Review Form 3

Journal Name:	**Journal of Engineering Research and Reports**
Manuscript Number:	**Ms_JERR_123462**
Title of the Manuscript:	**Evaluation of Corrosion Performance of LDX 2101 and UNS S32205 in Flexible Pipeline Applications: A Comparative Study**
Type of the Article	**Original Research Article**

Review Form 3

PART 1: **Review Comments**

Compulsory REVISION comments	**Reviewer's comment**	**Author's Feedback** *(Please correct the manuscript and highlight that part in the manuscript. It is mandatory that authors should write his/her feedback here)*
Please write a few sentences regarding the importance of this manuscript for the scientific community. Why do you like (or dislike) this manuscript? A minimum of 3-4 sentences may be required for this part.	**This a good manuscript and important**	
Is the title of the article suitable? **(If not please suggest an alternative title)**	**Yes**	
Is the abstract of the article comprehensive? Do you suggest the addition (or deletion) of some points in this section? Please write your suggestions here.	Here's a brief summary of the abstract for the study titled "Evaluation of Corrosion Performance of LDX 2101 and UNS S32205 in Flexible Pipeline Applications: A Comparative Study": This study investigates the corrosion resistance of two duplex stainless steels, LDX 2101 (UNS S32101) and UNS S32205, in flexible pipeline applications. The research focuses on their performance in environments containing CO2 and H2S, which are common in oil and gas production. The study includes both short-term and long-term tests to evaluate pitting and selective corrosion. The results indicate that both materials exhibit good corrosion resistance, but there are differences in their performance under specific conditions	
Are subsections and structure of the manuscript appropriate?	**Yes**	
Please write a few sentences regarding the scientific correctness of this manuscript. Why do you think that this manuscript is scientifically robust and technically sound? A minimum of 3-4 sentences may be required for this part.	The comparative study of the corrosion performance of LDX 2101 and UNS S32205 in flexible pipeline applications is quite fascinating. Both materials are types of duplex stainless steels, known for their excellent corrosion resistance and high strength. **LDX 2101** is a lean duplex stainless steel with a lower nickel content, making it a cost-effective alternative. It offers good resistance to localized and uniform corrosion due to its high chromium and nitrogen content. This makes it suitable for various applications, including flexible pipelines, where cost and performance are critical factors. **UNS S32205**, also known as 2205 duplex stainless steel, is a more traditional duplex stainless steel with higher chromium, molybdenum, and nickel content. It provides superior corrosion resistance, especially in harsh environments with high chloride content. This makes it ideal for more demanding applications where maximum corrosion resistance is required. In flexible pipeline applications, both materials have been tested for their performance in environments containing CO_2 and H_2S, which are common in oil and gas production. The studies typically involve autoclave testing to observe pitting and selective corrosion over both short and long-term periods.	
Are the references sufficient and recent? If you have suggestions of additional references, please mention them in the review form. **-**	References are ok	

Review Form 3

<table>
<tr><td><u>Minor</u> REVISION comments

Is the language/English quality of the article suitable for scholarly communications?</td><td>Yes</td><td></td></tr>
<tr><td><u>Optional/General</u> comments</td><td>In chapter 3, add a subsection that compares/validates experimental results of corrosion rate measurement in section 3.3 and Fig. 5 with theoretical corrosion rate calculation.

Comparing experimental results of corrosion rate measurements with theoretical corrosion rates involves several steps and considerations. Here's a general approach:

Understanding Corrosion Rate Measurement Methods
Experimental Methods: Common techniques include weight loss measurements, electrochemical methods like Linear Polarization Resistance (LPR), Electrochemical Impedance Spectroscopy (EIS), and Tafel extrapolation
Theoretical Methods: These often involve calculations based on known material properties, environmental conditions, and electrochemical principles.
Experimental Corrosion Rate Measurement
Weight Loss Method: This involves measuring the mass loss of a sample over time due to corrosion. It's straightforward but time-consuming.
Electrochemical Methods: These are faster and include:
LPR: Measures the polarization resistance to estimate the corrosion current and rate.
EIS: Analyzes impedance to provide insights into corrosion mechanisms and rates.
Tafel Extrapolation: Uses the Tafel slopes from polarization curves to determine the corrosion current density
Theoretical Corrosion Rate Calculation
Faraday's Law: Often used to calculate the theoretical corrosion rate. It relates the amount of material lost to the current density and the equivalent weight of the material.
$$Corrosion\ Rate = \frac{K \times I_{corr} \times EW}{d \times A}$$
where:
(K) is a constant,
(I_{corr}) is the corrosion current density,
(EW) is the equivalent weight,
(d) is the density,
(A) is the area.
Comparison and Analysis
Data Collection: Gather experimental data from your chosen method and calculate the theoretical rate using the appropriate formula.
Comparison: Compare the experimental results with the theoretical values. Discrepancies can arise due to factors like experimental conditions, measurement accuracy, and assumptions in theoretical calculations.
Analysis: Investigate the reasons for any differences. This might involve looking at</td><td></td></tr>
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	environmental factors, material properties, or experimental setups. **Practical Considerations** • Accuracy: Ensure the experimental setup is calibrated and measurements are taken consistently. • Environmental Factors: Consider the impact of temperature, humidity, and other environmental conditions on the corrosion rate. Material Properties: Different materials will have different corrosion behaviors, which should be accounted for in both experimental and theoretical calculations **References** 1. Electrochemical Corrosion Measurements (gamry.com) 2. icmt.ohio.edu/nace/presentations/01_PolRes_P Peterson__TEG097X_2011.pdf 3. research-collection.ethz.ch/bitstream/handle/20.500.11850/539893/MonitoringcorrosionrateswithERprobesacriticalassessmentbasedonexperimentsandnumericalmodelling_.pdf 4. A two-step method for the evaluation of corrosion rate in metals | Materials Science (springer.com) 5. Comparison of Corrosion-Rate Measurements on Fresh vs Previously Polarized Samples on JSTOR 6. Qualification Of Lean Duplex Grade Ldx 2101 (Uns32101) For Carcass Material In Flexible Pipes | NACE CORROSION | OnePetro 7. otke-cdn.outokumpu.com 8. Stainless Steel LDX 2101 (UNS S32101) (azom.com)	

PART 2:

	Reviewer's comment	Author's comment *(if agreed with reviewer, correct the manuscript and highlight that part in the manuscript. It is mandatory that authors should write his/her feedback here)*
Are there ethical issues in this manuscript?	*(If yes, Kindly please write down the ethical issues here in details)*	

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