# Flexible Assembly Systems
Chairs: Daniel Cox, M. A. Erdmann

Uncertainty Reduction Using Dynamics
M. Moll and M. A. Erdmann
Carnegie Mellon University

- For assembly tasks parts often have to be oriented before they can be put in an assembly. The results presented in this paper are a component of the automated design of parts orienting devices.

- We optimize the shape of the support surface and drop height that minimize the entropy of the pose distribution of a part. We use dynamic simulation in combination with quasi-capture regions to quickly compute the pose distribution.

- Our simulation and experimental results confirm that our dynamic simulator can be used to find the true pose distribution of an object.

- This new approach is a feasible way to assist in the design of parts orienting devices.

	Pose Distributions:					Entropy:
Surface 1:	.20	.15	.30	.10	.25	1.54
Surface 2:	.15	.10	.50	.10	.15	1.38
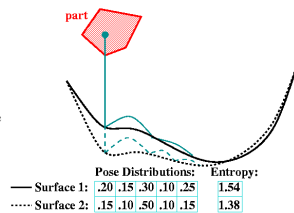
Flexible Handling in Disassembly with Screwnail Indentation
B. R. Zuo, A. Stenzel and G. Seliger
Technical University Berlin

- Flexible handling in disassembly

- Generate new surfaces with a screwnail to transmit the forces and torque's

- Development and validation of a mathematical model to calculate the indentation torque for the screwnail

- Realizable and cost-effective solution for handling in disassembly
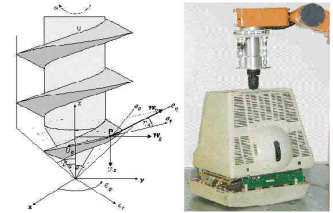
Flexible Robot-Assembly Using a Multi-Sensory Approach
Stefan Joerg[1], Joerg Langwald[1], Johannes Stelter[1], Gerd Hirzinger[1] and Ciro Natale[2]
[1]German Aerospace Center and [2]Universita degli Studi di Napoli Federico II

- Integrated Assembly Cell for flexible Robot-Assembly on moving parts

- Model-based real-time vision system for 3 D Pose Estimation and Tracking, force control using innovative compliant 6 DOF F/T sensor, automatic force controller design

- The system's robustness was demonstrated with great success at the KUKA booth during the Hannover Fair 1999

- Complex assembly problems can be solved with sensor-controlled robots.
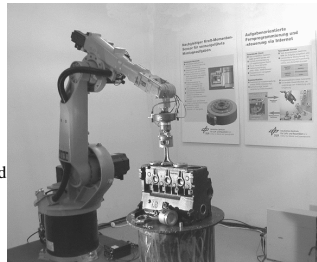
A system for automatic assembly and disassembly operations
Swee M. Mok[1], Chi-haur Wu[2] and D. T. Lee[3]
[1]Motorola Inc., [2]Northwestern University and [2]Academia Sinica

- To Represent Parts, Tools, and Operations

- Propose a Binary Tree

- Simulated Cellular Telephone Assembly

- Parts and Handlers Tree for Analysis
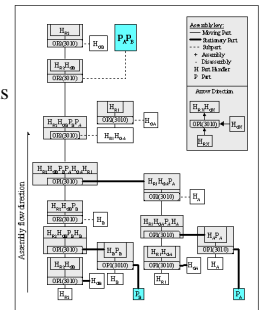
A Component-Based Approach to the Holonic Control of a Robot Assembly Cell
Jin-Lung Chirn and Duncan C. McFarlane
University of Cambridge

- reconfigurable manufacturing control architecture to long-term changes

- component-based development and holonic manufacturing systems

- execution control systems for a robot assembly cell

- implementation of plug-and-play manufacturing control
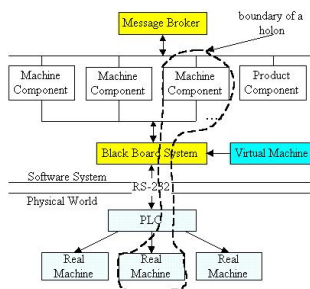
Automatic Object Recognition as Part of an Integrated Supervisory Control System
T. Tuytelaars, A. Zaatri, Luc Van Gool and H. Van Brussel
University of Leuven

- Easy interaction with objects under tele-operation

- through an automatic object recognition module

- viewpoint & illumination invariant

- integrated in a robust ISCS with different control levels, error recovery, anticipation, ...