

1st edition:  
Version:

February 2022  
Original

## **Railway applications Life Cycle Cost**

### **Guidelines for the application of LCC analysis to railway vehicles**



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**IRS to be classified in volumes of UIC:**

Chapter VIII - Technical specification

Subsection 88 - Guidelines

**Complete reference in case of citation:**

IRS-80882:2022,Ed1: Railway applications - Life Cycle Cost - Guidelines for the application of LCC analysis to railway vehicles

**Approbation date:**

30/06/2021

**With effect from:**

01 01 2022

**Application recommended to:**

Railway Undertakings and Entities in charge for the vehicles' maintenance

**Keywords:**

Annuity; Annuity/performance unit; Break-even point; Cost block; External Functional Analysis; IN/OUT framework; Internal Functional Analysis; Inflation rate; Interest rate; Key financial indicators; Life span; Life Cycle Cost; Mileage; Net Present Value; Operation hours; Option; Product Breakdown Structure; Profit and loss statement; RAMS; System Environment; User; Variant.

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© International Union of Railways (UIC) - Paris, 2022

Published by the International Union of Railways (UIC)

16 rue Jean Rey, 75015 Paris - France, February 2022

Dépôt Légal February 2022

ISBN 978-2-7461-3170-5



## Record of updates:

**1st edition, February 2022**

Creation of the document.

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## General Application

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# Foreword

An International Railway Solution (IRS) is a document drawn up by consensus and applied on a voluntary basis which aims to facilitate and harmonise railway operation.

IRSs are gradually replacing UIC leaflets.

Members of the International Union of Railways (UIC) participate in the creation of IRSs, of which they benefit in full. Furthermore, marketing to railway stakeholders contributes to the sharing and harmonisation of good practices, in accordance with UIC's primary goal.

While IRSs do not have the force of law, they are created and published in a professional manner and with technical approval on the basis of UIC procedures, and have full technical legitimacy in the railway sector.

The "General application" section constitutes the heart of the IRS and contains the working group's expertise applicable in the broadest manner. The addition of a "Specific application" aims to cover factors specific to a region, a type of service, etc.

Some provisions shall be implemented in all cases to ensure correct application and maintain the system's cohesiveness. Certain operational circumstances require that specific provisions be systematically applied by all users of the document.

For the purposes of understanding, the user acknowledges that the expression of:

- obligation indicates requirements to be respected in order to comply with the expertise expressed in the document (usually "shall");
- recommendation indicates options that are favourable but not essential (usually "should");
- permission indicates options that are recognised but without consequence (usually "may");
- capacity indicates possibilities from a technical standpoint and not permissions or probabilities (usually "can").

Obligation, recommendation and capacity can be expressed in the negative to indicate prohibiting, non-recommendation and incapacity.

If applicable, notably for the purposes of compliance with a UIC approval, passages that are recommended or mandatory for the cohesiveness of the system will be accompanied by the letters "R" and "MCS" respectively.

**This IRS reflects the following UIC working group expertise:**

Rail System Forum - Rolling Stock Sector

-SET\_02: Passengers related items

-SET\_03: Freight related items

-SET\_06: Running gears

**It integrates in full or in part the following UIC leaflets:**

None

**It complements the following standards:**

See reference documents, page 5.

**The following IRSs constitute a complementary series:**

IRS 80881

## Executive summary

The International Union of Railways (UIC) develops and distributes International Railway Solutions (IRSs) in order to help railway stakeholders, achieve further harmonisation and collaboration.

The content of this IRS is the result of the UIC project "Reliability / safety of axles, wheels and axle boxes, implementation of *EN 50126*" that was launched with the aim of calculating characteristic RAMS (reliability, availability, maintainability, safety) values as per *EN 50126*. To consider also economic requirements, in addition to the RAMS analysis, a LCC methodology was defined in the framework of the project.

This IRS proposes a methodology, guidelines and tools to carry out the analysis of the Life Cycle Cost of railway vehicles, of their assemblies, sub-assemblies or components<sup>1</sup>.

The guidelines and the tools for RAMS calculation and analysis are integrated in the *IRS 80881* "Railway applications: Reliability, availability, maintainability and safety - Guide for the implementation of RAMS analysis to mechanical components of railway vehicles".

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1. As the methodology proposed by this IRS is not mandatory but recommended, the user may modify it in part. In this case he shall mention and describe the modification he made in the report submitted to the customer for validation.

## Field of application

This IRS applies to the evaluation of the Life Cycle Cost (LCC) of railway vehicles and their assemblies, sub-assemblies, components. In this sense it proposes a tool to perform the LCC evaluation and guidelines for the correct use of these tools and for the interpretation of the results.

The tool proposed by this IRS to perform LCC evaluation is the UIC LCC Calculator (LCC-Calculator\_UIC.xls) based on a MS Excel file ([see Appendix A - page 19](#)).

The description of the guidelines follows the sequence of the slides in the "LCC- presentation-charts\_UIC.ppt" slideshow ([see Appendix B - page 20](#)).

The proposed LCC presentation slideshow aims:

- to guide the users to the result and the formulation of an objective recommendation and
- to support the users by supplying a revision-proof documentation on
  - the underlying data basis,
  - the data preparation, and
  - the presentation of results.

The use of the "LCC-presentation-charts\_UIC.ppt" slideshow ([see Appendix B](#)) is recommended for presenting and documenting the results of individual process steps and the overall result.