A vision on “Vision”

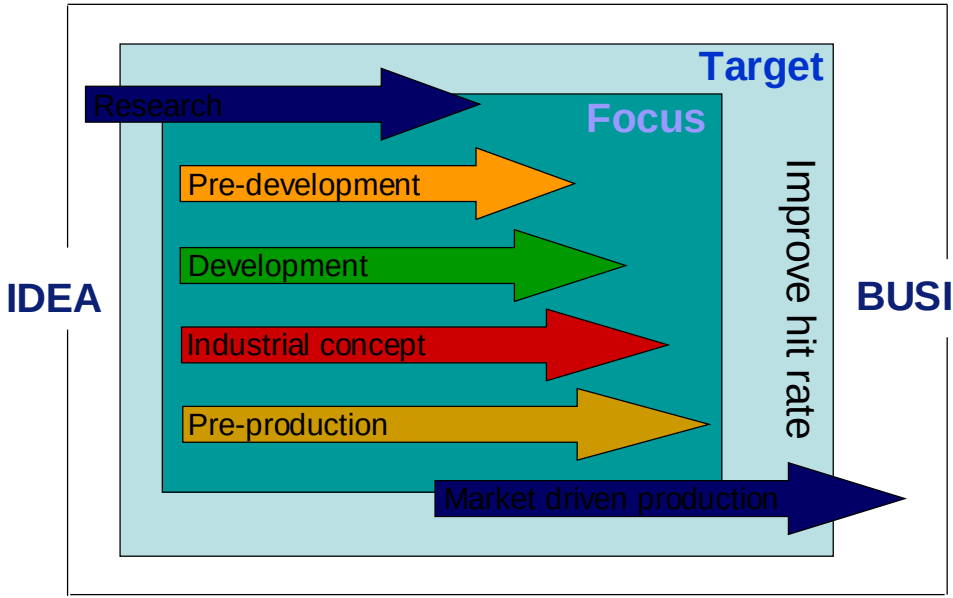
The role of Vision technology in future assembly

Mark van Veghel, Philips Applied Technology

Investments in savings

- Past period “Low hanging fruit”
  - Standardise & optimise
- Assembly moves to (far) East
- 2005:
  - Reasonable / good results up to now
  - Higher investments, less results
  - And now?

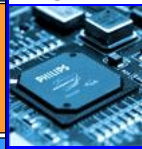
Philips Applied Technologies



Our role within Philips

Board of Management

G.J. Kleisterlee
G. Dutiné
A. Huijser
J.H.M. Hommen

Corporate Technologies A. Huijser	Lighting	Consumer Electronics	Semi-conductors	Medical Systems	DAP	Other Philips
Philips Research R. Harwig						
Philips Applied Technologies M. Halbe						
Philips IP&S R. Peters						

Key figures

A global, leading technology center

- Origin 1968

A multinational highly qualified workforce of ± 1300 (+ 250 temporary employees)

- University degree ± 700
  - 6 professors, 135 PhD.
- Bachelors & Engineers ± 400
- Other type of education ± 200

Sales 2004

- 197,2 M €
- 80,7 % internal sales; 19,3 % external sales

Worldwide representation

- 11 Locations spread over North America, Asia Pacific and Europe

Eindhoven
San José
Pittsburgh
Paris
Budapest
Vienna
Singapore
Bangalore
Shanghai
Redhill
Leuven

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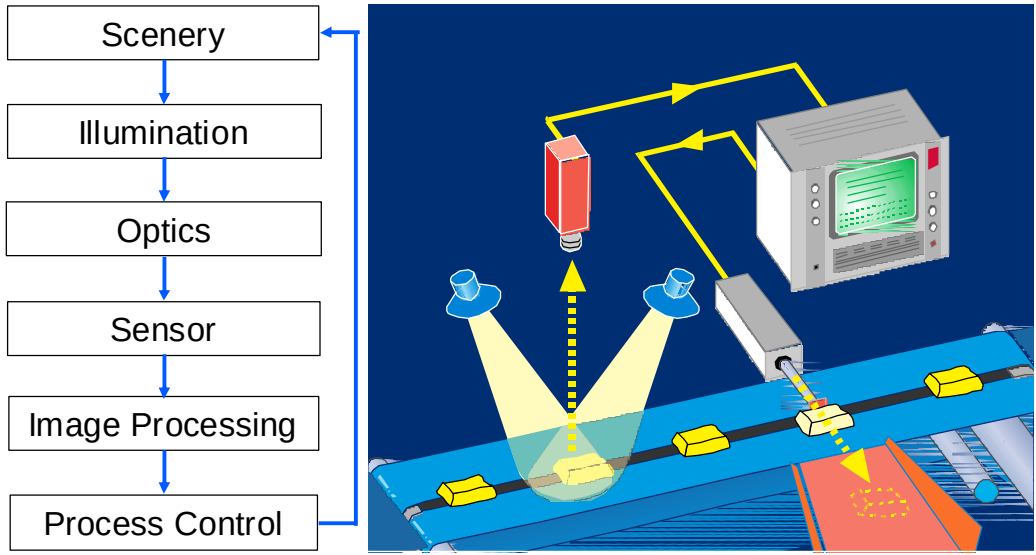
Machine Vision System

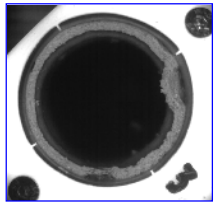


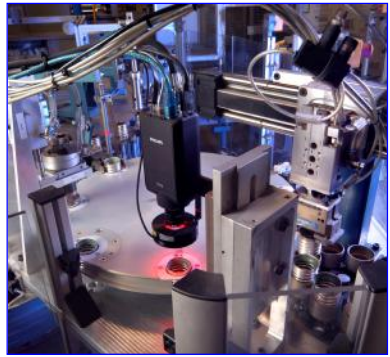
In-line Machine Vision systems

- Pros:
  - Quality / yield improvement:
    - 100% inspection / no defects
    - Early detection of defects
    - Objective inspection results
    - Ensure brand perception
  - Save costs
    - Less labour cost
    - Prevents complaints (= costs)
- Cons:
  - Vision system complexity ?

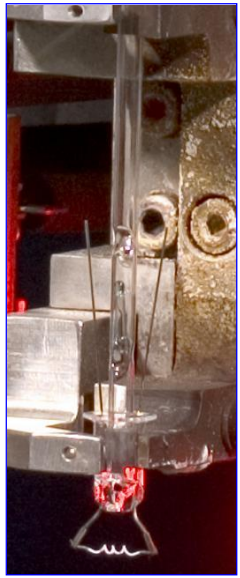
Compound filling inspection

- Inspection of compound after dispensing
- Based on *simple* autonomous intelligent camera Inca + CLICKS



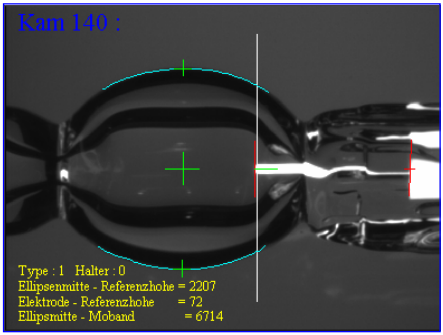


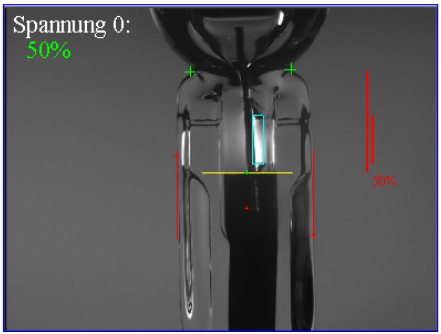
Inspection of TL-5 subassembly (“stel”)



- Several checks / measurements, including Coil type check and emitter coverage
- Glass, emitter, ceramics, metal.

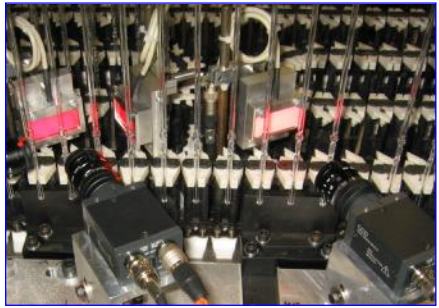
Xenon car light bulb inspection



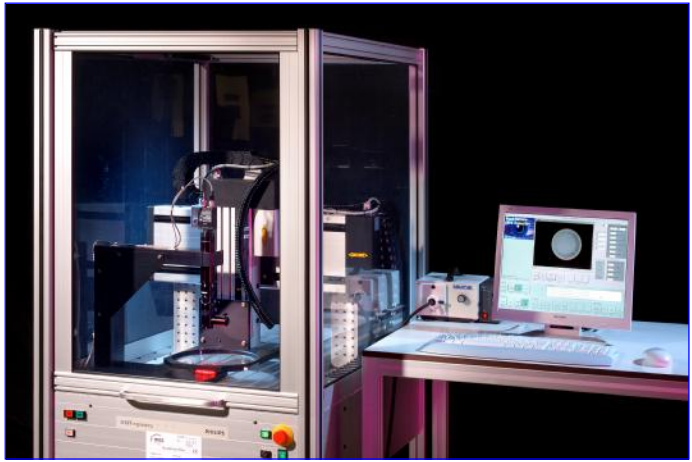


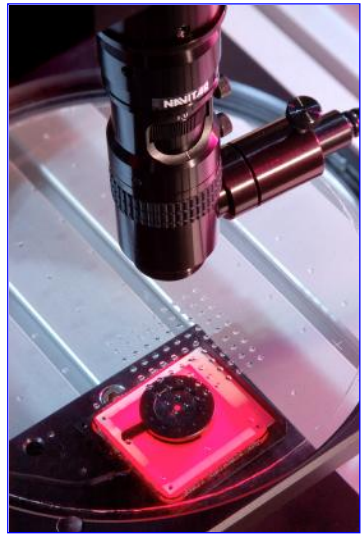
Short time-to-market:

- Product changes during production preparation
- Develop several tasks in parallel



Cell phone lens tester

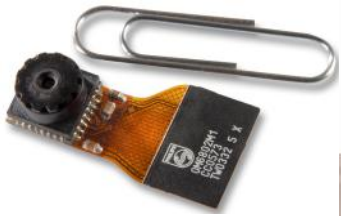


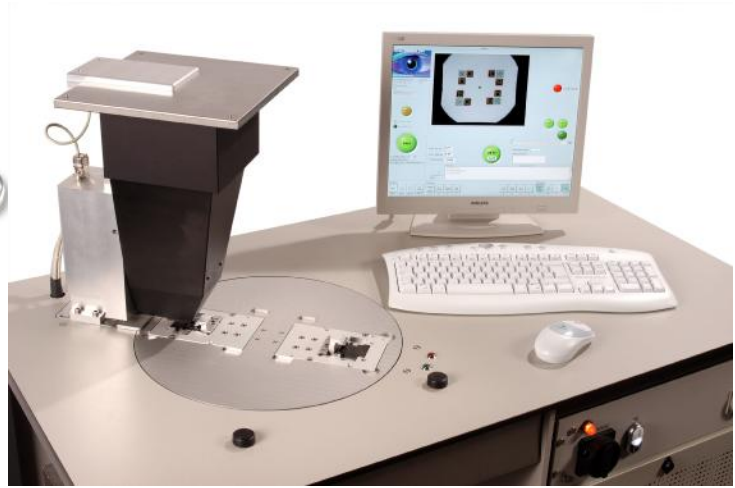


- Check individual Cell Phone lenses
- Detect particles, scratches, inclusions
- Stand-alone tester including motion stage

Automatic cell phone lens focussing

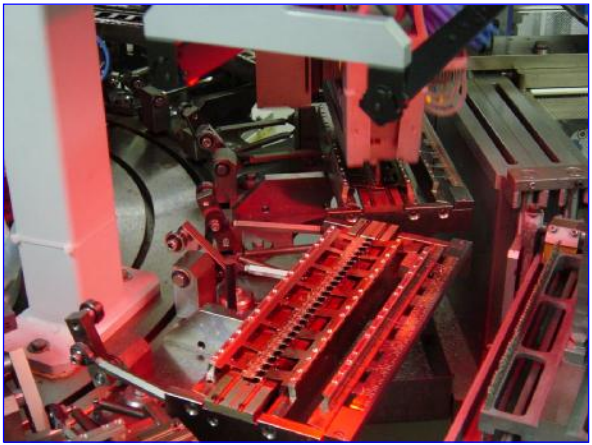
- Automatic and accurate focus adjustment of compact cameras for cell phones
- Patented double-reticle principle enables simple camera design and fast focussing



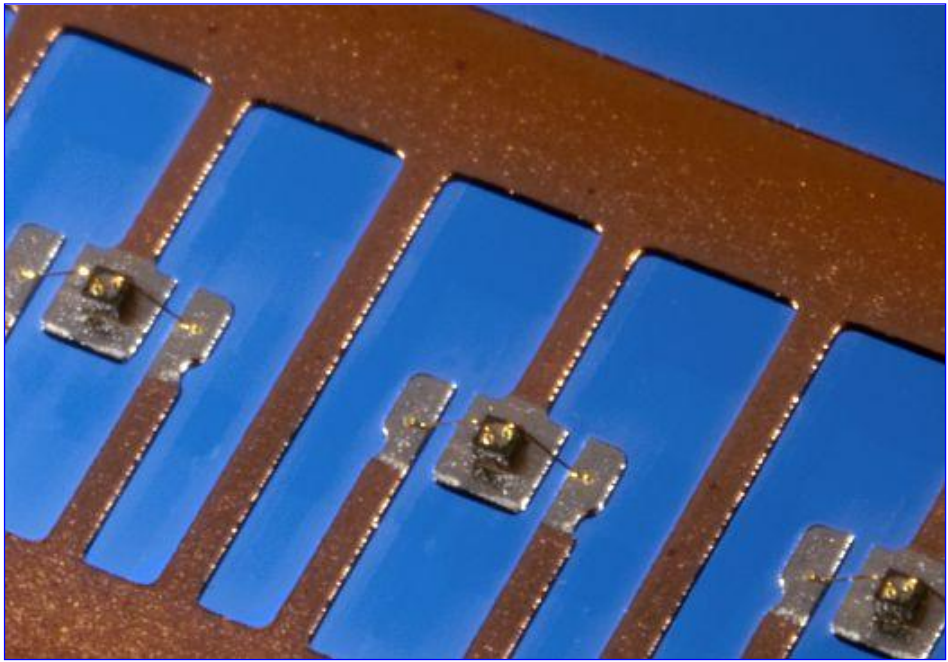


Solder paste inspection

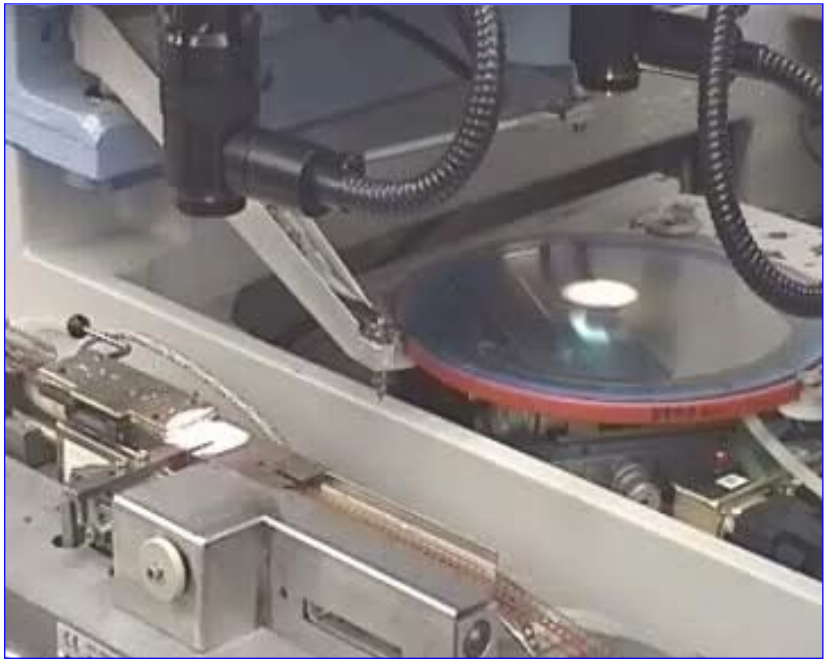
- In-line inspection of solder paste on leadframes (added)
- Quality assurance of leadframe soldering / joining process



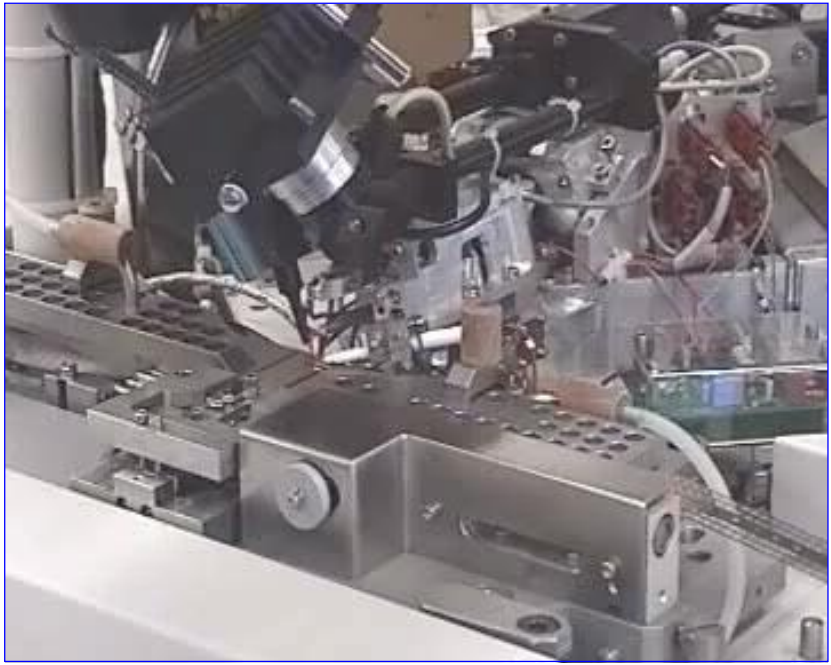
Die placement / Wire bonding



ADAT die placement

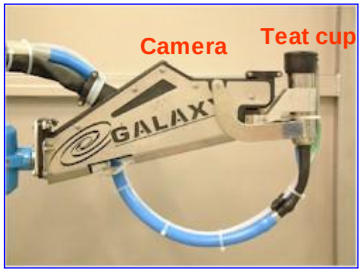


Phicom wire bonder



Cow milking robot

- Galaxy fully automatic milk system: Increase throughput of milking
- Automatic teat cup placement / “look while place”



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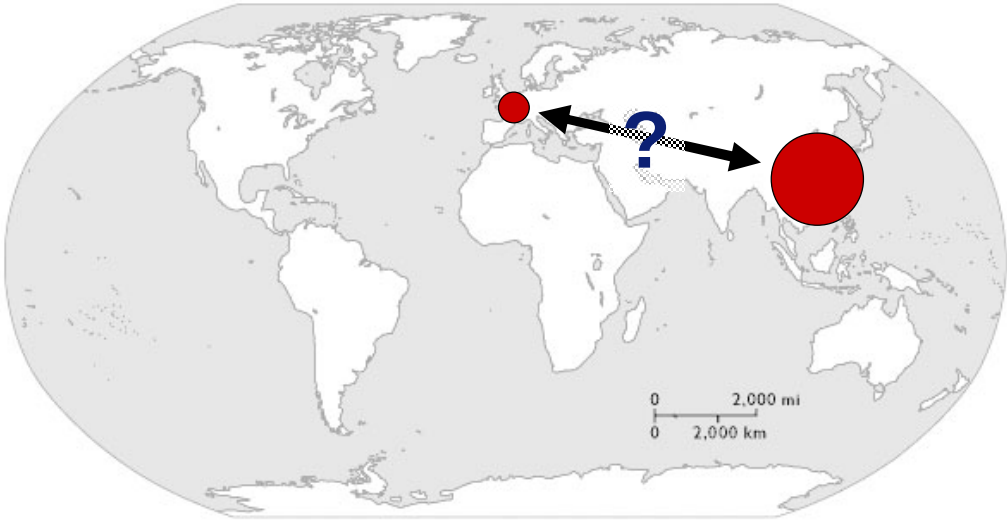
Chances for Assembly in Europe?



Chances for Assembly in Europe?

Findings in China factories:

- Miniaturization causing lower yield and quality
- barrier to automate due to low wages
- Too high investment for short lifecycles
- (Yet) Lack of available technology

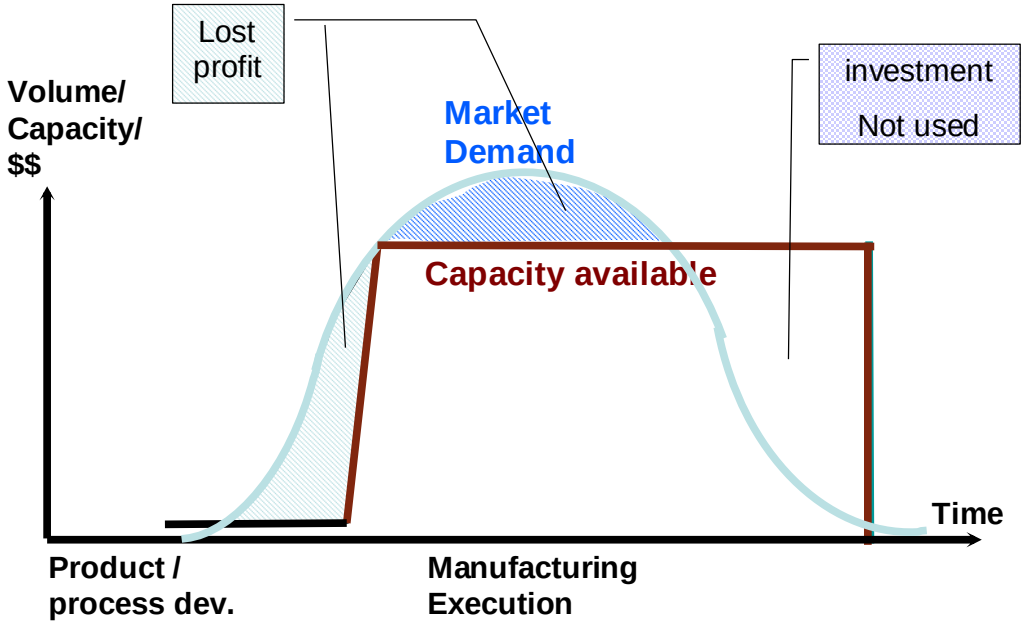
So: Opportunity for Europe in micro assembly

Future needs in assembly technology

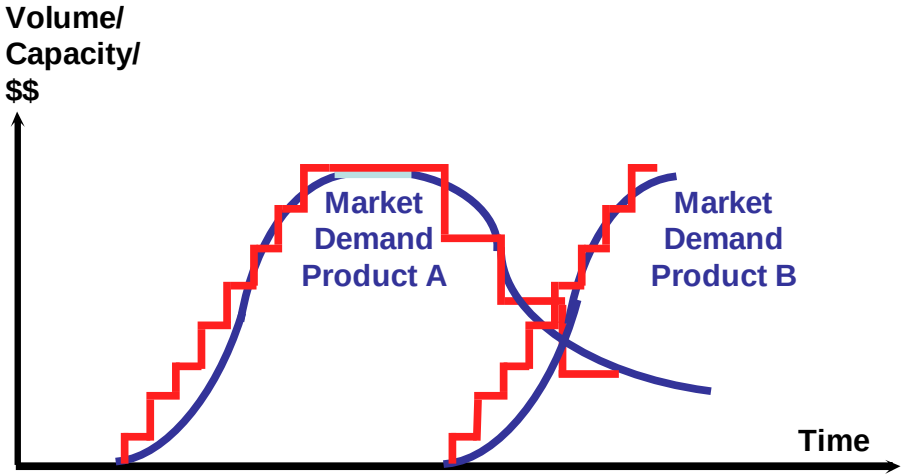
- Increasing industrial need for ultra precise micro assembly technology.
- Short start-up and stop of production, time to market.
- Flexible in ramp-up, follow the needs of the market.

- And of course … lower cost

Current equipment investment



Wishful thinking ?



EUPASS mission

Ø “To facilitate the development, implementation and promotion of affordable, cost effective and sustainable ultra-precision manufacturing solutions by offering rapidly deployable ultra-precision assembly services on demand “

Assembly systems based on:

- Reconfigurable and modular units
- Standardized and based on an open architecture
- Ultra precision solutions

Enables:

- High equipment re-use based on EUPASS module depots
- Evolvability, continuous growth in maturity

EUPASS facts

- European project, subsidized by the EU
- Kick off: November 1st, 2004
- Duration: 4 years
- Budget: 21 MEuro
- European wide 21 partner network
- Coordinator Philips Applied Technologies

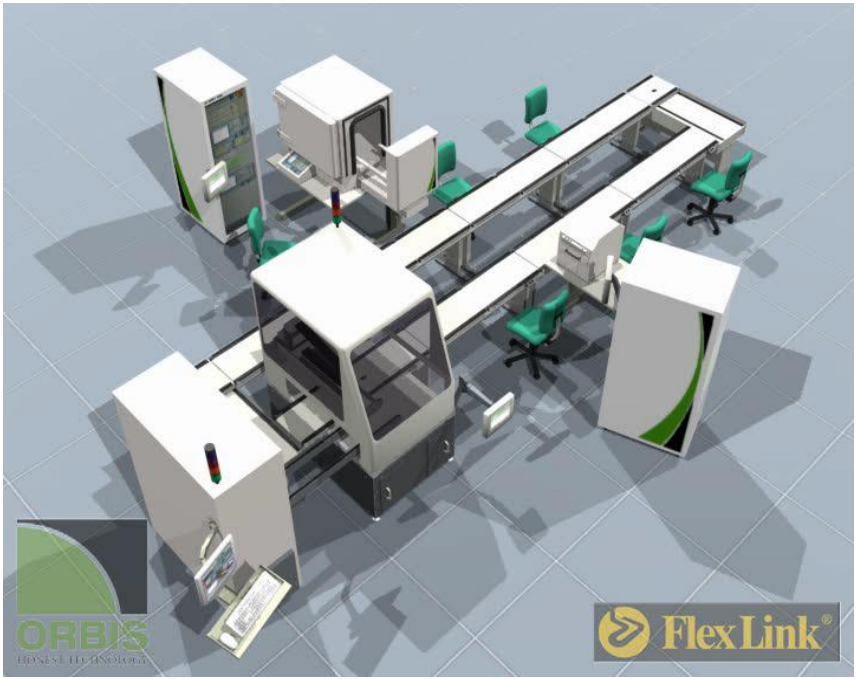
Industry:	**SME:**	**R&D :**	**Academic:**
Philips - NL	TQC - UK	TIA - IT	KTH - S
Bosch - D	Feintool - CH	Fz Karlsruhe -D	Nottingham-UK
Festo - D	IEF Werner- D	UFC - F	UNINOVA - P
Electrolux - IT	Masmec - IT	Fraunhofer - D	Tampere – Fi
Flexlink - S			EPFL – CH
Beckhoff - D			Solothurn - CH

EUPASS kick-off meeting

PRODUCTIE PROCES
AUTOMATISERING DAG

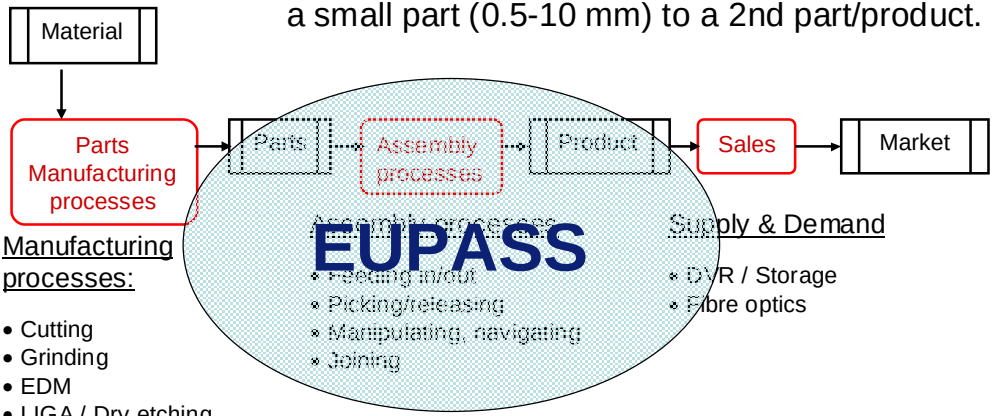
PHILIPS

Evolvable / reconfigurable systems



EUPASS definitions

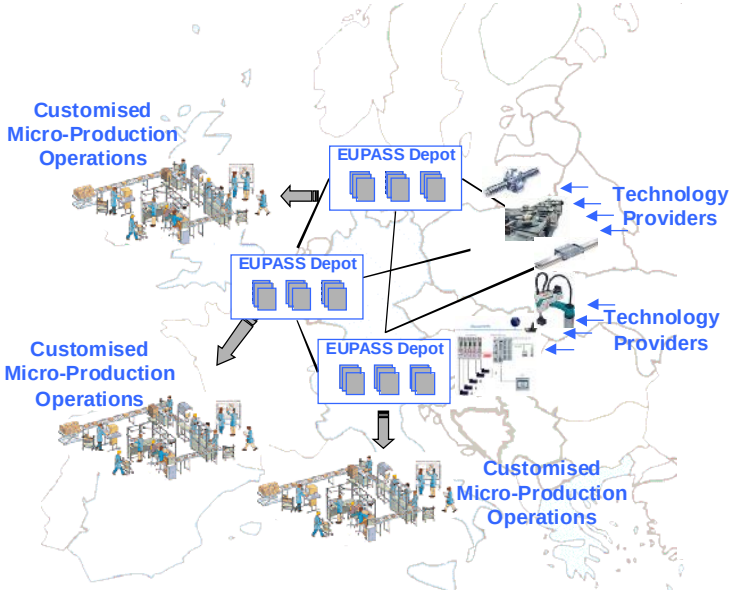
- Accurately (0.1-20 μm) manipulating and joining a small part (0.5-10 mm) to a 2nd part/product.



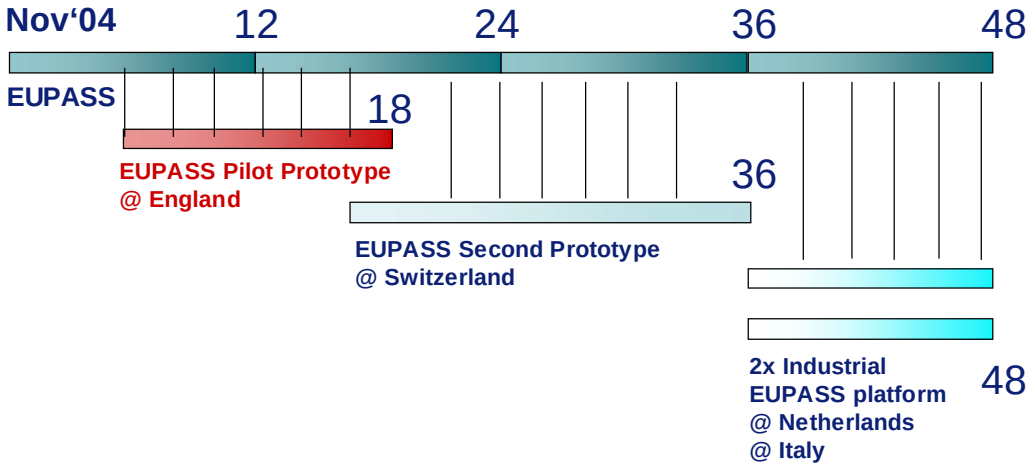
Manufacturing processes:

- Cutting
- Grinding
- EDM
- LIGA / Dry etching
- LBM
- ECM, etc.

EUPASS open architecture
Service on demand



EUPASS Overall planning



EUPASS Test Cases

- Philips Sound Solutions:
  - Rectangular Telecommunication (cellular phone) Speaker
- Festo:
  - Pneumatic Microvalve
- Electrolux:
  - White Goods micro-assembly (door lock)

Future opportunities

- EUPASS joins forces of technological programs of all participants
- Growing world-class in MicroSystemsTechnology by building a European wide supported methodology
- Relationship building through close collabration
- Improve international, multi-cultural cooperation skills

- **à** anticipate on future ultra precision assembly needs

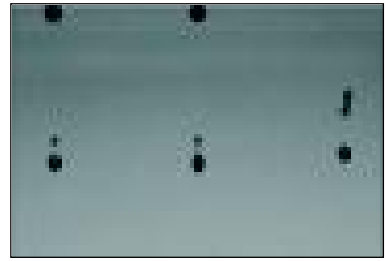
Future opportunities for Vision

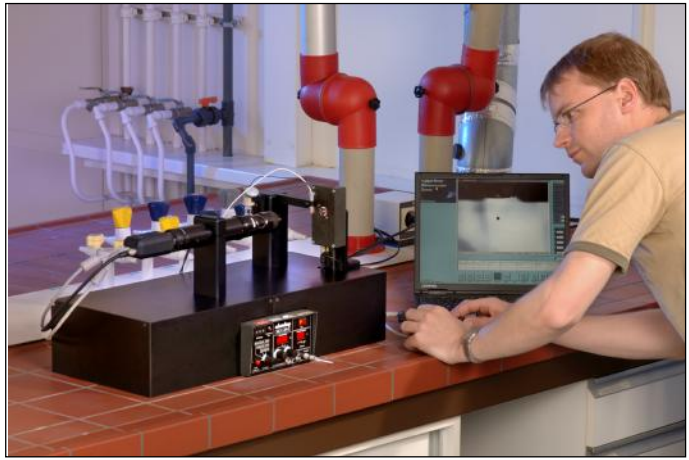
- Accurate assembly / joining of micro-parts:
  - Pre: alignment / pre-check
  - During: process feedback (example)
  - Post: check of the joining

- **à** anticipate on future ultra precision assembly needs

(Ink)jet Droplet inspection

- Inspection of droplets “in the flight”
- High accuracy (subpixel / contour algorithm)
- Measuring volume and vector (speed and angle).





EUPASS: Join the ride ?

Could this concept work for you ?

www.EUPASS.org

Thank you

More info at our internet site:
www.apptech.philips.com