‘The Schunk Dexterous Hand’

History and the future

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SCHUNK Product Range

Jaws  Lathe chucks  Clamping systems  Tool holders

Gripping modules  Linear modules  Rotary modules  Robot accessories

Magnet Clamping technology  Special clamping solutions

Modular assembly automation  Mobile gripping systems  Special gripping solutions

Facts & figures

- > 1800 Employees world-wide
- 226 Mio. € Turnover
- 25 Fully owned subsidiaries abroad
- Approx. 100 research projects
- 18 200 Customers in 45 different market segments
Grippers and gripping systems

Gripper solutions
- Pneumatic
- Electrical
- Mechatronik

Gripper systems
- Special systems
- Assembly solutions
- Mobile systems

Experience from 18,200 customers
- Automation
  - Handling
  - Machining
- Testing
- Logistics
  - Transportation
- Laboratory
  - Pharma/Life Science
  - Semicon/Solar
  - Chemical
- Medical
- Safety - protection
- Research & development

Complexity
Market trends

Gripping
Movement

Smart Gripping
Sensors
Force control

Intelligent Gripping
Examination
Flexibility
Adaption
Where are we heading?

From single product to “single systems”

Reactive grasping

Identification of object geometry and orientation
Challenges in (mobile) gripping systems

- Light weight
- Mass/performance ratio
- Modular
- Interface
- High performance
  - Kinematics, performance, loads, speed
- Energy efficient
- Adaptable and compact
- Commercially accepted
- Safe

“The Schunk Dexterous Hand”
Tomas Berg
ERF 2012
Challenges in (mobile) gripping systems

Robustness:
change of environmental conditions
collision unavoidable
operation without safety fence
precondition for service robotics

Key capability is the rise of flexibility:
contact to sensitive objects (animal, fruit) but also handling of heavy goods
From single component to logic structure

1994

2006

2008

2010

2011

2012

The Schunk Dexterous Hand

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ERF 2012
Gripping hands and modular systems

> 1,000 installed robots
> 10,000 Schwenk- u. Greifmodule
> 300 Customers
> 16 years of experience with hands and modular systems
Almost as talented as its human model
“The Schunk Dexterous Hand”
Ability expectations in Service Robotics:

- They should intuitively adapt to the human
- Communicate in the usual human way
- Master complex gripping operations
Design study, introduced at the SCHUNK International Expert Days on Service Robotics 2012, is available as a Right and Left “Hand” for the first time.
Nine drives enable the 5-finger hand to carry out various gripping operations.
“The Schunk Dexterous Hand”

Resembles its human model, in size, shape, appearance and mobility

By using tactile sensors in the fingers, the gripper hand has the necessary sensitivity and can therefore manage every gripping and manipulation task, even in unstructured and unforeseeable situations.
1a Thumb Opposition
max speed 164 (deg/s)
max torque 0.76 (Nm)
--coupled to palm ‘cupping’--

1b. Thumb Adduction
(Carpometacarpal Joint - CMJ)
max speed 83 (deg/s)
max torque 1.66 (Nm)
--coupled from a single actuator—(OR)

1b. Thumb Adduction
(Proximal Interphalangeal Joint - PIPJ)
max speed 83 (deg/s)
max torque 1.66 (Nm)
“The Schunk Dexterous Hand”
Superior Clamping and Gripping

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