

# P & P using Voice Coil Actuators

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[www-smac-mca.com](http://www-smac-mca.com) & [www-smcpneumatics.nl](http://www-smcpneumatics.nl)

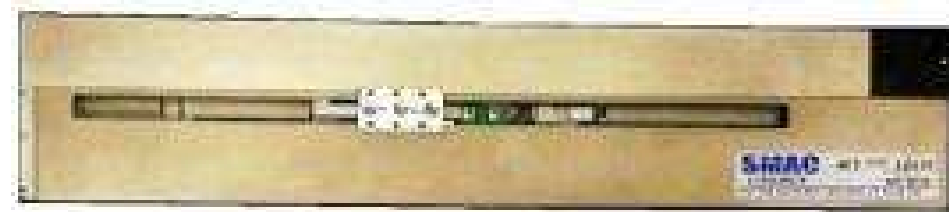


# Contents

- Linear motion concepts for P & P
- LARA27->LARA31:  
Quality improvements SMD pick & place
- LCS25-200:  
New Development for long stroke pick & place









- Questions



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# Linear motion concepts

	Force	Speed	Moving mass	Accuracy	Remark
<b>Moving coil</b> 	Medium	High	Low	High	Low Energy
<b>Moving magnet</b> 	Medium	High	High	Medium	IP-rating
<b>Spindle</b> 	High	Medium	High	Medium to High	App-dependent
<b>Belt</b> 	Medium	High	Low	Low	Low Cost
<b>Piezo</b> 	High	Low	Low	Medium	Compact
<b>Pneumatic</b> 	High	High	Medium	Low	2-pos, Low Cost

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# History SMAC

- 1990 SMAC founded in USA, SMC Distributor
- 1995 Softland introduced (patent)
- 2001 LARA27 (Linear/Rotary unit)
- 2003 SMAC office in Helmond
- 2008 CAL actuator (first IP rated voicecoil)
- 2010 LCA & LCS actuators, LCC controller



Electric  
Cylinder



Linear / Slide



Linear Rotary



XY Stage



Multi-Axis

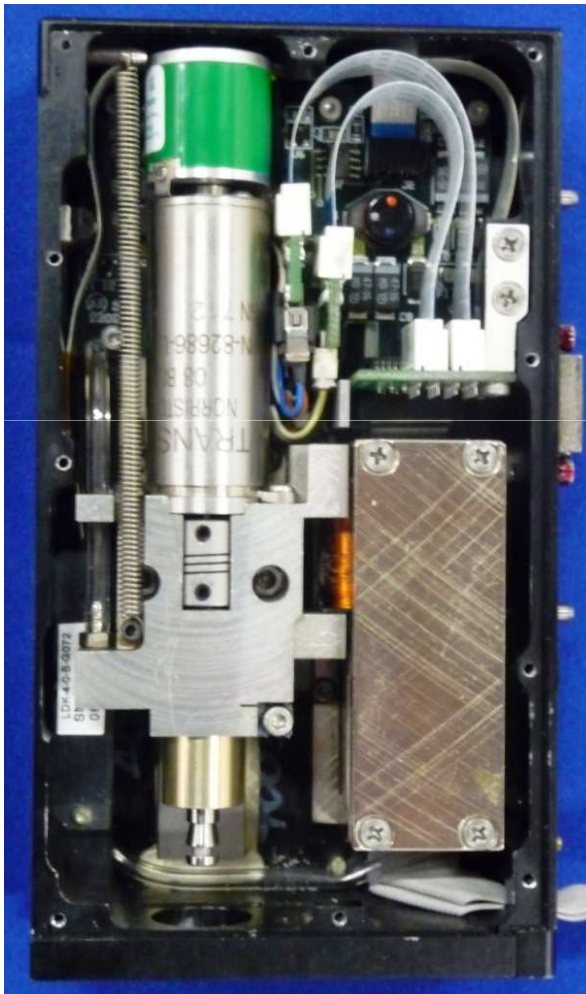
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## LARA27 specification

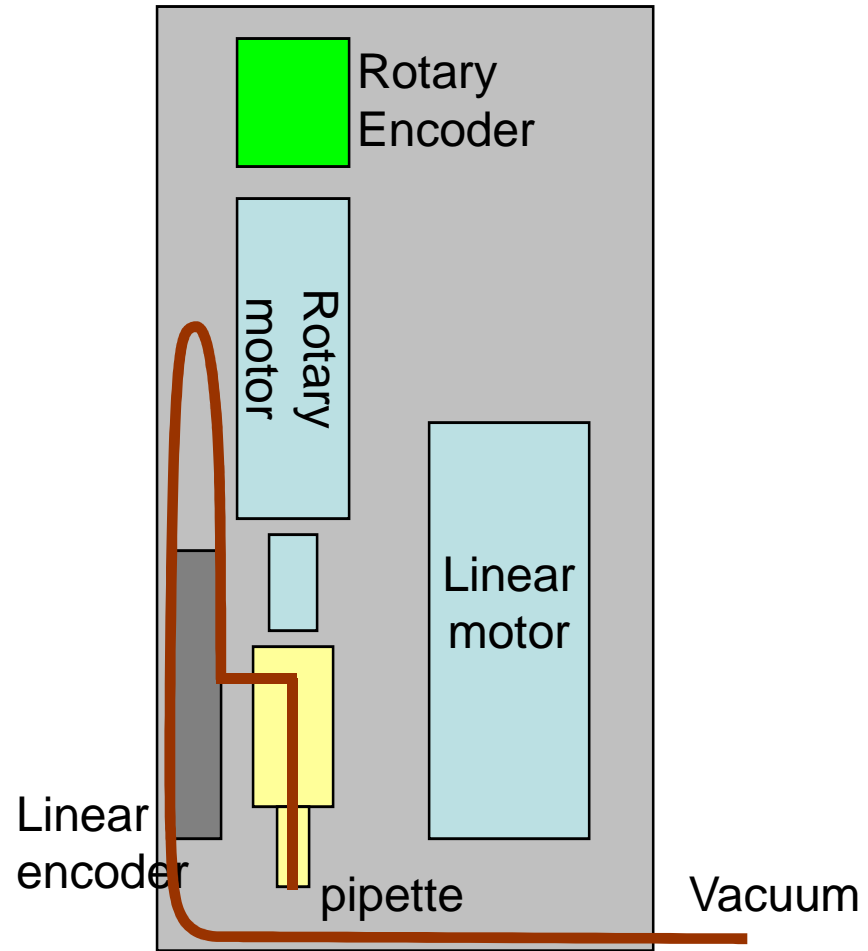
- Linear 27 mm, 5 micron resolution
- Rotary 20000 counts per rev.
- Run-out 10 micron, variation 2 micron
- 25 mm stroke in 50 msec
- Force variation < 0.5 N
- Shaft Sideways Stiffness = no play

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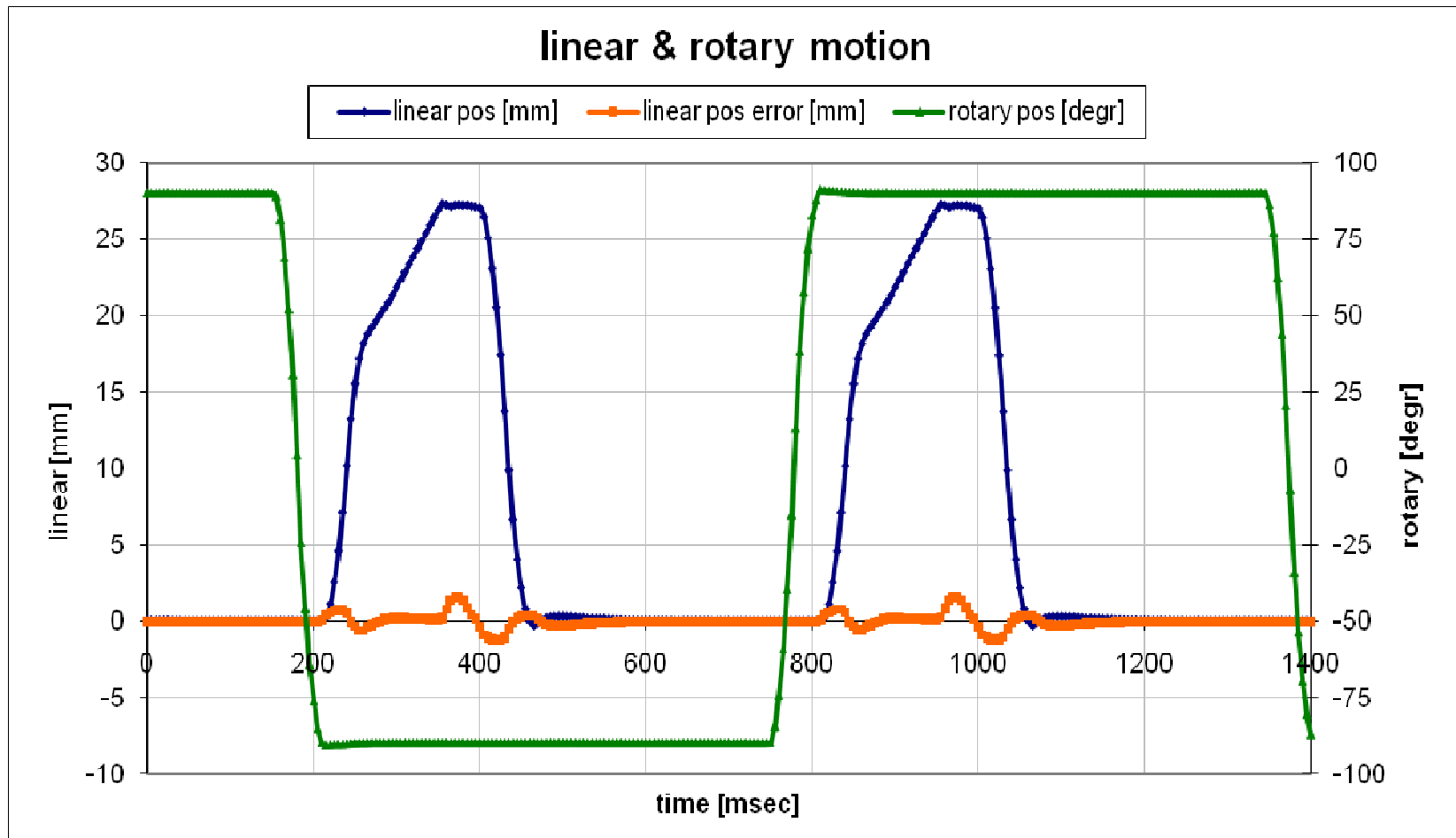
# LARA27 Concept



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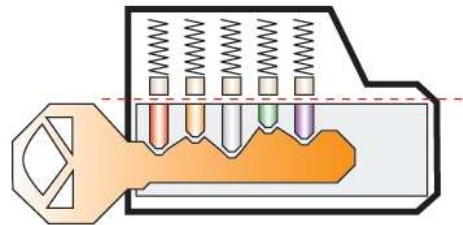


# LARA Pick & Place Softland



# LARA : Applications

- SMD pick and place
- Credit card production
- Lock assembly



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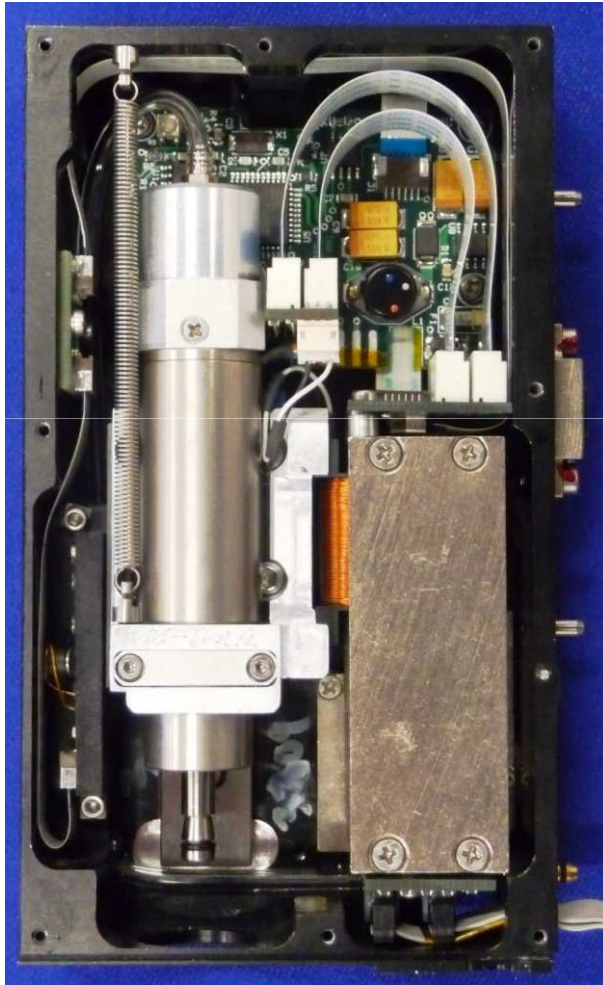
## LARA27: Life limiters

- Vacuum Pollution
- Linear guide
- Flex cable life
- Linear enc. pollution

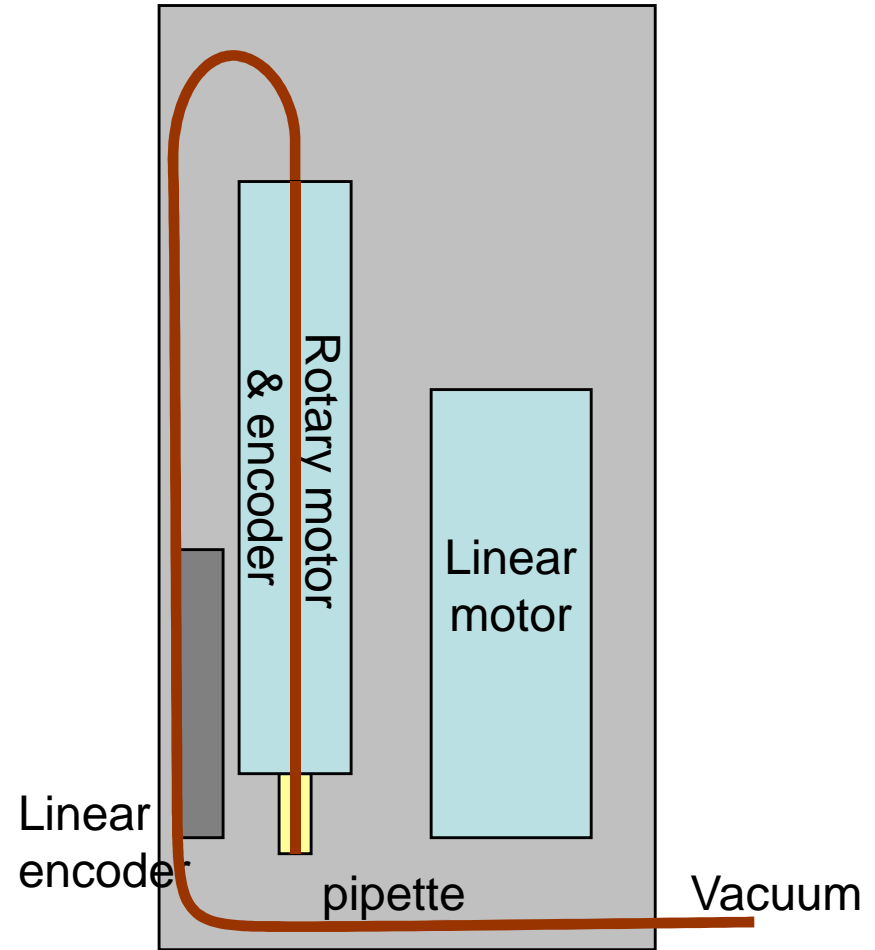
## LARA27: Life extenders

- Linear guide  
IKO C-sleeve  
1000 km becomes 20000 km
- Flex cable routing  
alignment

# LARA31 Concept



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# LARA31: Improvements

	LARA27	LARA31
Rotary Resolution	20000	40960
Vacuum seals	2	1
Rotary bearings	6	2
Vacuum routing	90 degr angle in piston & pipette	Only large radius in vacuum routing
Stroke	27 mm	31 mm
Encoder symmetry value (spec < 27 degr)	Typical 16 degr 	Typical 4 degr 

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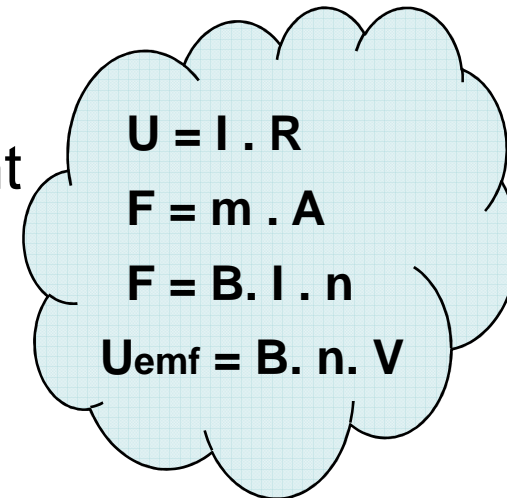
# LARA31 Result



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# LCS25-200: Basic Design Targets

- **Electrical power and Temperature**  
48V/2A      Housing Temp = Tamb + 10C max
- **Moving mass, Force, Force-constant**  
<100 gram    20N      12-15 N/A
- **Speed and acceleration**    ○    ○    ○  
1.5 m/s      12G
- **Price roadmap**



1995	2005	2010
LA20-25 + LAC5 Fmax = 4N, 25mm	LAS20-25 + LAC1 Fmax =6N, 25mm	LCS25-200 + LCC10 Fmax=20N, 200mm
2200 Euro	1500 Euro	1000 Euro

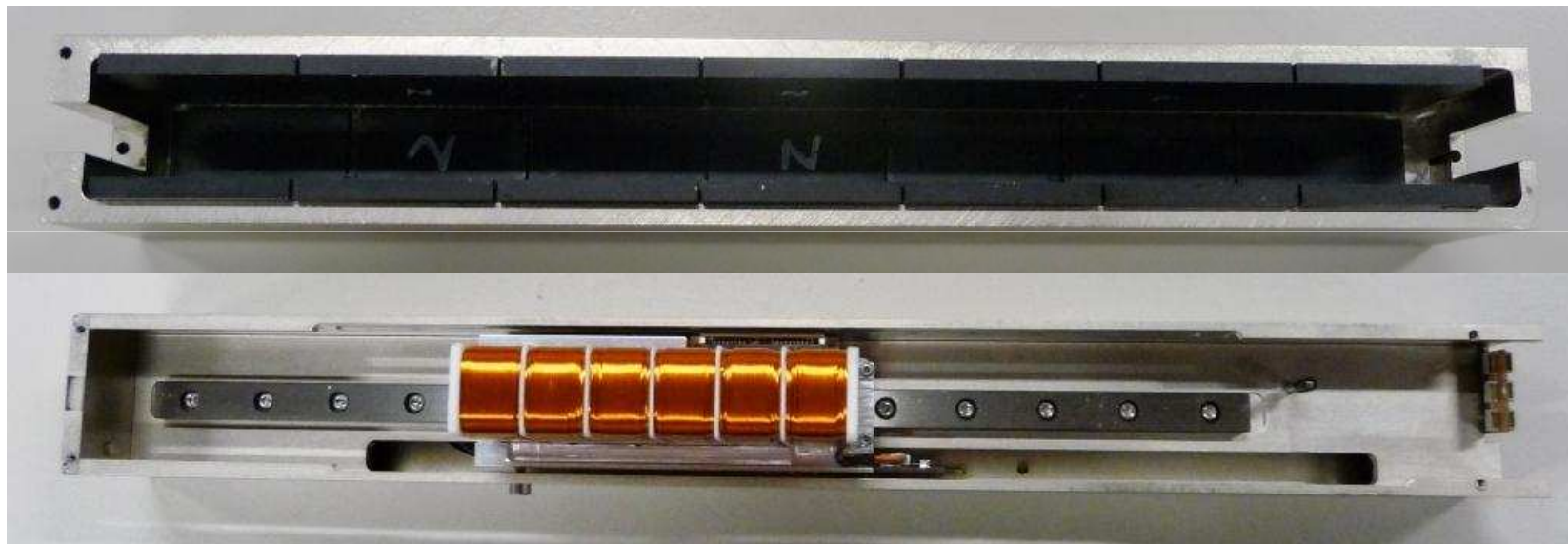
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## LCS25-200: Design Opportunities

- Centre Pole Motor – 6 coil multi pole
- Flex cable
- Low cost Linear encoder
- Low cost controller (LCC-10)

# LCS25-200 Motor

- Centre pole motor: High efficiency

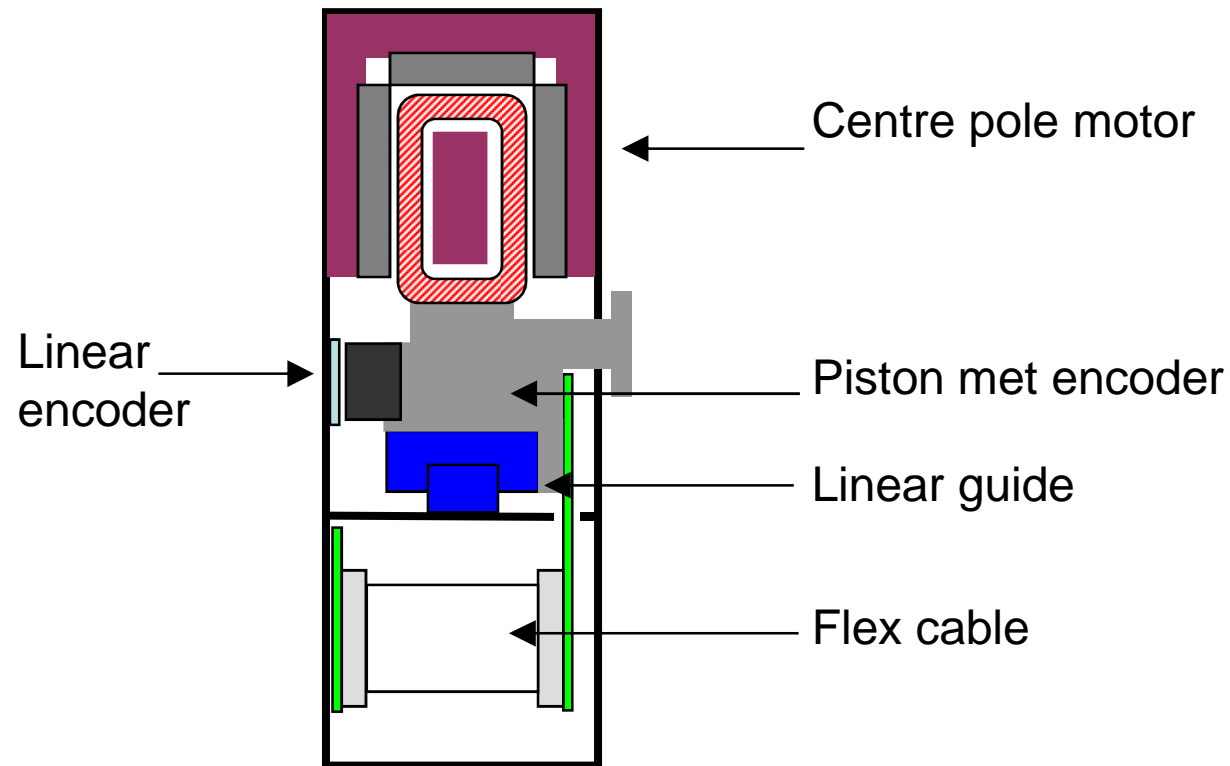


Increased magnet surface, more copper volume, stronger magnet housing

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# LCS25-200 Flex Cable

- Flex cable in separated chamber



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# LCC10 Controller

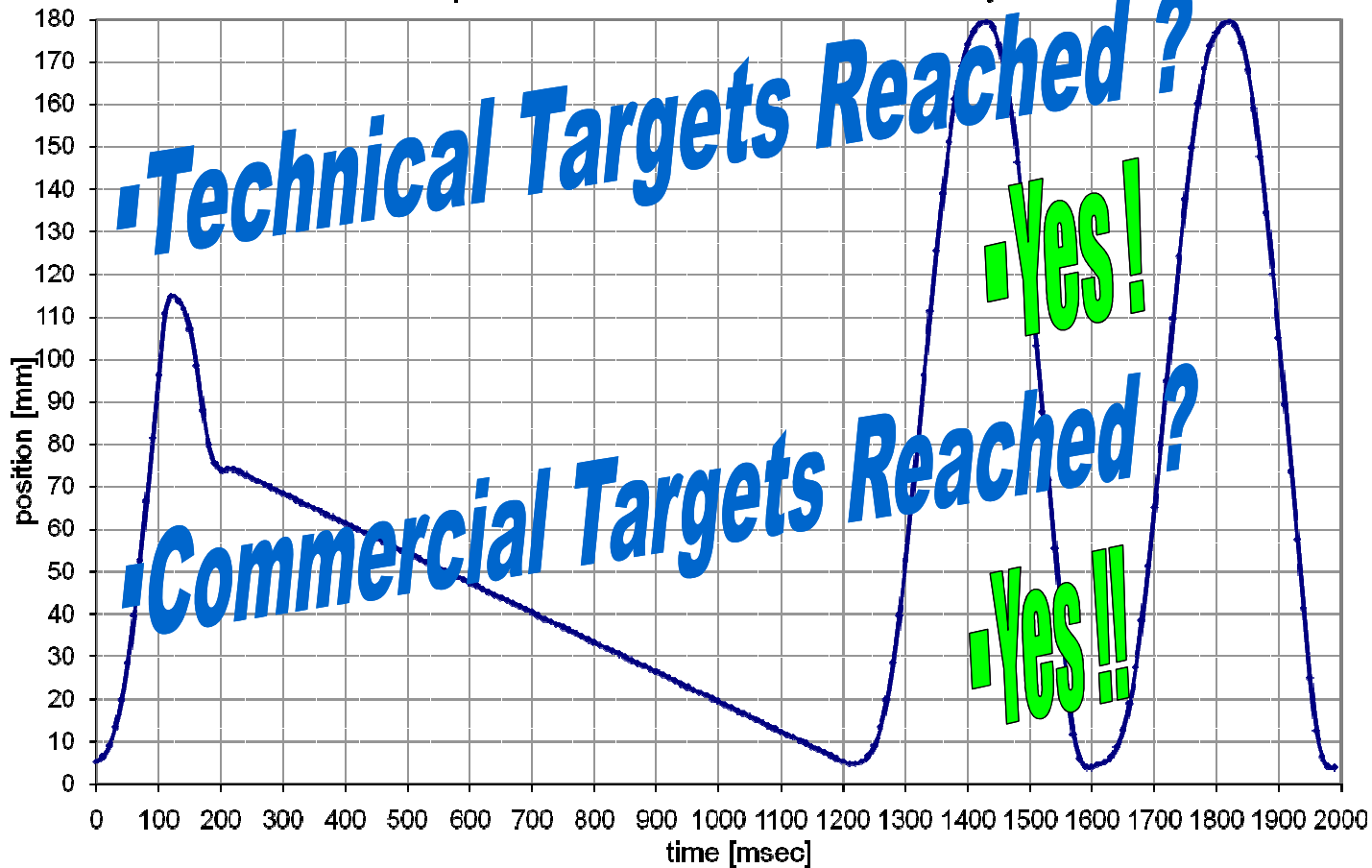
- Low cost controller
  - 48V/2A avg
  - 4 TTL Inp.
  - 4 TTL Outp.
  - 1 analog inp.
  - 1 analog outp.
  - Stand alone
  - RS232/Can bus



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# LCS25-200 motion profiles

Impact on hand and two standard cycles



# LCS25-200: Applications

- Pick and place of labels replacing pneumatics



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- Questions ?