Chapter 2
AssessLIFE Software for Automation of Asset Degradation to Estimate Asset Life and Degradation Drivers

Emenike Raymond Obi
RaySoft AssetAnalytics, Canada

Augustine O. Nwajana
https://orcid.org/0000-0001-6591-5269
University of Greenwich, UK

ABSTRACT

The AssessLIFE software is a solution platform that analyzes and reveals if industrial physical assets made of metals, alloys, and welds can survive their exposure or ambient conditions. The software also reveals when time-dependent premature failure is likely to occur. The software can generate great financial and safety benefits for all stakeholders. Furthermore, the AssessLIFE software aims to provide asset information for better financial and technical decision-making by managers, engineers, legal teams, insurance teams, fabricators, and inspectors.

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INTRODUCTION

Environmental Impact of Alloy Degradation

"The three main global challenges for the twenty-first century are energy, water, and air – that is, sufficient energy to ensure a reasonable standard of living, clean water to drink, and clean air to breathe. The ability to manage corrosion is a central part of using materials effectively and efficiently to meet these challenges" (Revie & Uhlig, 2008, p. xvii). AssessLIFE Software ties aptly into providing solutions to one of the biggest challenges facing humankind in the modern world, namely the effective and efficient use of generated energy and the reduction of greenhouse gases released into the atmosphere. AssessLIFE Software provides a means to select the right alloys for the right industrial applications to ensure that the alloys employed in industrial settings globally for the production of goods and services attain reasonable service-lives or lifespans and minimize the high risks of premature asset failures. Alloy premature failures typically involve the replacement of the failed assets with assets made of similar or dissimilar alloys. Since alloy production involves intense energy usage via high-temperature heating which subsequently (in most cases) involves the release of greenhouse gases, the effective and efficient usage of industrial alloys and the minimization of pre-mature failures directly reduces the level of greenhouses gases released to the atmosphere.

Financial Impact of Alloy Degradation

Many of the world's physical infrastructure is made of alloys. Alloys are typically solid metallic substances produced by mixing chemical elements (called alloying elements) into a molten or a liquid metallic-based matrix before its solidification via cooling. In many cases, the alloying elements are employed to modify the properties of the metallic-base matrix. For example, an author (Choudary, 2003, p. 228) explained that "the term 'alloy steel' is used to describe those steels to which one or more alloying elements, in addition to carbon, have been deliberately added in order to modify the properties of steel". Alloys, which constitute the material of construction for a significant portion of the global industrial and manufacturing structures and assets employed in the production of goods and services, are expensive when compared with many other types of industrial construction materials such as wood, fiber glass, polymers, composites, etc. Globally, billions of dollars per year are expensed in alloys and asset research, design, manufacture, procurement, fabrication, installation, and operations in applications which include infrastructural, military, industrial, machinery, aeronautical, automobile, residential, transportation, and astronomy. Unfortunately, these very expensive alloy-based assets, equipment,

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