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Special Issue on Integrated Design and Operation of Engineering Systems with Predictive Modeling

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ASME *Journal of Mechanical Design*

Special Issue on Integrated Design and Operation of Engineering Systems with Predictive Modeling

Growing trends towards increased complexity and prolonged useful lives of engineering systems present challenges for system designers in accounting for the impacts of post-design activities (e.g., manufacturing, condition monitoring, remaining life prediction, maintenance, service logistics, end-of-life options, etc.) on system performance (e.g., costs, reliability, customer satisfaction, environmental impacts, etc.). It is very difficult to develop accredited lifecycle system performance models because these activities only occur after the system is built and operated. Thus, system design and post-design decision making have traditionally been addressed separately, leading to suboptimal performance over the system's lifecycle.

With significant technological advances in computational modeling, simulation, sensing and condition monitoring, and machine learning and artificial intelligence, the capability of predictive modeling has grown exponentially over the past decade, leading to demonstrated benefits such as improved system availability and reduced operation and maintenance (O&M) costs. Predictive modeling can bridge system design and post-design stages and provide an optimal pathway for system designers to effectively account for future system operations at the design stage. While predictive modeling of post-design stage activities enables more holistic design decisions in an enlarged design space, there is an urgent need to acquire improved knowledge on various aspects of this emerging topic, such as predictive modeling in system design and operation, as well as novel design concepts incorporating predictive models into design decision making.

This Special Issue invites both research and review papers on topics related to predictive modeling for integrated design and operation of engineering systems. The following is a non-comprehensive list of representative topics within scope of this Special Issue:

Topic Areas

- Novel design concepts for integrated design decision making over design and post-design stages
- Predictive modeling methods (e.g., physics-based, data-driven, machine learning or physics-based machine learning, etc.) with demonstrated engineering system design applications
- Design methods incorporating predictive modeling of future activities at the post-design stages (e.g., manufacturing, operation, or end of life options etc.) and their impacts on system performance
- Digital twins for engineering system design and operation
- Methods for uncertainty quantification of operational stage activities for design
- Enabling technologies for integrated design and operation of engineering systems
- Survey, review, and assessment of challenges and opportunities at the interface of predictive modeling and engineering design
- Education of predictive modeling for engineering design

Publication Target Dates

Paper submission deadline	**January 31, 2022**
Initial review completed	**March 15, 2022**
Final decision	**June 1, 2022**
Special Issue publication date	**September 1, 2022**

Submission Instructions

Papers should be submitted electronically to the journal at **journaltool.asme.org**. If you already have an account, log in as author and select **Submit Paper** at the bottom of the page. If you do not have an account, select **Submissions** and follow the steps. In either case, at the **Paper Submittal** page, select the **ASME *Journal of Mechanical Design*** and then select the Special Issue **Integrated Design and Operation of Engineering Systems with Predictive Modeling**.

Papers received after the submission deadline may still be considered for the Special Issue, if time and space permits.

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