

Intelligent Modular Design of Automatic Dimensional Inspection Systems

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Abstract: The new production has to undertake a continuous quality improvement due to its major economic involvement; the consequence consists in high performances in the quality assurance. Therefore the author of this work wants to present some concerns in the automatic dimensional inspection systems field. The new production has to undertake a continuous quality improvement due to its major economic involvement; the consequence consists in high performances in the quality assurance. Therefore the author of this work wants to present some concerns in the automatic control system field.

This paper presents aspects of the design for an intelligent modular inspection system. The performed researches aimed at an original method of grouping the parts based on the relation between dimensional inspection process characteristics and modular design of all inspection equipments with a high universality and flexibility degree.

Keywords: Inspection, mechatronics, modular design, automation, dimension.

1. Introduction

Automation plays an increasingly important role in the global economy and in daily experience. Engineers strive to combine automated devices with mathematical and organizational tools to create complex systems for a rapidly expanding range of applications and human activities [1].

Mechatronics comprises today almost any field of instrumentation, from optical and medical technology through to domestic appliances, metrology, automatic control engineering, office automation and systems engineering.

An Automated mechatronic system is capable of handling materials and energy, communicating with its environment and is characterised by self-regulation, which enables it to respond to predictable changes in its environment in a pre-programmed fashion.

Starting at design and continuing through manufacture, mechatronic designs optimize the available mix of technologies to produce quality precision products and systems in a timely manner with features the customer wants.

The real benefits to industry of a mechatronic approach to design are shorter development cycles,

lower costs, and increased quality, reliability, and performance.

Traditional automated systems are rigid and are not capable of responding rapidly to changes in demand and supply. An *Intelligent* mechatronic system is capable of achieving given goals under conditions of uncertainty. In contrast to automated systems, which are, by definition, pre-programmed to deliver given behaviour and are therefore predictable, intelligent systems may arrive at specified goals in an unpredictable manner. They are endowed with flexibility, which means they are capable of responding to frequent changes in their environments without being re-programmed. This qualitative difference in their behaviour is a result of the separation of the domain knowledge from the mechanism for problem solving. Intelligence can be designed into a system using traditional

AI methods such as expert systems, fuzzy logic or neural networks, but the most cost-effective and powerful implementation is through the use of distributed artificial intelligence, where a community of intelligent agents decides on the optimal or near-optimal action through a process of negotiation. [4].

The recent manufacturing trends aim at delivering wide variety of products with short lifetime and

