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ROUGHNESS, AMPLITUDE DISTRIBUTION AND BEARING AREA CURVE DURING CNC MACHINING OF Al7SiMg

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ABSTRACT

The paper analyzes the roughness of surfaces obtained by CNC machining on a HAAS VF-1 center, using an Al7SiMg type material. The study presents general notions about microgeometrical precision, roughness parameters and their influence on the functioning of machine parts, such as wear resistance, corrosion, adjustments and fatigue limit. In the experiments, three faces of a part called a hydraulic distributor were processed, using drill, cylindrical-frontal end mill and frontal end mill tools. The roughness was measured on various surfaces using the Surtronic SJ-210 Mitutoyo equipment, which provides precise results in numerical and graphical form. The results include roughness values and graphs for each analyzed surface, complemented by graphical representations, such as histograms and distribution function curves. The study also highlights the interaction between CNC machining parameters and surface quality, providing useful information for optimizing the machining processes of aluminum alloy materials.

KEYWORDS: roughness, CNC machining, drilling, milling, Surtronic SJ-210 Mitutoyo

REFERENCES

[1] Gheorghe, D., Georgescu, C., Baroiu, N., *Toleranțe și control dimensional (Tolerances and dimensional control)*, Ed. Scorpion, Galați, ISBN 973-85803-0-7, 2002;

[2] Tarău I., Georgescu C., Otrocol D., *Precizia și calitatea la prelucrarea materialelor (Precision and quality in material processing)*, Ed. Scorpion, Galați, ISBN 973-85803-2-3, 2002;

[3] Lokesh, K.S., Pinto, T., Ramachandra, C.G., *Effect of tool wear & machinability studies on polymer composites: a review*, International Journal of Scientific Research in Mechanical and Materials Engineering, 1(5):71-77, 2017;

[4] Baroiu, N., Costin, G.A., Teodor, V.G., Nedelcu, D., Tăbăcaru, V., *Prediction of surface roughness in drilling ofpolymers using a geometrical model and artificial neural networks*, Materiale Plastice (Plastic Materials), 57(3): 160-173, 2020;

[5] Radu, S.A., *Tehnologii de fabricație I (Manufacturing technologies I)*, Ed. U.T. Press, Cluj-Napoca, ISBN 978-606-737-368-4, 2019;

[6] Moroșanu, G.A., Ilie, M., Teodor, V.G., Păunoiu, V., Baroiu, N., *Control of deviations from circularity when drilling polymeric materials*, The Annals of "Dunărea de Jos" University of Galați, Fascicle V, Technologies in machine building, ISSN 2668-4829 (Print), 2668-4888 (Online), 41: 59-66, 2023;

[7] GARDCO, *Surftest surface roughness tester*, shttps://www.gardco.com/Products/Surface-Profile-Testers/Surftest-Surface-Roughness-Testers/c/p-64432;

[8] Strihavkova, E., *Analysis of effect of calcium content on machinability of alloys type AlSi7Mg0.3*, 18th International Scientific Conference Engineering for Rural Development, 22-24.05.2019 Jelgava, Latvia, DOI: 10.22616/ERDev2019.18.N222, 2019;

[9] ASRO, *SR EN 1706:2000: Aluminiu și aliaje de aluminiu. Piese turnate. Compoziție chimică și caracteristici mecanice (Aluminium and aluminium alloys. Castings. Chemical composition and mechanical properties)*, https://magazin.asro.ro/ro/standard/25893;

[10] Chavan, S.Y., Jadhav V.S., *Determination of optimum cutting parameters for multiperformance characteristics in CNC and milling of Al-Si7Mg aluminum alloy*, International Journal of Engineering and Technical Research (IJETR), 1(6):15-21, 2013;

[11] Haas F1 Team, Official Machine Tool, *2023 Mill Operator's Manual, Features and functions of a Mill CNC machine,* https://www.haascnc.com/content/dam/haascnc/en/service/manual/operator/english_mill_interactive_manual_print_version_2023.pdf.