Lecture Notes in Electrical Engineering • Volume 900, Pages 11 - 20 • 2022 • Innovative Manufacturing, Mechatronics and Materials Forum, iM3F 2021 • Gambang • 20 September 2021through 20 September 2021 • Code 277979

Document type
Conference Paper

Source type
Book Series

ISSN
18761100

ISBN
978-981192094-3

DOI
10.1007/978-981-19-2095-0_2

Publisher
Springer Science and Business Media Deutschland GmbH

Original language
English

Volume Editors
Khairuddin I.M., Abdullah M.A., Ab. Nasir A.F., Mat Jizat J.A., Mohd. Razman M.A., Abdul Ghani A.S., Zakaria M.A., Mohd. Isa W.H., Abdul Majeed A.P.

Optimization of Waterjet Paint Removal Operation Using Artificial Neural Network

Alzaghir, Abdullah Faisal[a] ; Nawi, Mohd Nazir Mat[a, b]; Gebremariam M.A.[c]; Azhari, Azmir[a]

[a] Faculty of Manufacturing Engineering and Mechatronics Engineering Technology, Universiti Malaysia Pahang, Pekan, 26600, Malaysia

[b] Centre for Foundation Studies, International Islamic University Malaysia, Gambang, 26300, Malaysia

[c] College of Engineering, Universiti Malaysia Pahang, Pahang, Gambang, 26300, Malaysia

Abstract

Paint removal of automotive parts without environmental effects has become a critical issue around the world. The high pressure waterjet technology has received a wider acceptance for various applications involving machining, cleaning , surface treatment and material cutting. It offers an advantage to remove the automotive paint due to its superior environmental benefits over mechanical cleaning methods. Therefore, it is important to predict the waterjet cleaning process for a successful application for the paint removal in the automotive industry. In the present work, ANN model was used to predict the surface roughnes after the paint removel process of automotive component using the waterjet cleaning operation . A response surface methodology approach was employed to develop the experimental design involving the first order model and the second order model of central composite design. Into training and testing, a back-propagation algorithm used in the ANN model has successfully predicted the surface roughness with an average of 80% accuracy and 3.02 mean square error. This summarizes that ANN model can sufficiently estimate surface roughness in waterjet paint removal process with a reasonable error range. © 2022, The Author(s), under exclusive license to Springer Nature Singapore Pte Ltd.

Author keywords

Artificial neural network; Multiple jet passes; Paint removal ; Surface roughness; Waterjet cleaning

Indexed keywords

SciVal Topics

Metrics

Funding details

References (15)

View in search results format >

All

Export Print E-mail Save to PDF Create bibliography

1 Li, X., Wang, H., Yu, W., Wang, L., Wang, D., Cheng, H., Wang, L.

Laser paint stripping strategy in engineering application: A systematic review

(2021) *Optik*, 241, art. no. 167036. Cited 4 times.
http://www.elsevier.com/journals/optik/0030-4026
doi: 10.1016/j.ijleo.2021.167036

View at Publisher

2 Sanmartín, P., Cappitelli, F., Mitchell, R.

Current methods of graffiti removal: A review

(2014) *Construction and Building Materials*, 71, pp. 363-374. Cited 81 times.
doi: 10.1016/j.conbuildmat.2014.08.093

View at Publisher

3 Vergès-Belmin, V., Wiedemann, G., Weber, L., Cooper, M., Crump, D., Gouerne, R.

A review of health hazards linked to the use of lasers for stone cleaning

(2003) *Journal of Cultural Heritage*, 4 (SUPPL. 1), pp. 33-37. Cited 9 times.
http://www.elsevier.com
doi: 10.1016/s1296-2074(02)01224-4

View at Publisher

4 Folkes, J.
Waterjet-An innovative tool for manufacturing

(2009) *Journal of Materials Processing Technology*, 209 (20), pp. 6181-6189. Cited 115 times.
doi: 10.1016/j.jmatprotec.2009.05.025

View at Publisher

5 Carvalhão, M., Dionísio, A.
Evaluation of mechanical soft-abrasive blasting and chemical cleaning methods on alkyd-paint graffiti made on calcareous stones

(2015) *Journal of Cultural Heritage*, 16 (4), pp. 579-590. Cited 40 times.
http://www.elsevier.com
doi: 10.1016/j.culher.2014.10.004

View at Publisher

6 Erzurumlu, T., Oktem, H.
Comparison of response surface model with neural network in determining the surface quality of moulded parts

(2007) *Materials and Design*, 28 (2), pp. 459-465. Cited 104 times.
doi: 10.1016/j.matdes.2005.09.004

View at Publisher

7 Risbood, K.A., Dixit, U.S., Sahasrabudhe, A.D.
Prediction of surface roughness and dimensional deviation by measuring cutting forces and vibrations in turning process

(2003) *Journal of Materials Processing Technology*, 132 (1-3), pp. 203-214. Cited 228 times.
doi: 10.1016/S0924-0136(02)00920-2

View at Publisher

8 Chien, W.-T., Chou, C.-Y.
The predictive model for machinability of 304 stainless steel

(2001) *Journal of Materials Processing Technology*, 118 (1-3), pp. 442-447. Cited 39 times.
doi: 10.1016/S0924-0136(01)00875-5

View at Publisher

9 Madara, S.R., Pillai, S.R., Chithirai Pon Selvan, M., Van Heirle, J.
Modelling of surface roughness in abrasive waterjet cutting of Kevlar 49 composite using artificial neural network

(2021) *Materials Today: Proceedings*, Part 1 46, pp. 1-8. Cited 3 times.
https://www.sciencedirect.com/journal/materials-today-proceedings
doi: 10.1016/j.matpr.2020.02.868

View at Publisher

10 Daoming, G., Jie, C.
ANFIS for high-pressure waterjet cleaning prediction

(2006) *Surface and Coatings Technology*, 201 (3-4), pp. 1629-1634. Cited 40 times.
doi: 10.1016/j.surfcoat.2006.02.034

View at Publisher

11 Zain, A.M., Haron, H., Sharif, S.
Estimation of the minimum machining performance in the abrasive waterjet machining using integrated ANN-SA

(2011) *Expert Systems with Applications*, 38 (7), pp. 8316-8326. Cited 67 times.
doi: 10.1016/j.eswa.2011.01.019

View at Publisher

12 Çaydaş, U., Hasçalik, A.
A study on surface roughness in abrasive waterjet machining process using artificial neural networks and regression analysis method

(2008) *Journal of Materials Processing Technology*, 202 (1-3), pp. 574-582. Cited 221 times.
doi: 10.1016/j.jmatprotec.2007.10.024

View at Publisher

13 Zhang, H., Chen, M.
Theoretical Analysis and Experimental Study on the Coating Removal from Passenger-Vehicle Plastics for Recycling by Using Water Jet Technology

(2015) *JOM*, 67 (11), pp. 2714-2726. Cited 8 times.
http://www.springer.com/materials/journal/11837
doi: 10.1007/s11837-015-1424-6

View at Publisher

14 Singh, B.
Predicting airline passengers' loyalty using artificial neural network theory

(2021) *Journal of Air Transport Management*, 94, art. no. 102080. Cited 11 times.
www.elsevier.com/inca/publications/store/3/0/4/3/8/
doi: 10.1016/j.jairtraman.2021.102080

View at Publisher

15 Sharma, S., Sharma, S., Anidhya, A.
Understanding activation functions in neural networks
(2017) *Int J Eng Appl Sci Technol*, 4, pp. 310-316. Cited 308 times.

Alzaghir, A.F.; Faculty of Manufacturing Engineering and Mechatronics Engineering Technology, Universiti Malaysia Pahang, Pekan, Malaysia;
email:abdullahalzaghir@gmail.com

About Scopus

What is Scopus

Content coverage

Scopus blog

Scopus API

Privacy matters

Language

日本語版を表示する

查看简体中文版本

查看繁體中文版本

Просмотр версии на русском языке

Customer Service

Help

Tutorials

Contact us