

THE SUMMARY OF Ph. D. DISSERTATION

No. 1

Major Open and Environmental Systems		SURNAME, Firstname SHINODA, Shinji
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Title

A Fundamental Study of Listing Alternative Ideas for Designing Assembly-type Work Process by Hand Motions

Abstract

In the area of motion study, in order to improve the efficiency of a given work process, "the analyst" observes a given work process and breaks it down into predetermined categories of work elements such as Therbligs. Then, the analyst lists "alternative processes" by synthesizing the classified data applying valuable judgement based upon past experiences in such forms as principles and checklists. However, in spite of using principles and checklists, listing alternative processes still largely depends on individual ability, knowledge and experience, and therefore the quality of outcome varies widely.

A purpose of this paper is to propose a method for designing and/or improving assembly-type work process by hand motions systematically. This paper represents a work process from the viewpoint of controlled objects as "handled resources". The basic idea is to divide a given task into two categories of transformation steps from the viewpoint of how the product unit transform, namely, essential transformation (ET) and non-essential but necessary transformation (NENT). ET is a minimum set of indispensable transformations (assemble motions) to build a product unit from a set of necessary parts. NENT is a set of transformations (grasp or release motions) considered to be required in addition to all of the ETs. And this paper proposes a method of listing alternative ways to build a product unit utilizing a set of ETs depending upon the sequence of ETs and the kind, a minimum number and sequence of NENTs. And this paper proposes a method to improve this work which involves a minimum number of NENTs to achieve feasible work performance.

Moreover, This paper proposes an algorithm for listing alternative methods to be executed on a computer system using a series of matrices and presents a procedure for applying the system in designing and/or improving work processes.