



1 Partly automated screen
assembly with cooperative robots

COBOT – COOPERATIVE ROBOTS

Fraunhofer Institute for Production Systems and Design Technology

Pascalstr. 8-9
10587 Berlin

Contact

Dipl.-Ing. Gerhard Schreck
Phone: +49 30 39006-152
Fax.: +49 30 3917517
E-Mail:
gerhard.schreck@ipk.fraunhofer.de

Dr. Dragoljub Surdilovic
Phone: +49 30 39006-172
E-Mail:
dragoljub.surdilovic@ipk.fraunhofer.de

www.ipk.fraunhofer.de

Concept of the System

The abilities to change and to adapt represent the pillars for a competitive production. Today's automation technology has to be prepared increasingly for the requirements of an individualized production. This means to support the rapid reconfiguration of automated production systems by changeability and adaptability.

In addition to the general performance of the automation system the ability to adapt therefore increasingly defines the operational throughput and the load factor. This finally determines the profitability of productiveness of the production resources.

But mankind itself is the most adaptable and still by far the most intelligent resource in the whole production process. This is especially displayed in complex assembling processes in which man turns out to be irreplaceable, because of his outstanding

sensomotoric abilities and rapid learning aptitude. The smaller the lot size of an individualized production, the more important are human abilities.

The target of the human-centered automation is not replication, but the optimal assistance to the human abilities through the automation system. Thus the physical efficiency of man is being preserved or rather even extended, for instance by forces assistance in motion guidance in order to avoid exhaustion and work-related diseases due to stress.

Good examples for such human-oriented automation devices are the so called cooperative robots, in short COBOTs. They assist humans in physically wearing actions and still leave the full motion control to the user and therefore there is no need for programming individual motion sequences. Humans direct through the complex process, while the robot assumes the hard labor.



Rear screen Assembly with Cobots

Within the EU project "Flexible Assembly Systems through Workplace-Sharing and Time-Sharing Human-Machine Cooperation (PISA)" flexible assembly systems have been developed, which are based on the integration of humans and automation systems.

The main target is to support the worker with intelligent auxiliary systems instead of replacing him. In this project innovative technologies for the man-machine cooperation have been evolved, turned into industrial prototype systems and put to the test. In an application (or use case) implemented into automobile production the partially automated rear screen assembly was evaluated for cooperative robots (COBOTs).

Our Expertise

Fraunhofer IPK possesses 30 years of experience in the field of automation- and robot engineering. Entire control systems as well as advanced methods for motion control have been realized to the point of an industrial deployment for well-known manufacturers.

Currently the institute develops innovative kinematical systems in combination with new drive and control systems for utilization in industrial productions, space technology, medical- and rehab technology and even for the maintenance area.

The institute has extraordinary competences particularly in the field of force control robot systems. Based on that longtime experience in control development regulatory procedures for the interaction in human and robot environments have been designed and implemented in the recent years.

Your Benefit

Opposite to fully automated systems the COBOT applications reduce complexity in order to have overall system solutions implemented. The high level of flexibility is being achieved by direct interaction of the worker and the use of his human abilities. Manual force control and intuitional handling permit a quick initial skill adaptation training.

The reduction of physical stress by force amplification enhances the working conditions as well as it supports the employment of people with diminished productivity potential. In the examined use case especially the combination of manual control and simple automatic functions for the rear screen delivery has proven convenient. Thus the COBOT system has become an intelligent assistant, which integrative supports the automated delivery of components as well as manual assembly processes and therefore increases productivity.

Our Offer

By our longtime experience in the development of controls as well as the availability of development environments and demonstrator systems we can provide following services:

- Analysis and evaluation of use cases
- Conception and implementation of specific use cases
- Development of procedures and controls for OEM
- Testing and optimization of human-robot interaction

2 Simulation of the integrated cobot system in the assembly line