Analysis of an Industrial Case
Adaptive Flexible Assembly Systems

Cost effective ramp up
Adaptive for changes of production quantities
Reuse of equipment in case of short production and/or live cycle

Current requirements on production equipment

- Start Of Production (SOP) as fast as possible
- Cost effective ramp up
- Adaptive for changes of production quantities
- Extensible to additional product types or new generations
- Reuse of equipment in case of short production and/or live cycle
Special aspects of manufacturing automatically assembly machines

- Highly customized special purpose machine
- Cost intensive because of high development efforts
- Long delivery time because of development and test period
- High development and financial risk
  - Many disturbance factors in development process are possible (product and production machine)
  - The technologies to be realised are not pre-tested
  - Often additional functions, e.g. for further types, are necessary
- No cost effective reuse of equipment
**Turnover and Employees**

**Turnover 2006:** 11.2 Mio. €

**Export Quota:** 27%

**104 Employees**
- of which:
  - 48 Academically Qualified
  - 56 Apprentice Trained
- additionally:
  - 10 Trainees

**Division of Customer (2006)**

- Automotive: 71%
- Electro technique/ Electronic: 19%
- Photovoltaics: 6%
- Biotechnology: 2%
- Other: 2%
Adaptive Flexible Assembly Systems

XENON-Answer No. 1:

- Extensible hybrid assembly systems

Example: automotive headlight controller

VW Golf
Adaptive Flexible Assembly Systems

XENON-Answer No. 2:

- High flexibility by robot applications

Examples:

- Loading/unloading processes
- 3D-Assembly e. g. MID-products
- Insertion processes

Industrial Robot-Applications

Flexible handling with industrial robots
XENON-Answer No. 3:

- Modular flexline for connector assembly

Example: automotive multipole header

Modular Contact Insertion System
Semi-automatic Assembly Line
Modular Contact Insertion System
Semi-automatic Assembly Line

Manual workplace  Insertion  Control / Marking

Modular Contact Insertion System
Extension for additional functions

Manual workplace  Insertion  Control / Marking
Modular Contact Insertion System
Extension for additional functions

Manual workplace  Insertion  Bending  Control / Marking

Modular Contact Insertion System
Extension to an Automatic Line

Manual workplace  Insertion  Bending  Control / Marking
Modular Contact Insertion System
Extension to an Automatic Line

Manual feed       Insertion       Bending       Control / Marking       Unloading tray


Modular Contact Insertion System
Extension to an Automatic Line

Manual feed       Insertion       Bending       Control / Marking       Output tray

Modular Contact Insertion System
Extension to an Automatic Line

Feed bulk material   Insertion       Bending       Control / Marking   Unloading tray

Modular Contact Insertion System
Fully automatic Assembly Line – Single Row Connector

Feed bulk material   Insertion       Bending       Control / Marking   Unloading tray
Automatic Lines for Contact Insertion

MHC – Modular Contact Insertion Line

Adaptive Flexible Assembly Systems

XENON-Answer No. 4:

- Micro-assembly combined with peripheral modules

Example: electro acoustic converter
Adaptive Flexible Assembly Systems

Usage of universal gripping systems

GVP - Global Variant Production System

Project:
- Developing of variable and scaleable assembly technology
- Perfecting of international cooperation processes
- Increasing of flexibility and reaction rate inside the company

Project Objectives:
- Formulation of globalised automation technology with flexible assembly modules + strengthening of the assembly location Germany

Project Partners:

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Design review for micro assembly cell

Assembly modul / feed modul / chaining
Micro Assembly of Electro Acoustic Converter

3 Assembly modules / 2 feed modules / robot [maximum extension]

Networks – Project NANUSO

Cooperative Project Sustainable Usage of Special Purpose Machinery