

## Ergonomic Highly Cited Articles

### 1 - Human factors and ergonomics in manufacturing in the industry 4.0 context - A scoping review

**By:**

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#### TECHNOLOGY IN SOCIETY

**Volume:** 65

**Article Number:** 101572

**DOI:** 10.1016/j.techsoc.2021.101572

**Published:** MAY 2021

**Early Access:** MAR 2021

**Indexed:** 2021-07-08

**Document Type:** Review

**Abstract:**

Industry 4.0 revolution has brought rapid technological growth and development in manufacturing industries. Technological development enables efficient manufacturing processes and brings changes in human work, which may cause new threats to employee well-being and challenge their existing skills and knowledge. Human factors and ergonomics (HF/E) is a scientific discipline to optimize simultaneously overall system performance and human well-being in different work contexts. The aim of this scoping review is to describe the state-of-the-art of the HF/E research related to the industry 4.0 context in manufacturing. A systematic search found 336 research articles, of which 37 were analysed utilizing a human-centric work system framework presented in the HF/E literature. Challenges related to technological development were analysed in micro- and macroergonomics work system frameworks. Based on the review we frame characteristics of an organisation level maturity model to optimize overall sociotechnical work system performance in the context of rapid technological development in manufacturing industries.

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### 2 - Emerging research fields in safety and ergonomics in industrial collaborative robotics: A systematic literature review

**By:**

Gualtieri, L (Gualtieri, Luca) [1] ; Rauch, E (Rauch, Erwin) [1] ; Vidoni, R (Vidoni, Renato) [1]

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#### ROBOTICS AND COMPUTER-INTEGRATED MANUFACTURING

**Volume:** 67

**Article Number:** 101998

**DOI:** 10.1016/j.rcim.2020.101998

**Published:** FEB 2021

**Indexed:** 2020-10-06

**Document Type:** Review

**Abstract:**

Human-robot collaboration is a main technology of Industry 4.0 and is currently changing the shop floor of manufacturing companies. Collaborative robots are innovative industrial technologies introduced to help operators to perform manual activities in so called cyber-physical production systems and combine human inimitable abilities with smart machines strengths. Occupational health and safety criteria are of crucial importance in the implementation of collaborative robotics. Therefore, it is necessary to assess the state of the art for the design of safe and ergonomic collaborative robotic workcells. Emerging research fields beyond the state of the art are also of special interest. To achieve this goal this paper uses a systematic literature review methodology to review recent technical scientific bibliography and to identify current and future research fields. Main research themes addressed in the recent scientific literature regarding safety and ergonomics (or human factors) for industrial collaborative robotics were identified and categorized. The emerging research challenges and research fields were identified and analyzed based on the development of publications over time (annual growth).

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**3 - State of science: mental workload in ergonomics****By:**

Young, MS (Young, Mark S.) [1] ; Brookhuis, KA (Brookhuis, Karel A.) [2] ; Wickens, CD (Wickens, Christopher D.) [3] ; Hancock, PA (Hancock, Peter A.) [4]

**ERGONOMICS**

**Volume:** 58

**Issue:** 1

**Page:** 1-17

**DOI:** 10.1080/00140139.2014.956151

**Published:** JAN 2 2015

**Indexed:** 2015-01-02

**Document Type:** Review

**Abstract:**

Mental workload (MWL) is one of the most widely used concepts in ergonomics and human factors and represents a topic of increasing importance. Since modern technology in many working environments imposes ever more cognitive demands upon operators while physical demands diminish, understanding how MWL impinges on performance is increasingly critical. Yet, MWL is also one of the most nebulous concepts, with numerous definitions and dimensions associated with it. Moreover, MWL research has had a tendency to focus on complex, often safety-critical systems (e.g. transport, process control). Here we provide a general overview of the current state of affairs regarding the understanding, measurement and application of MWL in the design of complex systems over the last three decades. We conclude by discussing contemporary challenges for applied research, such as the interaction between cognitive workload and physical workload, and the quantification of workload 'redlines' which specify when operators are approaching or exceeding their performance tolerances.

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#### **4 - Fundamentals of systems ergonomics/human factors**

**By:**

Wilson, JR (Wilson, John R.)

**APPLIED ERGONOMICS**

**Volume:** 45

**Issue:** 1

**Page:** 5-13

**DOI:** 10.1016/j.apergo.2013.03.021

**Published:** JAN 2014

**Indexed:** 2014-01-01

**Document Type:** Article

**Abstract:**

Ergonomics/human factors is, above anything else, a systems discipline and profession, applying a systems philosophy and systems approaches. Many things are labelled as system in today's world, and this paper specifies just what attributes and notions define ergonomics/human factors in systems terms. These are obviously a systems focus, but also concern for context, acknowledgement of interactions and complexity, a holistic approach, recognition of emergence and embedding of the professional effort involved within organization system. These six notions are illustrated with examples from a large body of work on rail human factors. (C) 2013 Published by Elsevier Ltd.

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#### **5 - A strategy for human factors/ergonomics: developing the discipline and profession**

**By:**

Dul, J (Dul, Jan) [1] ; Bruder, R (Bruder, Ralph) [2] ; Buckle, P (Buckle, Peter) [3] ; Carayon, P (Carayon, Pascale) [4] ; Falzon, P (Falzon, Pierre) [5] ; Marras, WS (Marras, William S.) [6] ; Wilson, JR (Wilson, John

R.) [7] ; van der Doelen, B (van der Doelen, Bas) [8]

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**ERGONOMICS**

**Volume:** 55

**Issue:** 4

**Page:** 377-395

**DOI:** 10.1080/00140139.2012.661087

**Published:** 2012

**Indexed:** 2012-01-01

**Document Type:** Article

**Abstract:**

Human factors/ergonomics (HFE) has great potential to contribute to the design of all kinds of systems with people (work systems, product/service systems), but faces challenges in the readiness of its market and in the supply of high-quality applications. HFE has a unique combination of three fundamental

characteristics: (1) it takes a systems approach (2) it is design driven and (3) it focuses on two closely related outcomes: performance and well-being. In order to contribute to future system design, HFE must demonstrate its value more successfully to the main stakeholders of system design. HFE already has a strong value proposition (mainly well-being) and interactivity with the stakeholder group of 'system actors' (employees and product/service users). However, the value proposition (mainly performance) and relationships with the stakeholder groups of 'system experts' (experts from technical and social sciences involved in system design), and 'system decision makers' (managers and other decision makers involved in system design, purchase, implementation and use), who have a strong power to influence system design, need to be developed. Therefore, the first main strategic direction is to strengthen the demand for high-quality HFE by increasing awareness among powerful stakeholders of the value of high-quality HFE by communicating with stakeholders, by building partnerships and by educating stakeholders. The second main strategic direction is to strengthen the application of high-quality HFE by promoting the education of HFE specialists, by ensuring high-quality standards of HFE applications and HFE specialists, and by promoting HFE research excellence at universities and other organisations. This strategy requires cooperation between the HFE community at large, consisting of the International Ergonomics Association (IEA), local (national and regional) HFE societies, and HFE specialists. We propose a joint world-wide HFE development plan, in which the IEA takes a leadership role. Practitioner Summary: Human factors/ergonomics (HFE) has much to offer by addressing major business and societal challenges regarding work and product/service systems. HFE potential, however, is underexploited. This paper presents a strategy for the HFE community to strengthen demand and application of high-quality HFE, emphasising its key elements: systems approach, design driven, and performance and well-being goals.