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Architecture and implementation of a shop-floor programming system for STEP-compliant CNC

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Abstract

STEP-NC (formalized as ISO 14649 and ISO 10303 AP238) is a new interface (or language) standard for the CADâ€“CAMâ€“CNC chain, currently under establishment by ISO TC184 SC1 and SC4. Upon completion, it will replace ISO 6983, so called M & G codes used for CNC since 1950s. As the new language is being established, a new CNC controller called STEP-CNC (STEP-compliant CNC), capable of carrying out various intelligent tasks using the new language as an input, receives worldwide attention. Shop-floor programming (SFP) system is a computer-assisted part programming system interfaced with STEP-CNC. Its primary function is to generate part program in ISO 14649 (or STEP AP238) to machine the part geometry given by STEP AP203 or AP224 file. In this paper, we first present an architecture for the SFP system, followed by implementation technology including: (1) STEP physical file interpretation, (2) feature

recognition, (3) process planning, (4) part program generation, and (5) verification. The developed methodology was implemented in a prototype called PosSFP, and tested with Korea STEP-NC system.

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Keywords

STEP; Numerical control; CNC; ISO 14649; ISO 10303 AP238; Shop-floor programming

Suk-Hwan Suh (http://e-mfg.postech.ac.kr/~shs) is a professor of the School of Mechanical and Industrial Engineering and the Director of National Research Laboratory for STEP-NC Technology (NRL-SNT; http://stepnc.postech.ac.kr) at the Pohang University of Science and Technology (POSTECH) in Korea. He obtained BS and MS in industrial engineering from Korea University and KAIST in 1976 and 1978, respectively, and PhD in manufacturing engineering from Ohio State University in 1986. Before joining POSTECH in 1987, he was with the Center for Research on Integrated Manufacturing (CRIM) at the University of Michigan. Since he established the E-Manufacturing Lab

(formerly CAM Lab) in 1987, Professor Suh and his research team have been engaged in various researches in the area of CAD/CAM/CNC. His current research interests include STEP-NC, E-manufacturing, and intelligent CNC. He recently authored two books: (1) CNC System: Principle and Design, (2) Open Architecture CNC and Development. In 2000 his laboratory was designated as the National Research Laboratory for STEP-NC Technology by the Ministry of Science and Technology in Korea, where he and his research staff are fully devoted to the development of STEP-NC technology. He is the chairman of Korea TC184/SC1, and an active member of ISO TC184/SC1 and SC4.

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