HITACHI
⊕Hitachi Rail Italy SpA

TCM/DIC	Interface Control Document
DEPARTMENT	DOCUMENT TYPE

Metro Mumbai L2/L7

TCMS

TCMS - WFL Interface Control Document (ICD)

<div style="border:2px solid red; color:red;">

PRELIMINARY

</div>

(*) If applicable

IDC.dotx Vers. 1.2 ---------------------- 02J_EC13P021841B_ICD_ Requirements_for_WFL.docx	Preparation	2019/03/01	A. Di Napoli		DOCUMENT NAME MUM TCMS-WFL ICD		
	Review (*)	2019/03/01	B.Busco				
	Approval (*)	2019/03/01	B.Busco		CDRL IDENTIFIER (*)		
HITACHI ⊕Hitachi Rail Italy SpA		DATE	RESPONSIBLE	TITLE /SIGNAT. (*)	NA		
		EC13P021841B	00.1		PREPARED		Page 1/12
		DOCUMENT NUMBER	REVISION LEVEL		STATUS		NUMBER OF PAGES

HITACHI
⊛Hitachi Rail Italy SpA

MUM TCMS-WFL ICD	EC13P021841B	00.1	Page 2/12
DOCUMENT NAME	DOCUMENT NUMBER	REV.	PAG.

REVISION SHEET						
N°	**Change description**	**Date**	**Prepared**	**Reviewed**	**Approved**
00.1	Preliminary issue for internal review	2019/03/01	tbd	B.Busco	B.Busco

PRELIMINARY

Table of content

List of figures

List of tables

1. Introduction

This Interface Control Document (ICD) specifies the requirements for the WFL system in order to correctly interface with the Hitachi Train Control and Management System (TCMS).

1.1 Purpose

This document contains a description of the interface between the TCMS and the WFL system for Metro Mumbai L2/L7 project. This document is intended to be used by Hitachi engineers as well as by supplier engineers.

1.2 Scope

This Interface Control Document (ICD) has been compiled to be compliant with requirements given by the Technical Specifications [1], by the General Interface Control Document (GICD) [5] and by the TCMS ECN generic requirements document [6].

Only technical requirements are covered by this document. Commercial or project management requirements are out of scope.

This Interface Control Document contains all data that the WFL system shall exchange with the TCMS.

Any other interface of WFL system is out of scope.

For all the requirements that are not specified in this document, the reference shall be the Technical Specifications [1] for which the supplier is required to be fully compliant.

1.3 Abbreviations, acronyms and definitions

Definitions of all terms, acronyms and abbreviations required to properly understand this document are reported in the following paragraphs.

1.3.1 Acronyms and abbreviations

ACRONYM	MEANING
WFL	Wheel Flange Lubrificator
CB	Circuit Breaker
CS	Consist Switch
HRI	Hitachi Rail Italy
HW / SW	HardWare / SoftWare
ICD	Interface Control Document
PD	Process Data
TCMS	Train Control and Management System
TRDP	Train Real-time Data Protocol

1.4 References

1.4.1 Contractual documents

Ref.	Document Number	Rev.	Title
[1]	BID NO. MRS1 - PART II: Supply Requirements		MRS1: Design, Manufacture, Supply, Testing, Commissioning and Training of 378 Numbers of Standard Gauge Metro Rail Cars for Mumbai Metro Rail Investment Project – Part II

1.4.2 Reference standards

Ref.	Identification	Authors	Title
[2]	EN 50155	CENELEC	Railway applications – Electronic equipment used on rolling stock
[3]	EN 50128	CENELEC	Railway Applications: Software of Railway Control and Protection Systems
[4]	IEC 61375	IEC	Electric railway equipment – Train bus

1.4.3 Project Documents

Ref.	Identification	Authors	Title
[5]	05_EC13P021831B_General_Interface_Control_Document	HRI	General Interface Control Document
[6]	02_ECN_Requirements_EC13P021830B	HRI	TCMS ECN generic requirements
[7]	TBD	HRI	Functional Requirement Specification TBD

2.   Interface design

The TCMS and WFL system interface is based on two types of interface:

- Ethernet
- Wired

For basic requirements please refer to the General Interface Control Document (GICD) [5] and the TCMS ECN generic requirements document [6].

2.1   List of interface signals

The following table contains the list of interface signals exchanged between WFL system and TCMS.

(The following list is preliminary and shall be completed/modified during design phases)

Name	Description	Type	Source	Destination	Note
	Car ID	Ethernet (TRDP)	TCMS	WFL	
	Current Data and Time	Ethernet (TRDP)	TCMS	WFL	
	Train speed	Ethernet (TRDP)	TCMS	WFL	
	Cab side enabling status	Ethernet (TRDP)	TCMS	WFL	
	Oil activation cycle adjust	Ethernet (TRDP)	TCMS	WFL	
	WFL exclusion	Ethernet (TRDP)	TCMS	WFL	
	Test start request	Ethernet (TRDP)	TCMS	WFL	
	CRC (Cyclic redundancy check)	Ethernet (TRDP)	TCMS	WFL	
	Test starting response	Ethernet (TRDP)	WFL	TCMS	
	Test execution status	Ethernet (TRDP)	WFL	TCMS	
	WFL major fault status	Ethernet (TRDP)	WFL	TCMS	
	WFL internal alarm	Ethernet (TRDP)	WFL	TCMS	
	Oil level	Ethernet (TRDP)	WFL	TCMS	
	Software version	Ethernet (TRDP)	WFL	TCMS	
	Oil level	Ethernet (TRDP)	WFL	TCMS	
	Oil level	Wired (Digital)	WFL	TCMS	
	Major fault	Wired (Digital)	WFL	TCMS	

Table 1: List of interface signals

PRELIMINARY

2.2   Ethernet interface

The WFL system (provided at both driving ends of each train DM1-DM6) is connected to the TCMS through the consist switch CS:

(The following diagram is preliminary and shall be completed/modified during design phases)
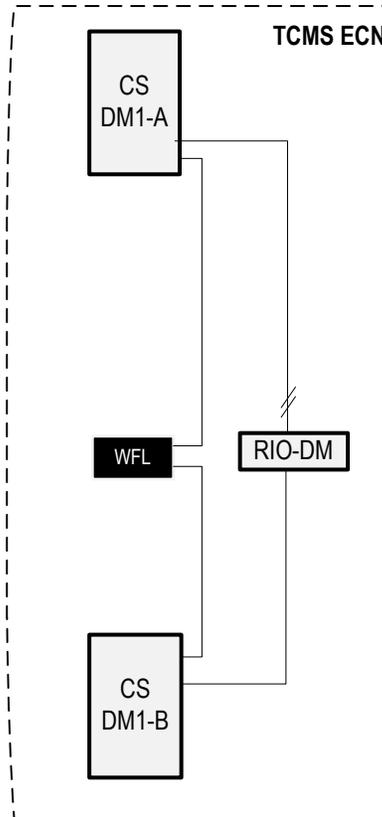
Figure 1: Ethernet Interface

2.2.1   Process data list

The following table contains the list of PD exchanged between WFL system and TCMS trough the TRDP.

(The following list is preliminary and shall be completed/modified during design phases)

ID	SOURCE	DESTINATION	DESCRIPTION
1001	TCMS	ALL SYSTEMS	TCMS Global information
XXXX	TCMS	WFL	TCMS to WFL train status
XXXX	WFL	TCMS	WFL status

Table 2: Process data list

<div style="border:2px solid red; text-align:center; color:red; font-weight:bold">PRELIMINARY</div>

2.2.2   Process data content description

For each Process data listed in the previous table a dedicated section is provided to describe the content and data format.

2.2.2.1   Variable type abbreviations

The following table contains some abbreviations for TCN standard variable types:

Abbreviation	TCN Datatype
I8	INTEGER8
I16	INTEGER16
I32	INTEGER32
I64	INTEGER64
U8	UNSIGNED8
U16	UNSIGNED16
U32	UNSIGNED32
U64	UNSIGNED64
R32	REAL32
C8	CHARACTER8
B8	BITSET8
TD48	TIMEDATE48
A2	ANTIVALENT2
E4	ENUM4
B1	BOOLEAN_1

Table 3: Variable type abbreviations

2.2.2.2 Process Data Id 1001 (TCMS to All systems)

(The following list is preliminary and shall be completed/modified during design phases)

Source devices (PD Id): TCMS
Destination devices: All systems.
Description: TCMS Global information.

Offset		Signal	Data	Description	
Byte	Bit	Name	Type		
0	0	Life	U8	Sequential Counter (values from 0 to 255)	
1	0	Chk	A2	value 00 = not valid value 01 = valid value 10 = not valid value 11 = not valid	
2	0	Date Time	U8	Current DateTime: Day field (DD).	Local Time YY-> 19 = 2019
3	0		U8	Current DateTime: Month field (MM)	
4	0		U8	Current DateTime: Year field (YY)	
5	0		U8	Current DateTime: Hour field (hh)	
6	0		U8	Current DateTime: Minute field (mm)	
7	0		U8	Current DateTime: Second field (ss)	
8	0	Train Idenitification	U8	Valid range 0 - 65535	
10	0	TCMS Mastership	B8	0 = Not Master 1 = DM1 unit is Master 1 = DM6 unit is Master	
	1	Spare			
	2	Spare			
	3	Spare			
	4	Spare			
	5	Spare			
	6	Spare			
	7	Spare			
11		Spare	U8		
12		Spare	U8		
13		Spare	U8		
14		Spare	U8		
15		Spare	U8		

Table 4: PD 1001 - TCMS global information

2.2.2.3   Process Data Id XXXX (TCMS to WFL)

(The following list is preliminary and shall be completed/modified during design phases)

Source devices (PD Id): TCMS				
Destination devices: WFL				
Description: TCMS output for WFL				

Offset		Signal Name	Data Type	Description
Byte	bit			
0	0	Life	U8	Sequential Counter (values from 0 to 255)
1	0	Chk	A2	value 00 = not valid value 01 = valid value 10 = not valid value 11 = not valid

Table 5: PD XXXX - TCMS output for WFL

PRELIMINARY

2.2.2.4   Process Data Id XXXX (WFL to TCMS)

(The following list is preliminary and shall be completed/modified during design phases)

Source devices (PD Id): WFL

Destination devices: TCMS.

Size [Byte]: XX **– Cycle Time [ms]:** XX **– Time Out [ms]:** XX

Description: WFL output.

Offset		Signal	Data	Description	
Byte	**bit**	**Name**	**Type**		
0	0	Life	U8	Sequential Counter (values from 0 to 255)	
1	0	Chk	A2	value 00 = not valid value 01 = valid value 10 = not valid value 11 = not valid	

<div align="center">

Table 6: PD XXXX - WFL output

</div>

<div align="center">

PRELIMINARY

</div>

2.3   Wired interface

The diagram below shows the wired connections between TCMS and the WFL system:

(The following diagram is preliminary and shall be completed/modified during design phases)
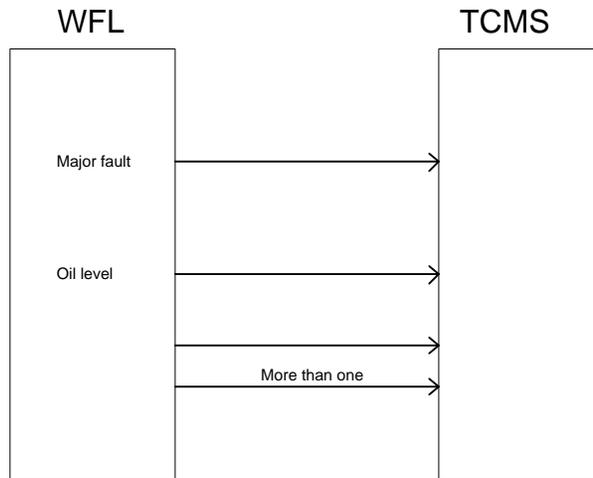
Figure 2: Wired Interface