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Intelligent Manufacturing and Mechatronics

Selected Articles from iM3F 2023, 7–8 August, Pekan, Malaysia

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Preface

The fourth edition forum of the Innovative Manufacturing, Mechatronics and Materials Forum 2023 (iM3F 2023) organized by Universiti Malaysia Pahang Al-Sultan Abdullah through its Faculty of Manufacturing and Mechatronic Engineering Technology was held on 7 and 8 August 2023. The main field focuses on Manufacturing, Mechatronics as well as Materials.

About 95 submissions were received during iM3F 2023 and were reviewed in a single-blind manner, and 48 papers were advocated by the reviewers to be published in this Springer Proceedings of Materials. The editors would like to express their gratitude to all the authors who submitted their papers. The paper published in this proceeding has been thoroughly reviewed by the appointed technical review committee which consists of various experts in the field of materials and manufacturing engineering.

The conference had brought a new outlook on cutting-edge issues shared through keynote speeches by Assoc. Prof. Ir. Dr. Haji Nik Mohd Zuki Nik Mohamed, Prof. Eng Hwa Yap and Prof. Gian Antonio Susto.

Finally, the editors hope that readers find this volume informative as we thank Springer Proceedings in Materials for undertaking this volume publication. We also would like to thank the conference organization staff and the international program committees' members for their hard work.

Pekan, Pahang, Malaysia
November 2022

Radhiyah Abd. Aziz
Zulhelmi Ismail
A. K. M. Asif Iqbal
Irfan Ahmed

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Prediction of Real Contact Area on Curvature Region in Hot Stamping Process of AA7075 Aluminium Sheet

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Muhammad Amir Iqbal Jefry, Mohamad Farid Mohamad Sharif, Wahaizad Safiei & Suraya Sulaiman

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Abstract

Hot stamping process of AA7075 aluminium sheet is one of the forming methods used to produce high-strength structural components for automobiles despite their poor room-temperature formability. In this method, the hot aluminium sheet (also known as blank) must be cooled rapidly to prevent the formation of coarse precipitate, which could compromise the strength of the component. The real contact area between two solid surfaces is crucial as it determines the amount of heat transfer from the hot aluminium blank and the cold steel die, thereby affecting the cooling rate of the component formed. This study will use finite element analysis to predict the real contact area between multiple asperities on a flat AA7075 blank surface and a curved, asperity-free steel die surface under different displacements and localized loads. The resulting real contact area could be correlated as a function of displacement and localized load, for used in ANSYS simulation.

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