Requirement		
Status:	draft	Stability:	stable
Target Release:	2.0	Priority:	mandatory
Originator:	Technics (R&D)	Allocation:	System
Verification Method:	Inspection/Review	Verification Step:	

Comments:

Satisfies:

#### COMSYNC:FAN:41      Adhere to Coding Rules

All produced code has to fulfill the coding rules [2].

Type:	GCR - General Constraints Requirement		
Status:	draft	Stability:	stable
Target Release:	2.0	Priority:	mandatory
Originator:	Safety	Allocation:	Library
Verification Method:	Inspection/Review	Verification Step:	review

Comments:

Satisfies:

#### COMSYNC:FAN:42      Adhere to Design Rules

All produced code has to fulfill the design rules [3] where applicable.

Type:	GCR - General Constraints Requirement		
Status:	draft	Stability:	stable
Target Release:	2.0	Priority:	mandatory
Originator:	Safety	Allocation:	Library
Verification Method:	Inspection/Review	Verification Step:	review

Comments:

Satisfies:



### 3.13 Personnel Related Requirements

#### COMSYNC:FAN:43      Java knowledge

Project personal shall have Java knowledge.

Type:	GCR - General Constraints Requirement		
Status:	draft	Stability:	stable
Target Release:	2.0	Priority:	mandatory
Originator:	Technics (R&D)	Allocation:	System
Verification Method:	Inspection/Review	Verification Step:	

Comments:

Satisfies:

#### COMSYNC:FAN:44      Safety knowledge

Project personal shall have safety knowledge.

Type:	GCR - General Constraints Requirement		
Status:	draft	Stability:	stable
Target Release:	2.0	Priority:	mandatory
Originator:	Safety	Allocation:	System
Verification Method:	Inspection/Review	Verification Step:	

Comments:

Satisfies:

### 3.14 Training Related Requirements

Not applicable.

### 3.15 Logistics Related Requirements

#### COMSYNC:FAN:47      Components deployment

The binaries, sources, and java-docs shall be deployed on the Thales repository management system (i.e. Nexus).

Type:	FUR - Functional Requirement		
Status:	draft	Stability:	stable
Target Release:	2.0	Priority:	mandatory
Originator:	Technics (R&D)	Allocation:	System
Verification Method:	Inspection/Review	Verification Step:	

Comments:

Satisfies:



**COMSYNC:FAN:48      Online Documentation**

The fan control system documentation shall be deployed on <http://tas-aww/java-projects/fan>

Type:	FUR - Functional Requirement		
Status:	draft	Stability:	stable
Target Release:	2.0	Priority:	mandatory
Originator:	Technics (R&D)	Allocation:	System
Verification Method:	Inspection/Review	Verification Step:	

Comments:

Satisfies:

### 3.16 Other Requirements

There are no requirements, which do not match any of the other categories.

### 3.17 Deliver Related Requirements

**COMSYNC:FAN:49      Documentation in English language**

All documentation has to be provided in English language.

Type:	DOR - Documentation Requirement		
Status:	draft	Stability:	stable
Target Release:	2.0	Priority:	mandatory
Originator:	Quality	Allocation:	System
Verification Method:	Inspection/Review	Verification Step:	review

Comments:

Satisfies:

**COMSYNC:FAN:50      Juridical aspects of 3rd party software**

The fan control system shall prove, that all juridical aspects dealing with 3rd party SW are legal. It shall be approved, that the application can use the new fan control system without any juridical impacts.

Type:	MCR - Management and Commercial Requirement		
Status:	draft	Stability:	stable
Target Release:	2.0	Priority:	mandatory
Originator:	Standards/Legal	Allocation:	System
Verification Method:	Analysis	Verification Step:	formal approval

Comments:

Satisfies:



#### COMSYNC:FAN:51 Coding Rules

The fan control system, though not safety-critical, shall obey the set of Coding Rules that shall be observed by safe applications which use J4S.

Type:	DOR - Documentation Requirement		
Status:	draft	Stability:	stable
Target Release:	2.0	Priority:	mandatory
Originator:	Technics (R&D)	Allocation:	User Guides
Verification Method:	Inspection/Review	Verification Step:	review

Comments:

Satisfies:

#### COMSYNC:FAN:52 Design Rules

The fan control system, though not safety critical, shall obey the Design Rules that are to be observed by safe applications which use J4S.

Type:	DOR - Documentation Requirement		
Status:	draft	Stability:	stable
Target Release:	2.0	Priority:	mandatory
Originator:	Technics (R&D)	Allocation:	User Guides
Verification Method:	Inspection/Review	Verification Step:	review

Comments:

Satisfies:

### 3.18 Precedence and Criticality of Requirements

All requirements are mandatory.



## 4 NOTES



## REQUIREMENTS LIST

Identifier	Synopsis	Category	Status
COMSYNC:FAN:1	fan control	FUR	draft
COMSYNC:FAN:2	temperature sensors and fan speed control device	PER	draft
COMSYNC:FAN:3	periodical sensor metering	FUR	draft
COMSYNC:FAN:4	fan control modes	FUR	draft
COMSYNC:FAN:5	fan activation and deactivation	FUR	draft
COMSYNC:FAN:6	STARTUP mode	FUR	draft
COMSYNC:FAN:7	NORMAL mode	FUR	draft
COMSYNC:FAN:8	BROKEN mode	FUR	draft
COMSYNC:FAN:9	SPEED_CHECK mode	FUR	draft
COMSYNC:FAN:10	ONLINE_TEST_ON mode	FUR	draft
COMSYNC:FAN:11	ONLINE_TEST_OFF mode	FUR	draft
COMSYNC:FAN:12	Fan Listener Interface	FUR	draft
COMSYNC:FAN:14	Configuration Interface	TIR	draft
COMSYNC:FAN:17	Development according to CENELEC standard	GCR	draft
COMSYNC:FAN:20	Thales confidential	SER	draft
COMSYNC:FAN:23	TAS Platform MCC	FUR	draft
COMSYNC:FAN:24	Hardware resource utilization	DOR	draft
COMSYNC:FAN:25	Java Programming Language	FUR	draft
COMSYNC:FAN:26	Configuration Management	FUR	draft
COMSYNC:FAN:27	Build Tool	FUR	draft
COMSYNC:FAN:28	Continuous Build	FUR	draft
COMSYNC:FAN:29	Code Quality Assurance Tool	FUR	approved
COMSYNC:FAN:30	Toolchain on Linux	FUR	draft
COMSYNC:FAN:31	Package Management System	FUR	draft
COMSYNC:FAN:32	Regression Tests	FUR	draft
COMSYNC:FAN:33	Code Coverage Tool	FUR	draft
COMSYNC:FAN:34	Profiling Tool	FUR	draft
COMSYNC:FAN:35	Development according to the chorus 2.0 process	GCR	draft
COMSYNC:FAN:36	Test coverage	TVR	draft
COMSYNC:FAN:37	Quality metrics	GCR	draft
COMSYNC:FAN:38	Sample code and examples	FUR	draft
COMSYNC:FAN:39	Component documentation	DOR	draft
COMSYNC:FAN:41	Adhere to Coding Rules	GCR	draft
COMSYNC:FAN:42	Adhere to Design Rules	GCR	draft
COMSYNC:FAN:43	Java knowledge	GCR	draft
COMSYNC:FAN:44	Safety knowledge	GCR	draft
COMSYNC:FAN:47	Components deployment	FUR	draft
COMSYNC:FAN:48	Online Documentation	FUR	draft
COMSYNC:FAN:49	Documentation in English language	DOR	draft
COMSYNC:FAN:50	Juridical aspects of 3rd party software	MCR	draft

Identifier	Synopsis	Category	Status
COMSYNC:FAN:51	Coding Rules	DOR	draft
COMSYNC:FAN:52	Design Rules	DOR	draft
COMSYNC:FAN:53	check fan operativeness (online test)	FUR	draft
COMSYNC:FAN:0054	SHUTDOWN mode	FUR	draft
COMSYNC:FAN:0055	periodical rotational speed self-check	FUR	draft



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