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REVIEWER'S REPORT

Manuscript No.: IJAR- 55874

Title: MICROSTRUCTURE AND MECHANICAL BEHAVIOR OF 17-7PH STEEL WITH MODIFIED CHEMICAL COMPOSITION AFTER NATURAL AGING

Recommendation:
Accept

Rating	Excel.	Good	Fair
Originality	Yes		
Techn. Quality	Yes		
Clarity		Yes	
Significance		Yes	

Reviewer Name: Dr. Ashish Yadav

Detailed Reviewer's Report

Reviewer's Comment for Publication.

Acceptance Comment are mentioned below suitable for the paper titled "MICROSTRUCTURE AND MECHANICAL BEHAVIOR OF 17-7PH STEEL WITH MODIFIED CHEMICAL COMPOSITION AFTER NATURAL AGING"

Reviewer Comments: Accept

Reviewer Comments –

1. Introduction

The introduction clearly establishes the relevance of 17-7PH precipitation-hardened stainless steel for automotive engine applications, particularly where a balance of strength, corrosion resistance, and dimensional stability is required. The motivation for modifying Cr, Ni, and Al contents is well justified, and the research gap regarding the combined effect of compositional modification and natural aging is clearly articulated. The objectives are concise and aligned with industrial requirements, providing a strong foundation for the study.

2. Literature Review

The literature review adequately covers prior work on 17-7PH steel, precipitation hardening mechanisms, and the influence of alloying elements on phase transformation and mechanical behavior. Relevant studies are appropriately cited, and the authors effectively highlight limitations in existing research, particularly the lack of focused studies on narrow compositional ranges combined with natural aging. The review supports the novelty and necessity of the present work.

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3. Solution Approach / Methodology

The experimental methodology is sound, systematic, and well described. The selection of modified chemical composition, rod dimensions (16 mm), and the sequence of solution annealing followed by precipitation hardening and natural aging are appropriate for the stated objectives. Heat treatment parameters are consistent with metallurgical standards, and the chosen characterization techniques for microstructure and mechanical properties are suitable and sufficient to validate the research outcomes.

4. Results and Discussion

The results are clearly presented and logically discussed. The formation of a martensitic–austenitic microstructure with a high martensite fraction and minor delta ferrite presence is convincingly demonstrated. Mechanical properties achieved after aging meet or exceed those of standard 17-7PH steel, confirming the effectiveness of the modified composition and heat treatment. The discussion effectively correlates microstructural evolution with mechanical behavior, demonstrating strong metallurgical insight and practical relevance.

5. Conclusion

The conclusions are concise and well supported by experimental results. The study successfully demonstrates that modified Cr, Ni, and Al contents combined with appropriate heat treatment and natural aging can achieve mechanical properties suitable for automotive engine components. The findings contribute meaningful knowledge to the field of precipitation-hardened stainless steels and have clear industrial applicability.