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A new architecture model for smart manufacturing: A performance analysis and comparison with the RAMI 4.0 reference model

Resman, M.[a,*], **Pipan, M.**[a], **Šimic, M.**[a], **Herakovič, N.**[a]

[a]Department of Manufacturing Technologies and Systems, Faculty of Mechanical Engineering, University of Ljubljana, Ljubljana, Slovenia

ABSTRACT

In this paper we proposed a new architectural model of the smart factory to allow production experts to make easier and more exact planning of new, smart factories by using all the key technologies of Industry 4.0. The existing complex reference architectural model of Industry 4.0 (RAMI 4.0) offers a good overview of the smart-factory architecture, but it leads to some limitations and a lack of clarity for the users. To overcome these limitations, we have developed a simple model with the entire and very simple architecture of the smart factory, based on the concept of distributed systems with exact information and the data flows between them. The proposed architectural model enables more reliable and simple modelling of the smart factory than the existing RAMI 4.0 model. Our approach improves the existing methodology for planning the smart factory and makes all the necessary steps clearer. At the end of the paper a comparison of the proposed architectural model LASFA (LASIM Smart Factory) with the existing RAMI 4.0 model was made. The developed LASFA model was already successfully implemented in the laboratory environment for building the demo centre of a smart factory.

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**Corresponding author:*
matevz.resman@fs.uni-lj.si
(Resman, M.)

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Nov model arhitekture za pametno proizvodnjo: Analiza zmogljivosti in primerjava z referenčnim modelom RAMI 4.0

Resman, M.[a,*], **Pipan, M.**[a], **Šimic, M.**[a], **Herakovič, N.**[a]

[a]Department of Manufacturing Technologies and Systems, Faculty of Mechanical Engineering, University of Ljubljana, Ljubljana, Slovenia

POVZETEK

V tem prispevku smo predlagali nov arhitekturni model pametne tovarne, ki bo proizvajalcem omogočil lažje in natančnejše načrtovanje novih pametnih tovarn z uporabo vseh ključnih tehnologij industrije 4.0. Obstoječi kompleksni referenčni arhitekturni model industrije 4.0 (RAMI 4.0) ponuja dober pregled nad arhitekturo pametne tovarne, vendar vodi do nekaterih omejitev in premalo jasnosti za uporabnike. Za premagovanje teh omejitev smo razvili preprost model s celotno in zelo preprosto arhitekturo pametne tovarne, ki temelji na konceptu porazdeljenih sistemov z natančnimi informacijami in pretokom podatkov med njimi. Predlagani arhitekturni model omogoča bolj zanesljivo in preprosto modeliranje pametne tovarne kot obstoječi model RAMI 4.0. Naš pristop izboljšuje obstoječo metodologijo za načrtovanje pametne tovarne in naredi vse potrebne korake jasnejše. Na koncu prispevka je bila narejena primerjava predlaganega arhitekturnega modela LASFA (LASIM Smart Factory) z obstoječim modelom RAMI 4.0. Razvit model LASFA je bil že uspešno implementiran v laboratorijskem okolju za gradnjo demonstracijskega centra pametne tovarne.

PODATKI O ČLANKU

Ključne besede:
Industrija 4.0;
Pametna proizvodnja;
Pametna tovarna;
Arhitekturni model;
Referenčni arhitekturni model;
RAMI 4.0

**Kontaktna oseba:*
matevz.resman@fs.uni-lj.si
(Resman, M.)

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