Thermo Fisher Scientific Logo

CUSTUMER REQUIReMENTS SPECIFIcATION

TFS FLAT SHEET GAUGING for ALUMINiUM ROLLING MILLS

|  |  |
| --- | --- |
| Customer | TFS |
| Project | 0515.TBD |
| Author | Rene Roelands |

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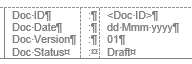
Open Issues

Before approval of this document, all open Issues must be solved and this table must be removed.

If this is not possible, a Change Request must be submitted.

| **ID** | **Description** | **Due date**  [dd Mmm yyyy] | **Owner** | **Change ID** |
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| OI-xxxxx |  |  |  |  |

Template Guidance text:

* Style Text : To be used for standard text.
* Style Bullet : To be used for standard bullets.
* Style Help : Help text, to be removed after reading.
* Style Medical : Text having requirements for Medical Device products only.
* <Example> : Text needs to be filled-in; afterwards the brackets must be removed.
* Language : English (UK)
* Layout : It is at the end to the author to take care of a good readable layout,   
   e.g. with adding Break Pages
* Header : Should have Carriage Returns  
   

# Introduction

## Purpose

The purpose of this CRS is to document the requirements of all stakeholders involved in the whole lifecycle of the product, customer, production, and service. Also appropriate regulatory requirements are documented.

The purpose of this project is to develop a 10 keV sheet gauging system for the aluminium rolling mills. The project is a co-development between Thermo Fisher Scientific (TFS) and Sioux. The document focuses on the customer requirements for the parts that are in the scope of Sioux.

## Scope

This document applies to the development of 10 keV sheet gauging system.

In Sioux scope:

* Electronics and software
* Enclosures
* Cooling
* Frames

Instruction how to write the CRS:

* Gather requirements:
* Identify all stakeholders involved in the whole product lifecycle; customer, production and service as providers of the requirements.
* Delivery and post-delivery activities requirements
* Identify the appropriate regulatory requirements.
* Gather all requirements by studying all related documentation and by interviewing the requirements stakeholders.
* Write requirements, ensuring that requirements are:
* Correct; It is correct if, every requirement stated therein is one that the product shall meet and is ‘implementation free’.
* Clear; It is unambiguous if every requirement stated therein has only one interpretation. As a minimum, this requires that each characteristic of the final product be described using a single unique term.
* Complete; It is complete if, it includes the following elements :
* All significant requirements, whether relating to functionality, performance, design constraints, attributes or external
* Definition of the responses of the software to all realizable classes of input data in all realizable classes of situations
* Full labels and references to all figures, tables and diagrams in the CRS and definitions of all terms of units of measurements
* Consistent; It is consistent with the higher level documents

# system description

## System Context

The context of the flat sheet gauging system is shown in Figure 1. In mills aluminium is rolled to a prescribed thickness. The thickness is measured with the flat sheet gauging system.

Example

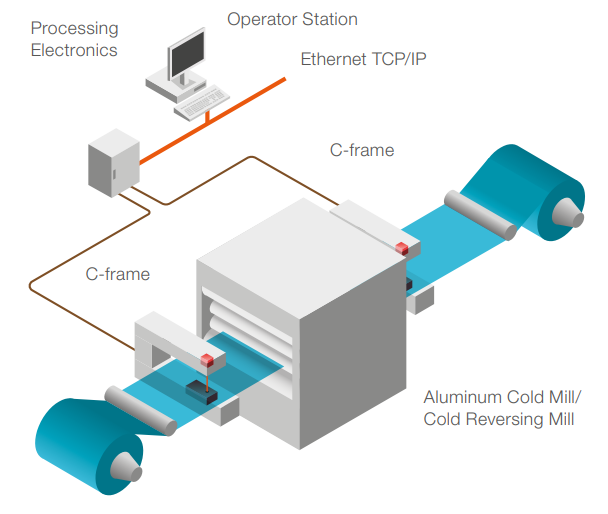


Figure 1: Flat sheet gauging system

Figure 2.1: < Project Name> context

## Decomposition

Figure 2: preliminary structural decomposition. Elements in Sioux scope are shown in orange and elements in the TFS scope in red.

## Intended use

Process monitoring. High speed 1 ms measurement time. 5 – 700 µm aluminium. Druchstrahl

## Intended users

Aluminium mills.

## User environment

Environment?

* High Humidity, dust, …
* Maximum acceleration forces?
* Mill vibration, shocks by sheet break
* Temperature range outside of enclosures
  + -40°C … 80°C?
* Temperature in enclosure
  + Suppress temperatures changes from outside by factor 20 (20x geringere temperaturänderungen als Umgebung)
* Cooling fluid:
  + kerosene or water 20°C
* Mill oil will have contact with enclosures

## Markets

The xxx will be brought to the European, North American (USA) and Japanese market.

# Requirements

## Functional requirements

Functional requirements describe the features of a product, the functions it should have, the (industrial) design it has and the actions it should perform.

The functions are including those, which satisfy implied needs:

* Suitability
* Accuracy
* Interoperability
* Traceability
* Efficiency  
  (Set of attributes about the relationship between the level of performance of the software and the amount of resources used under stated conditions)

Consider also requirements not stated by customer but necessary for specified intended use, where known.

Add any additional requirements considered necessary by the organisation.

| **Req. Id.[[1]](#footnote-1)** | **Requirement Description** | **Origin [[2]](#footnote-2)** |
| --- | --- | --- |
| CRS.01.xxx | Measurement uncertainty < 0.1 %. |  |
|  | Measurement range 5 – 700 micron |  |
|  |  |  |

## System performance

### Overall

### Source

#### Emitter

* ***Electronics***
* ***Shutter***
* ***X-ray source***

#### Beam control

* ***Collimator***
* ***Pre-filter***
* ***Sample holder***

### Detector

Add requirements on:

* General Specifications
* Cost of Goods
* System Life Time
* Productivity
* Accuracy
* Constraints and preconditions

| **Req. Id.** | **Requirement Description** | **Origin** |
| --- | --- | --- |
| CRS.02.xxx |  |  |
| CRS.02.xxx |  |  |

## Non-functional requirements

The Non Functional requirements:

* + Maintainability:  
    Set of attributes about the effort needed to make specified modifications
    - Analysability
    - Changeability
    - Stability
    - Testability
    - Manageability
    - Reusability
  + Reliability:  
    Set of attributes about the capability of software to maintain its level of performance under stated conditions for a stated period of time:
    - Maturity
    - Fault tolerance
    - Recoverability
    - Availability
    - Degradability
  + Portability:  
    Set of attributes about the ability of the software to be transformed from one environment to another
    - Adaptability
    - Installability
    - Conformance
    - Replaceability

| **Req. Id.** | **Requirement Description** | **Origin** |
| --- | --- | --- |
| CRS.03.xxx |  |  |
| CRS.03.xxx |  |  |
| CRS.03.xxx |  |  |

### Manufacturing

Add requirements on:

* Manufacturing
* Packaging
* Transport
* Storage

| **Req. Id.** | **Requirement Description** | **Origin** |
| --- | --- | --- |
| CRS.03.xxx |  |  |
|  |  |  |
|  |  |  |

### Installation

Add requirements on:

* Installation

| **Req. Id.** | **Requirement Description** | **Origin** |
| --- | --- | --- |
| CRS.03.xxx |  |  |
|  |  |  |
|  |  |  |

### Service

Add requirements on:

* Serivce

| **Req. Id.** | **Requirement Description** | **Origin** |
| --- | --- | --- |
| CRS.03.xxx |  |  |
|  |  |  |
|  |  |  |

### DfX

Add requirements on:

* Design for Test-DfT,
* Design for Manufacturability-DfM and
* Design for Quality-DfQ

| **Req. Id.** | **Requirement Description** | **Origin** |
| --- | --- | --- |
| CRS.03.xxx |  |  |
|  |  |  |
|  |  |  |

### Safety and Security

Add requirements on:

* Safety and Security

| **Req. Id.** | **Requirement Description** | **Origin** |
| --- | --- | --- |
| CRS.03.xxx |  |  |
|  |  |  |
|  |  |  |

## Usability Requirements

Usability is a set of attributes about the effort needed for use, and on the individual assessment of such use, by a stated or implied set of users:

* Understandability
* Learnability
* Operability
* Explicitness
* Customisability
* Attractively
* Clarity
* Helpfulness
* User-friendliness
* The acceptance criteria that will be used to validate that the product satisfies the allocated requirements.

| **Req. Id.** | **Requirement Description** | **Origin** |
| --- | --- | --- |
| CRS.04.xxx |  |  |
|  |  |  |
|  |  |  |

## Regulatory Requirements

In chapter 2, all information is provided to be able to select the applicable standards, directives and regulations. In the SRS this information will be taken as input and used to define the appropriate standards, directives and regulations.

| **Req. Id.** | **Requirement Description** | **Origin** |
| --- | --- | --- |
| CRS.05.xxx |  |  |
|  |  |  |
|  |  |  |

## Environmental

Environmental requirements for the product on:

* Temperature and humidity conditions
* Ingress protection
* Vibrations
* Reliability parameters

| **Req. Id.** | **Requirement Description** | **Origin** |
| --- | --- | --- |
| CRS.06.xxx |  |  |
|  |  |  |
|  |  |  |

## External Interfaces

See Figure 2.1, Context diagram. Add requirements on:

* Interfaces
* General Specifications
* Material
* Supplies
* User

| **Req. Id.** | **Requirement Description** | **Origin** |
| --- | --- | --- |
| CRS.07.xxx |  |  |
|  |  |  |
|  |  |  |

# Document Info

## Terms and Abbreviations

List of specific terms and abbreviations used in this document.

For the general terms and abbreviation used within Sioux, see [Ref1].

| **Term** | **Description** |
| --- | --- |
| CRS | Customer Requirement Specifications |
| SRS | System Requirement Specifications |
|  |  |
| “will” | Customer requirement |
| “should” | Recommendation by customer or executives |
| “could” | Accepted by customer or regulations |
| “must” | Prescribed by legislation or regulatory |

## References

Use as few references as possible to reduce maintenance.

References are by default to the last version of a document. Specific versions are indicated when needed.

| **Ref.** | **Document Title** | **Doc. ID.** |
| --- | --- | --- |
| [Ref1] | General Terms and Abbreviations | STE.QSM.ADD-02 |
| [Ref2] | Work Instruction Regulatory CE Approval Medical Device Directive | STE.REG.WIN-03 |
| [Ref3] | System Requirements Specification (SRS) | DEV.PDE.TPL-02 |
|  |  |  |

## Document Control

If this Document Control section is needed, depends on the document to be created. The table is an example that can be used for e.g. (Medical) Product Documentation or agreements. If not needed, this section may be removed.

| **Control** | **QMS Role** | **Name**  [First Last Name] | Date  [dd Mmm yyyy] | Signature |
| --- | --- | --- | --- | --- |
| Review by |  |  |  |  |
| Approval by |  |  |  |  |
|  | Customer |  |  |  |

## Document Version History

Only the last 3 versions need to be recorded.

| **Version** | **Date**  [dd Mmm yyyy] | **Author**  [First Last Name] | **Description of changes** | **Change ID** |
| --- | --- | --- | --- | --- |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

# Appendix-A: <Title>

Use this Appendix-layout-style for Appendices, if not needed, remove this section.

## <Sub-H**eading** for Appendix>

1. Req. ID has format CRS.yy.xxx. Where yy refers to the paragraph number: e.g. The yy is 04 for $3.4 Usability requirements. xxx is a sequential number starting 001. If a requirement is added the next free number must be taken. If a requirements is deleted the entry must remain, indicating requirement is obsolete, preventing that the Req.ID is reused for another new requirement. [↑](#footnote-ref-1)
2. Origin refers to any information on the origin of the requirement. This can be e.g. a reference to the provider of the requirement (the stakeholder), a change request number or a reference to a customer request document. [↑](#footnote-ref-2)