

Developing Digital Twins of Steel Hull Processes

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Abstract : The development of digital twins strongly depends on efficient algorithms and their capability to mirror real-life processes. Nowadays, such efforts are required to establish factories of the future faced with new demands of custom-made production. The ship hull processes face these challenges too. Therefore, it is important to implement design and evaluation approaches based on production system engineering. In this study, the recently developed finite state method is employed to describe the steel hull process as a platform for the implementation of digital twinning technology. The application is justified by comparing the finite state method with the analytical approach. This method is employed to rebuild a model of a real shipyard ship hull process using a combination of serial and splitting lines. The key performance indicators such as the production rate, work in process, probability of starvation, and blockade are calculated and compared to the corresponding results obtained through a simulation approach using the software tool Enterprise dynamics. This study confirms that the finite state method is a suitable tool for digital twinning applications. The conclusion highlights the advantages and disadvantages of methods employed in this context.

Keywords : digital twin, finite state method, production system engineering, shipyard

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