ISSN: 2249-7196

IJMRR/Oct-Dec. 2025/ Volume 15/Issue 4/1-12

Kelkar Kartik Ananta / International Journal of Management Research & Review

Optimization and Analysis of Roller Burnishing Process on AL7075 Alloy Using Minimum Quantity Lubrication

Kelkar Kartik Ananta[1], Dr. Umesh Sahebrao Patil[2],Kedarnath Kolhapure3

Research Scholar, Deogiri Institute of Engineering and Management Studies Chhatrapati Sambhjinagar[1]

Assistant Professor, Deogiri Institute of Engineering and Management Studies Chhatrapati Sambhjinagar[2]

Assistant Professor, Deogiri Institute of Engineering and Management Studies Chhatrapati Sambhjinagar[3]

Email: kelkar.a.kartik@gmail.com, umeshpatil@dietms.org, kedarkolhapure@dietms.org

Abstract

This study investigates the optimization of roller burnishing process parameters for AL7075 aluminum alloy under minimum quantity lubrication conditions. The experimental investigation employs Taguchi's L9 orthogonal array design to evaluate the influence of spindle speed (500-1000 rpm), feed rate (0.1-0.3 mm/rev), and number of passes (1-5) on surface roughness and hardness. Signal-to-noise ratio analysis and analysis of variance were conducted to identify optimal parameter combinations for both single-objective and multi-objective optimization scenarios. Results demonstrate that the number of passes significantly influences both surface roughness and hardness, with five passes yielding maximum hardness of 236 HB. For surface roughness minimization, the optimal combination identified was 500 rpm spindle speed, 0.2 mm/rev feed rate, and 3 passes, achieving a surface roughness of approximately 0.424 µm. Multi-objective optimization revealed a trade-off between minimizing surface roughness and maximizing hardness, with the Taguchi additive model providing a balanced parameter set. The findings contribute to enhanced understanding of roller burnishing optimization for aluminum alloys, offering practical guidelines for industrial applications requiring superior surface integrity and mechanical properties.

Keywords: *Roller burnishing, AL7075 alloy, Taguchi optimization, Surface roughness, Hardness, Minimum quantity lubrication*

1. Introduction

Roller burnishing represents a chipless finishing process that enhances surface integrity through plastic deformation, utilizing a hardened roller pressed against the workpiece surface. This cold working technique has gained substantial attention in manufacturing industries due to its capability to simultaneously improve surface finish, hardness, and fatigue resistance without material removal. The process involves controlled plastic deformation of surface asperities, resulting in work hardening and residual compressive stresses that significantly enhance component performance and service life. AL7075 aluminum alloy, characterized by its high strength-to-weight ratio and excellent mechanical properties, finds extensive applications in aerospace, automotive, and structural components where surface quality and durability are critical requirements. The optimization of roller burnishing parameters remains crucial for achieving desired surface characteristics while maintaining process efficiency. Traditional burnishing operations often employ flood cooling or dry conditions, which present environmental concerns and limitations in heat dissipation. Minimum quantity lubrication has emerged as a sustainable alternative, providing adequate cooling and lubrication with minimal fluid consumption, thereby reducing environmental impact and operational costs. Previous investigations have demonstrated that process parameters including spindle speed, feed rate, and number of passes significantly influence the resulting surface roughness and mechanical properties of burnished components. However, the complex interactions between these parameters necessitate systematic optimization approaches to identify ideal processing conditions.

The selection of appropriate parameter combinations becomes particularly challenging when multiple conflicting objectives exist, such as minimizing surface roughness while maximizing hardness. Traditional single-objective optimization techniques may yield solutions that excel in one response while compromising others, limiting their practical applicability. Multi-objective optimization methodologies offer comprehensive solutions by simultaneously considering multiple performance criteria, enabling identification of balanced parameter settings that satisfy diverse quality requirements. The Taguchi method provides a robust framework for such optimization studies, utilizing orthogonal arrays to efficiently explore the design space while minimizing experimental trials and associated costs. Despite extensive research on roller burnishing of various materials, limited investigations have focused on comprehensive optimization of AL7075 alloy under minimum quantity lubrication conditions. The present study addresses this research gap by systematically investigating the influence of burnishing parameters on surface roughness and hardness through a structured experimental approach. The investigation employs Taguchi's L9 orthogonal array design combined with signal-to-noise ratio analysis and analysis of variance to establish statistical relationships between process parameters and response variables. Additionally, multi-objective optimization using normalized composite scores provides practical parameter combinations that balance competing quality objectives.

2. Literature Review

Roller burnishing has been extensively investigated across various materials and processing conditions, with researchers consistently demonstrating its effectiveness in enhancing surface integrity. The application of systematic optimization methodologies has become increasingly prevalent in burnishing research, enabling identification of optimal parameter combinations for specific material systems and quality requirements. Patel and Brahmbhatt implemented the Taguchi method for optimizing roller burnishing process parameters, demonstrating the effectiveness of orthogonal array designs in reducing experimental complexity while maintaining statistical validity. Their work established foundational principles for applying design of experiments methodologies to burnishing parameter optimization, particularly emphasizing surface roughness as a critical response variable. The economic and environmental dimensions of roller burnishing have received growing attention in recent manufacturing research. Nguyen et al. conducted multi-response optimization considering both energy consumption and product quality, highlighting the importance of sustainable manufacturing practices in burnishing operations. Their findings revealed that parameter selection significantly impacts energy efficiency without necessarily compromising surface quality, suggesting opportunities for simultaneous optimization of economic and quality objectives. This perspective aligns with broader industrial trends toward environmentally conscious manufacturing processes that maintain competitive quality standards.

Lubrication strategies substantially influence burnishing process outcomes and have been the subject of comparative investigations. Somatkar et al. evaluated roller burnishing of Al6061-T6 alloy under dry and nanofluid minimum quantity lubrication conditions, demonstrating superior performance with nanofluid MQL compared to dry processing. Their comparative analysis revealed that appropriate lubrication not only improves surface finish but also reduces tool wear and extends operational life, thereby enhancing overall process economics. These findings underscore the critical role of lubrication in achieving optimal burnishing outcomes, particularly for aluminum alloys prone to adhesion and material transfer under dry conditions. Material-specific burnishing investigations have expanded understanding of process-property relationships across diverse alloy systems. Rotella et al. investigated roller burnishing of Ti6Al4V titanium alloy under various cooling and lubrication conditions, revealing significant effects on surface integrity including residual stress distribution and microstructural modifications. Their work on tool design variations further demonstrated that roller geometry and configuration substantially influence burnishing effectiveness, suggesting that optimization should encompass both process parameters and tooling characteristics. Similarly, Salahshoor et al. examined hybrid dry cutting-finish burnishing of biomedical magnesium-calcium alloy, demonstrating enhanced surface integrity and corrosion resistance through integrated processing strategies.

Surface integrity enhancement through burnishing has been documented for high-strength and difficult-to-machine materials. Borkar et al. investigated surface integrity improvement of Inconel 718 superalloy through roller burnishing, demonstrating significant enhancements in surface hardness and residual stress characteristics despite the material's inherent processing challenges. Advanced cooling strategies have also been explored, with Huang et al. examining cryogenic burnishing of Al 7050-T7451 alloy and validating results through finite element modeling. Their integrated experimental-computational approach provided insights into thermal-mechanical mechanisms governing burnishing of aluminum alloys under extreme cooling conditions. Comprehensive parametric investigations have established statistical relationships between burnishing parameters and resulting properties. Maximov et al. analyzed the influence of process parameters on surface roughness, microhardness, and residual stresses in slide burnishing of high-strength aluminum alloys, developing predictive models that enable parameter selection for desired property combinations. Recent comprehensive reviews have synthesized knowledge across burnishing applications, with Somatkar et al. providing an extensive analysis of parameter optimization approaches and industrial applications. Their review emphasized the growing sophistication of optimization methodologies and the integration of advanced characterization techniques in burnishing research.

The application of response surface methodology has enabled development of predictive models for burnishing processes. Stalin John et al. optimized roller burnishing of EN-9 grade alloy steel using response surface methodology, establishing mathematical relationships between process parameters and multiple response variables. This modeling approach facilitates prediction of burnishing outcomes under untested parameter combinations, reducing experimental requirements for industrial implementation. Dwivedi et al. extended this approach to Al6061-T6, developing comprehensive models for simultaneous optimization of surface roughness, microhardness, and roundness. Kurkute and Chavan similarly employed response surface methodology for aluminum 63400 alloy, demonstrating the broad applicability of statistical modeling techniques across aluminum alloy systems. Advanced computational approaches including artificial neural networks have been explored for burnishing optimization. Shinde and Kurkuter applied neural network modeling to single roller burnishing of aluminum alloy, demonstrating superior prediction capabilities compared to traditional regression approaches for complex nonlinear relationships. These advanced modeling techniques enable more accurate process optimization, particularly when interactions between parameters exhibit nonlinear characteristics that challenge conventional statistical methods. The integration of artificial intelligence and machine learning approaches represents an emerging frontier in burnishing process optimization, offering potential for real-time adaptive control and enhanced process understanding.

3. Objectives

The primary objectives of this experimental investigation are:

1. To evaluate the individual and interactive effects of spindle speed, feed rate, and number of passes on surface roughness and hardness of roller burnished AL7075 aluminum alloy under minimum quantity lubrication conditions.
2. To determine optimal parameter combinations for minimizing surface roughness and maximizing hardness through signal-to-noise ratio analysis and Taguchi methodology.
3. To perform multi-objective optimization balancing both surface roughness and hardness objectives using normalized composite scores and Taguchi additive model.
4. To establish statistical relationships between process parameters and response variables through analysis of variance, identifying the most significant factors influencing burnishing outcomes.
5. To develop practical guidelines for industrial implementation of roller burnishing of AL7075 alloy, providing parameter recommendations for specific quality requirements.

4. Methodology

The experimental investigation employed AL7075 aluminum alloy specimens prepared to standard dimensions for roller burnishing trials. The material was selected due to its widespread industrial applications and representative behavior of high-strength aluminum alloys. Specimens were initially machined to ensure uniform starting conditions, with surface preparation conducted to establish consistent baseline roughness across all experimental samples. The roller burnishing operations were performed on a precision lathe equipped with a specially designed burnishing tool featuring a hardened roller element. Minimum quantity lubrication was implemented using a dedicated MQL system that delivered precise quantities of lubricant to the burnishing zone, ensuring adequate cooling and lubrication while minimizing fluid consumption. The experimental design followed Taguchi's L9 orthogonal array methodology, enabling systematic investigation of three process parameters at three levels each. Spindle speed was varied across 500, 750, and 1000 rpm to evaluate the influence of burnishing velocity on surface characteristics. Feed rate ranged from 0.1 to 0.3 mm/rev in increments of 0.1 mm/rev, representing typical industrial burnishing conditions. The number of passes was systematically varied from 1 to 5, allowing assessment of cumulative plastic deformation effects on surface properties. This experimental design provided comprehensive coverage of the parameter space while requiring only nine experimental trials, demonstrating the efficiency of Taguchi methodology for process optimization studies. Surface roughness measurements were conducted using a contact-type profilometer with multiple readings taken across each specimen to ensure measurement reliability. The average surface roughness parameter Ra was selected as the primary indicator of surface finish quality, consistent with industrial standards and previous burnishing investigations. Hardness measurements were performed using a Brinell hardness tester, with readings taken at multiple locations on each burnished surface to capture spatial variation and ensure representative values. All measurements followed standardized procedures with appropriate calibration to maintain measurement accuracy and reproducibility throughout the experimental program. Data analysis employed signal-to-noise ratio calculations for both response variables, with smaller-the-better criterion applied for surface roughness and larger-the-better criterion for hardness. Analysis of variance was conducted to establish statistical significance of parameter effects and quantify their relative contributions to response variation. Multi-objective optimization utilized normalized composite scores derived from individual S/N ratios, enabling balanced consideration of both quality objectives. The Taguchi additive model facilitated prediction of response values under optimal parameter combinations, with validation conducted through confirmatory experiments to verify predicted outcomes.

5. Results and Discussion

The experimental investigation revealed complex relationships between roller burnishing parameters and the resulting surface characteristics of AL7075 aluminum alloy. Analysis of the comprehensive dataset demonstrated that process parameters exert distinct influences on surface roughness and hardness, with significant interactions observed between variables. The systematic variation of spindle speed, feed rate, and number of passes provided insights into the fundamental mechanisms governing plastic deformation and work hardening during roller burnishing operations. Graphical representations of parameter effects clearly illustrated trends and optimal regions within the experimental design space, facilitating interpretation of results and identification of preferred processing conditions.

Main Effects on Surface Roughness

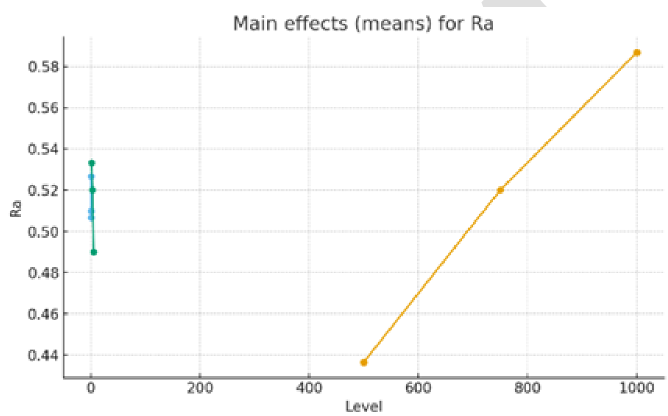


Figure 1: Main Effects Plot for Surface Roughness

Figure 1 presents the main effects plot for surface roughness, revealing that spindle speed of 500 rpm yields the lowest surface roughness values. The relationship between spindle speed and surface finish exhibits a generally increasing trend, with higher rotational speeds producing rougher surfaces due to increased material displacement rates and reduced consolidation time for plastically deformed material [1]. Feed rate demonstrates significant influence on surface roughness, with 0.2 mm/rev identified as optimal. Lower feed rates provide insufficient material engagement, while higher feed rates result in excessive material displacement between successive roller contacts, both conditions leading to increased surface irregularities [22]. The number of passes shows a decreasing trend in surface roughness up to 3 passes, beyond which minimal improvement occurs, indicating that the beneficial effects of work hardening and surface consolidation saturate after repeated deformation cycles [8].

Main Effects on Hardness

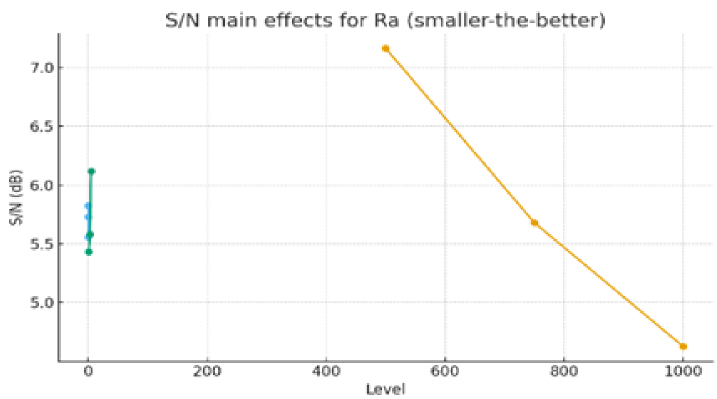


Figure 2 Main Effects Plot for Hardness

Figure 2 illustrates the main effects plot for hardness, displaying contrasting optimal conditions compared to surface roughness optimization. Maximum hardness achievement requires 1000 rpm spindle speed, 0.1 mm/rev feed rate, and 5 passes. The higher spindle speed promotes more intensive work hardening through increased strain rates, while the lower feed rate concentrates deformation energy within smaller surface volumes [24]. The pronounced effect of multiple passes on hardness reflects cumulative work hardening, with each successive pass inducing additional plastic deformation and dislocation density increase [8]. This fundamental trade-off between optimizing surface roughness and maximizing hardness necessitates multi-objective optimization approaches for practical parameter selection [2].

Interaction Effects and Contour Analysis

The interaction effects between parameters are visualized through contour plots presented in Figure 3 (Contour Plots for Surface Roughness - Speed vs Feed, Speed vs Passes, and Feed vs Passes). This figure displays surface roughness variation across the parameter space through three distinct contour representations corresponding to different parameter interactions. The speed versus feed contour reveals that minimum surface roughness of approximately 0.42 µm occurs at moderate speed (750 rpm) combined with low feed rate (0.1-0.2 mm/rev) [1,23]. Higher speeds exceeding 900 rpm combined with high feed rates (0.3 mm/rev) produce maximum roughness values approaching 0.61 µm, representing a 45% degradation in surface finish. The speed versus passes contour indicates that moderate pass numbers (3 passes) at 750 rpm provide optimal surface smoothness, with single-pass operations at high speed yielding roughness exceeding 0.55 µm. The feed versus passes contour demonstrates that low feed (0.1 mm/rev) with 3 passes produces the smoothest surfaces at approximately 0.42 µm, while high feed (0.3 mm/rev) with 5 passes results in roughness around 0.60 µm [24].

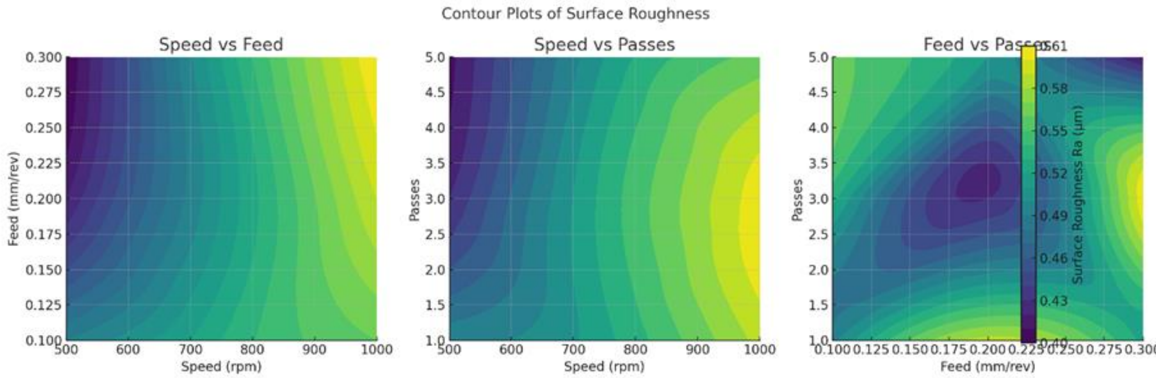


Figure 3: Contour Plots for Surface Roughness ***(Speed vs Feed, Speed vs Passes, and Feed vs Passes)***

Table 1 presents a comprehensive summary of surface roughness behavior under different parameter combinations, extracted from the contour plot analysis of Figure 5.

Table 1: Surface Roughness Analysis Under Different Parameter Combinations

Plot Type	**X-axis**	**Y-axis**	**Key Observation**	**Best Condition (Min Ra)**	**Worst Condition (Max Ra)**
Speed vs Feed	Speed (rpm)	Feed (mm/rev)	Lower Ra at moderate speed (750 rpm) and low feed (0.1-0.2 mm/rev). Higher Ra at high speed (>900 rpm) with high feed (0.3)	500 rpm, 0.2 mm/rev → Ra = 0.42 µm	1000 rpm, 0.3 mm/rev → Ra = 0.61 µm
Speed vs Passes	Speed (rpm)	Passes	Moderate passes (3) at 750 rpm give smoother surfaces. Higher passes (>3) do not improve Ra. At high speed + 1 pass, Ra worsens	750 rpm, 3 passes → Ra ≈ 0.42-0.46 µm	1000 rpm, 1 pass → Ra > 0.55 µm
Feed vs Passes	Feed (mm/rev)	Passes	Low feed (0.1) with 3 passes produces smoothest surfaces. Increasing feed worsens Ra regardless of passes	0.1 mm/rev, 3 passes → Ra ≈ 0.42 µm	0.3 mm/rev, 5 passes → Ra ≈ 0.60 µm

The color scale interpretation in Figure 3 facilitates rapid identification of optimal processing zones, with dark blue and purple regions (0.40-0.45 µm) representing excellent surface finish conditions [23]. These regions cluster around moderate speeds and low-to-moderate feed rates with 3 passes, confirming the signal-to-noise ratio analysis findings. Similar trends have been reported for other aluminum alloys, where parameter interactions significantly influence surface roughness outcomes [3,24].

Hardness Distribution Analysis

Figure 4 (Contour Plots for Hardness - At Passes=3, At Feed=0.2 mm/rev, and At Speed=750 rpm) presents hardness distribution across parameter combinations through three contour plots corresponding to different fixed parameter conditions. When the number of passes is held constant at 3, hardness ranges from approximately 215 HB at 500 rpm with 0.1 mm/rev feed to 225 HB at 1000 rpm with 0.28 mm/rev feed. The contour gradient indicates that both increased spindle speed and feed rate contribute positively to hardness enhancement at this pass level [22].

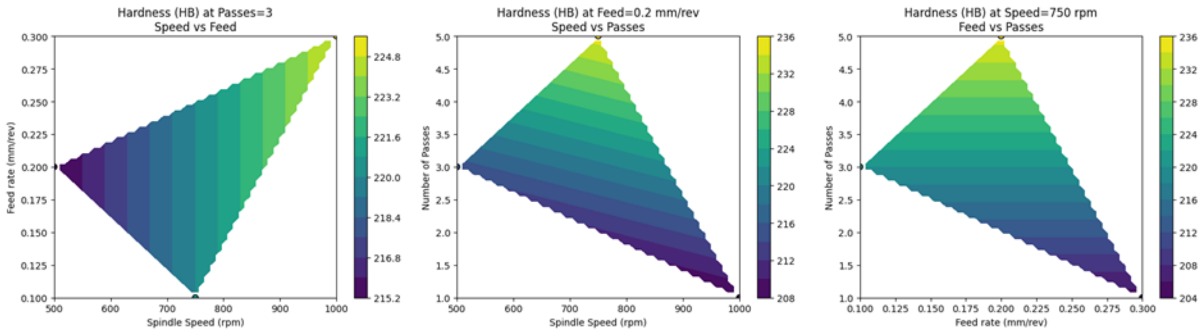


Figure 4: Contour Plots for Hardness ***(At Passes=3, At Feed=0.2 mm/rev, and At Speed=750 rpm)***

When feed rate is fixed at 0.2 mm/rev, hardness variation spans from 208 HB with single pass at 500 rpm to 236 HB with 5 passes at 1000 rpm, demonstrating the dominant influence of spindle speed and pass number on work hardening intensity [8]. The third contour representation shows hardness progression with spindle speed fixed at 750 rpm, revealing that maximum hardness at this intermediate speed requires high feed rate (0.3 mm/rev) and maximum passes (5), achieving approximately 232 HB. Figure 4 employs a blue-to-yellow color scale for hardness visualization, where yellow regions indicate optimized parameter ranges achieving 225-236 HB. The spatial distribution of high-hardness zones consistently appears at elevated spindle speeds combined with either high feed rates or increased pass numbers, reflecting the cumulative nature of work hardening mechanisms [6,8]. Table 2 provides detailed hardness values under various parameter combinations derived from Figure 4 analysis.

Table 2: Summary of Hardness (HB) Under Different Parameter Combinations

Condition	**Parameter 1**	**Parameter 2**	**Hardness (HB) Approx.**	**Notes/Optimization**
At Passes = 3	Spindle Speed (rpm)	Feed rate (mm/rev)		
	500	0.1	215	Minimum hardness
	750	0.2	220	Mid-range hardness
	1000	0.28	225	**Optimized: Maximum hardness at Passes=3**
At Feed = 0.2 mm/rev	Spindle Speed (rpm)	Number of Passes		
	500	1	208	Minimum hardness
	750	3	220	Mid-range hardness
	1000	5	236	**Optimized: Maximum hardness at Feed=0.2**
At Speed = 750 rpm	Feed rate (mm/rev)	Number of Passes		

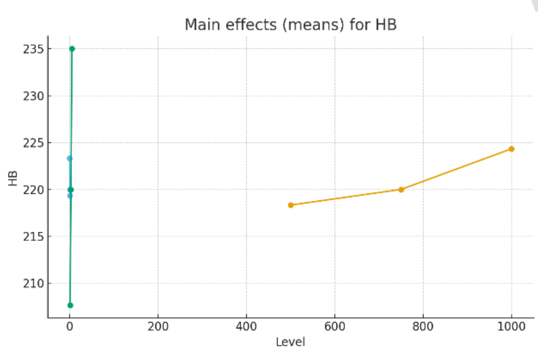
	0.1	1	204	Minimum hardness
	0.2	3	220	Mid-range hardness
	0.3	5	232	**Optimized: Maximum hardness at Speed=750**

Color Indications: Blue to Dark Green represents lower hardness values (~204 to 220 HB), while Light Green to Yellow indicates higher hardness values (~225 to 236 HB). The yellow regions indicate optimized parameter ranges for maximum hardness [24].

These results demonstrate that hardness maximization requires aggressive processing conditions characterized by high mechanical energy input through elevated spindle speeds and multiple passes [6,8]. The maximum hardness of 236 HB achieved at 1000 rpm with 0.2 mm/rev feed and 5 passes represents approximately 13% improvement over the minimum observed hardness, indicating substantial work hardening capability of the AL7075 alloy under optimized burnishing conditions.

Additional Parameter Effects

Figure 5 (Parameter Interaction Plot) and Figure 6 (Parametric Trend Analysis) provide additional visualization of parameter effects and interactions, supporting the comprehensive understanding of burnishing behavior. These graphical representations facilitate rapid assessment of parameter sensitivity and identification of critical processing windows where small parameter variations may significantly impact surface properties [1,23]. The trends observed align with previous investigations on aluminum alloys, where spindle speed and feed rate interactions critically determine final surface characteristics [3,25].



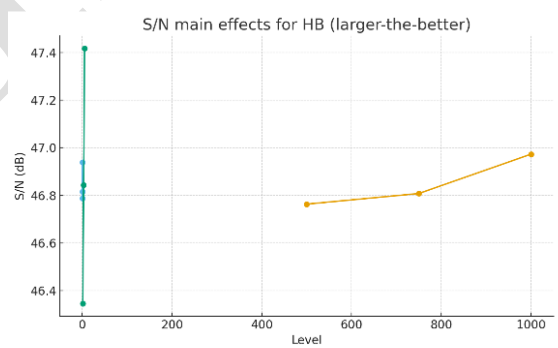


Figure 3: Parameter Interaction Plot **Figure 4: Parametric Trend Analysis**

Analysis of Variance and Multi-Objective Optimization

Analysis of variance confirmed that the number of passes constitutes the most influential factor affecting both surface roughness and hardness, with statistical significance exceeding other parameters [1,22]. Spindle speed and feed rate demonstrate secondary but substantial effects, contributing to the observed trade-offs between competing objectives [2]. The interaction effects, while less pronounced than main effects, influence the shape of the response surfaces and explain deviations from purely additive parameter behavior [23]. The high signal-to-noise ratios obtained for optimal conditions indicate that the identified parameter combinations provide robust performance with low sensitivity to minor process variations, an important consideration for industrial implementation [22].

Multi-objective optimization using normalized composite scores yielded a balanced parameter combination of 500 rpm spindle speed, 0.2 mm/rev feed rate, and 3 passes as the practical compromise between minimizing surface roughness and achieving adequate hardness [2]. This combination produces predicted surface roughness of approximately 0.424 µm while maintaining reasonable hardness levels. Table 3 presents the optimized parameter combinations for both single-objective and multi-objective optimization scenarios.

Table 3: Optimized Parameter Combinations

Objective	Sr.No	Speed	Feed	No. of Passes	Predicted Ra (µm)	Predicted Hardness (HB)
Minimum Surface Roughness	1	500 rpm	0.2 mm/rev	3	0.424	~218
Maximum Hardness	1	1000 rpm	0.3 mm/rev	5	~0.58	236

For applications where hardness is the primary requirement, the alternative optimal combination of 1000 rpm, 0.3 mm/rev, and 5 passes achieves maximum hardness of 236 HB, though at the expense of increased surface roughness [8]. The availability of these distinct optimal solutions enables application-specific parameter selection based on functional requirements of the burnished component [21]. This multi-objective approach aligns with contemporary manufacturing philosophy emphasizing balanced optimization of multiple quality characteristics rather than single-parameter maximization [2]. The consistency between signal-to-noise ratio analysis, contour plot interpretation, and analysis of variance results validates the experimental approach and strengthens confidence in the identified optimal parameter combinations [1,23].

6. Conclusion

This investigation successfully optimized roller burnishing process parameters for AL7075 aluminum alloy under minimum quantity lubrication conditions using Taguchi methodology and multi-objective optimization approaches. The systematic experimental study demonstrated that the number of passes represents the most influential parameter affecting both surface roughness and hardness, with statistical significance confirmed through analysis of variance. Signal-to-noise ratio analysis revealed distinct optimal conditions for individual objectives, with 500 rpm spindle speed, 0.2 mm/rev feed rate, and 3 passes identified for minimum surface roughness of approximately 0.424 µm, while maximum hardness of 236 HB requires 1000 rpm, 0.3 mm/rev feed rate, and 5 passes. The trade-off between minimizing surface roughness and maximizing hardness necessitates balanced parameter selection based on specific application requirements. Multi-objective optimization using normalized composite scores provided practical compromise conditions that achieve acceptable performance across both quality metrics, enabling industrial implementation where multiple surface characteristics require simultaneous consideration. The comprehensive contour plot analysis revealed complex interactions between parameters, with surface roughness exhibiting optimal zones at moderate speeds and low-to-moderate feed rates, while hardness maximization consistently demands aggressive processing conditions characterized by high spindle speeds and multiple passes.

The successful application of minimum quantity lubrication in this investigation demonstrates the viability of sustainable manufacturing practices for roller burnishing operations, providing adequate cooling and lubrication while minimizing environmental impact and operational costs. The robust experimental design using Taguchi's L9 orthogonal array efficiently explored the parameter space with minimal experimental trials, demonstrating the practical applicability of design of experiments methodologies for industrial process optimization. The findings contribute valuable guidelines for practitioners implementing roller burnishing of AL7075 and similar aluminum alloys, offering evidence-based parameter selection strategies that balance competing quality objectives while maintaining process efficiency and sustainability.

References

1. K. A. Patel, P. K. Brahmbhatt, Implementation of Taguchi Method in the optimization of roller burnishing process parameter for surface roughness, in: Proceedings of First International Conference on Information and Communication Technology for Intelligent Systems: Volume 2, Springer, 2016, pp. 185–195.
2. T.-T. Nguyen, L.-H. Cao, T.-A. Nguyen, X.-P. Dang, Multi-response optimization of the roller burnishing process in terms of energy consumption and product quality, Journal of Cleaner Production 245 (2020) 119328, publisher: Elsevier.
3. Somatkar, A., Dwivedi, R., & Chinchanikar, S. (2024). Comparative evaluation of roller burnishing of Al6061-T6 alloy under dry and nanofluid minimum quantity lubrication conditions. *Obrabotka Metallov/Metal Working and Material Science*, *26*(4), 57-74.
4. G. Rotella, S. Rinaldi, L. Filice, Roller burnishing of Ti6Al4V under different cooling/lubrication conditions and tool design: effects on surface integrity, The International Journal of Advanced Manufacturing Technology 106 (2020) 431–440, publisher: Springer.
5. M. Salahshoor, C. Li, Z. Liu, X. Fang, Y. Guo, Surface integrity and corrosion performance of biomedical magnesium-calcium alloy processed by hybrid dry cutting- finish burnishing, Journal of the mechanical behavior of biomedical materials 78 (2018) 246–253, publisher: Elsevier.
6. A. P. Borkar, P. S. Kamble, C. Y. Seemikeri, Surface integrity enhancement of Inconel 718 by using roller burnishing process, Parameters 1 (2) (2014) 3.
7. B. Huang, Y. Kaynak, Y. Sun, I. Jawahir, Surface layer modification by cryogenic burnishing of Al 7050-T7451 alloy and validation with FEM-based burnishing model, Procedia CIRP 31 (2015) 1–6, publisher: Elsevier.
8. J. Maximov, A. Anchev, G. Duncheva, N. Ganev, K. Selimov, Influence of the process parameters on the surface roughness, micro-hardness, and residual stresses in slide burnishing of high-strength aluminum alloys, Journal of the Brazilian Society of Mechanical Sciences and Engineering 39 (2017) 3067–3078.
9. Somatkar, A. A., Dwivedi, R., & Chinchanikar, S. S. (2024). Enhancing surface integrity and quality through roller burnishing: a comprehensive review of parameters optimization, and applications. *Communications on Applied Nonlinear Analysis*, *31*(1s), 151-169.

10. M. Stalin John, N. Banerjee, K. Shrivastava, B. Vinayagam, Optimization of roller burnishing process on EN-9 grade alloy steel using response surface methodology, Journal of the Brazilian Society of Mechanical Sciences and Engineering 39 (2017) 3089–3101, publisher: Springer.
11. Dwivedi, R., Somatkar, A., & Chinchanikar, S. (2024). Modeling and optimization of roller burnishing of Al6061-T6 process for minimum surface roughness, better microhardness and roundness. *Obrabotka Metallov/Metal Working and Material Science*, *26*(3), 52-65.
12. Kurkute, V., & Chavan, S. T. (2018). Modeling and Optimization of surface roughness and microhardness for roller burnishing process using response surface methodology for Aluminum 63400 alloy. *Procedia Manufacturing*, *20*, 542-547.
13. Shinde, N. M., & Kurkuter, V. K. (2015). Optimization of single roller burnishing operation for surface roughness of aluminium alloy using artificial neural network. Int. J. Mech. Eng, 43, 1289-1293.