

Machine and System Safety in Digital Transformation

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The symposium addresses challenges and solutions arising in human factors and ergonomics (HF&E) with regard to machine and system safety under digital transformation. Contributions refer to activities in HF&E of the International Safety and Security Association (ISSA) Section on Machine and System Safety (MSS) the symposium and go beyond by presenting and discussing design requirements relevant for future work environments and for change through digital transformation.

HF&E contributes to machinery and system safety by prevention of occupational hazards and risks with the consequence of improving system availability and reliability as well as operational safety. While some work systems will remain unchanged, others in future will evolve under digital transformation. New challenges will arise for HF&E and safety disciplines, as dynamics and interactions will be more predominating in operator task design, in function allocation, and in human-centred design requirements; with safety and security measures as well as intelligent environments are interwoven entities. Challenges and solutions will address the design of work systems and refer to related components and their interactions. The aim is to integrate HF&E design requirements early into machinery construction; i.e. issues of ergonomic design of operator work task, workplace, equipment and environment are of relevance. HF&E can also be integrated later in the design process, however, often requires more resources and may be less effective.

Taking into account new solutions and challenges in digital manufacturing, selected design requirements and recommendations, explanations, examples and references should inform manufacturers and health and safety experts at the shop floor level about HF&E and OSH. Information assist in how to integrate relevant and significant HF&E issues into construction of machinery or other technical installations for practical use in human-system-interaction design and evaluation.

Some common design requirements and recommendations referring to the concept of work system design in ergonomics and occupational safety and health (OSH) are presented at the [ISSA MSS platform](#). Future work systems call for more support of ergonomic design related to human information processing with interchange of information variable and dynamic in quantity, quality and time.

- Peter Nickel (DGUV-IFA, Germany) and colleagues inform about work system design in machinery and system safety with a focus on human system interaction.
- Michael Wichtl (AUVA, Austria) and colleagues illustrate relevant issues with regard to anthropometrics and biomechanics in work place design.
- Luigi Monica (INAIL, Italy) and colleagues present work on occupational exoskeletons regarding new challenge for human factors, ergonomics and safety disciplines in the workplace of the future.
- Era Poddar (MSABC, Canada) and colleagues report about importance of human factors and ergonomics in improving system safety in ever changing industrial scenarios.



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Presentations will include statements that stimulate discussions with the audience on knowledge gaps in HF&E for improving machine and system safety under digital transformation.

KEYWORDS

Occupational safety and health, Work system design, Human-system interaction, Physical and mental load, Change management.

REFERENCES

Nickel, P., Bärenz, P., Radandt, S., Wichtl, M., Kaufmann, U., Monica, L., Bischoff, H.-J. & Nellutla, M. (2020). Human-system interaction design requirements to improve machinery and systems safety. *Advances in Intelligent Systems and Computing (AISC)* 969, 3-13. [doi.org/10.1007/978-3-030-20497-6_1]

DESCRIPTIVE STATEMENT

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NOTE TO TECHNICAL PROGRAM CO-CHAIRS

The intention of the symposium with one 90-minute session is to raise attention to HF&E closely related to machine and system safety in digital transformation. The Machine and System Safety section of the ISSA as a non-profit organisation aim at improving occupational safety and health, calls for inclusion of human factors and ergonomics at manufacturer and shop floor level and intends to facilitate good practice. Session organisers have experience in organising international conferences, workshops and meetings as well as sessions within events.