

Editorial: Enhancing design through the 4th Industrial Revolution Thinking

This Procedia CIRP volume entails the proceedings of the 30th CIRP Conference on Design (CIRP Dn 2020), hosted on 5 – 8 May 2020 by the Tshwane University of Technology, Pretoria, South Africa. The conference was scheduled to be held at the Kruger National Park in South Africa but sadly due to the global pandemic, the event was held online. The conference is a continuation of the history of production engineering design engagements under the banner of the International Academy for Production Engineering (CIRP). The theme of the 2020 conference was “Enhancing Design through the 4th Industrial Revolution Thinking”. An online platform was provided for CIRP members, engineers, and young researchers to engage on concepts and vigorously debate knowledge on topics concerning design in production engineering.

The Fourth Industrial Revolution continues to challenge the design approaches in the pursuit of improving the contribution of manufacturing to the GDP of countries especially in the Global South. Companies involved in the business of manufacturing are finding that conventional approaches to design for production are quickly becoming obsolete. This is more pronounced in the developing countries as continually those organisations that are failing to innovate in their design approaches are finding that, globally agile companies are depleting even their local market share. In general small, micro and medium enterprises in production engineering design often experience this phenomenon at a high level, resulting in negatively affecting their bottom line.

The research questions that are important to be discussed in shaping the future of production engineering design as the age of the Fourth Industrial Revolution continues, mainly the Internet-of-Things (IoT) Technologies, Cyber-Physical Systems, the digital twin, haptic design as well as X-reality. From a sustainability perspective, issues on design include circular economy, remanufacturing, and product-lifecycle engineering. From the education perspective, issues such as design education, learning as well as teaching factories, design thinking, human-centred design, and deep learning. From a manufacturing process perspective, questions are being asked about design in additive manufacturing and other advances in process design. This proceeding delves into and explores all these issues extensively.

This year organisers received 232 full paper submissions and all reviews have been carefully provided by an International Scientific Committee and independent reviews. At least two reviews were received per paper. Finally 143 papers were accepted as the final papers with others being rejected or being withdrawn by authors. These papers covered a liberal spread of topics on design from the process itself to case studies on design and the role the Fourth Industrial Revolution thinking contributes to shaping the future of design in production engineering. Three keynotes were presented. One was on AR/VR/MR/XR and the critical role it continues to play in production engineering design. Another paper focused on the development of cloud manufacturing as an important design and collaboration platform across countries. The third keynote focused on developments of design in a developing country and the key role it is playing in driving competitiveness of manufacturers and other organisations related to the sector.

It is with gratefulness that as the editors and organisers of the 30th Design Conference Proceedings, editors are thankful to the STC Dn Officers Prof Rainer Stark, Prof Tetsuo Tomiyama and Prof Nabil Anwer. The volunteers are also appreciated for the key role they played in organising a smooth and successful online event. Our heartfelt appreciation is given to the members of the International Scientific Committee and peer reviewers for evaluating papers promptly. Our valued sponsors including, the Tshwane University of Technology, the Gibela Rail Transport Consortium, and the National Research Foundation through the DSI NRF SARChI in Future Transport Manufacturing who collectively contributed to the successful realisation of CIRP Design 2020 conference. This proceeding

enlightens the production engineering community on current and future design achievements in production engineering, on how the 4th Industrial Revolution thinking can be utilised to pave a brighter future for all while highlighting the design research challenges that still need to be resolved in the future.

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