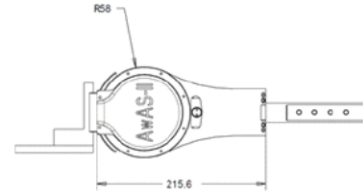
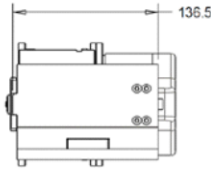


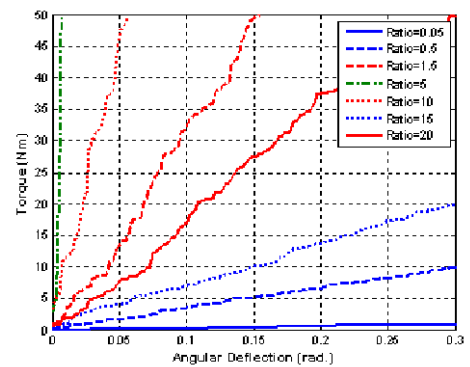
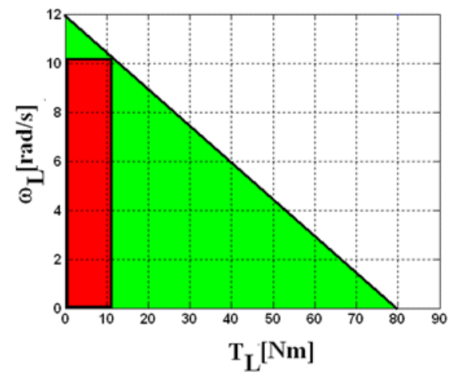
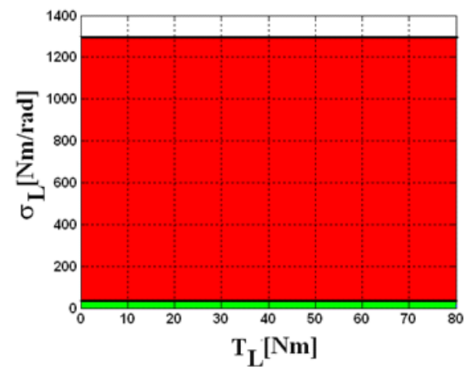
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The second version of Actuator with Adjustable Stiffness



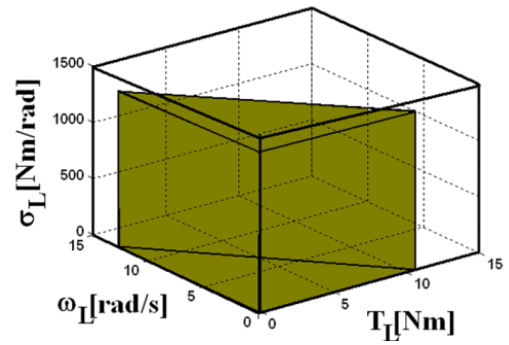
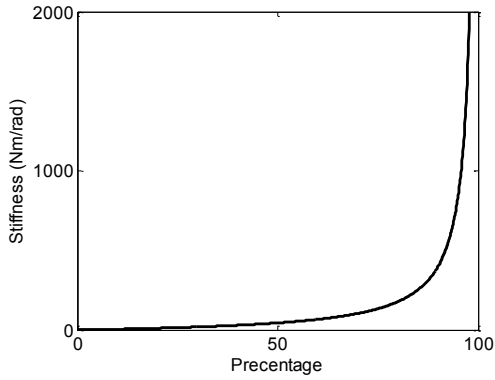
Operating Data			
#	(quantity)	(unit)	(value)
Mechanical			
1	Continuous Output Power	[W]	56
2	Nominal Torque	[Nm]	10.75
3	Nominal Speed	[rad/s]	10.2
4	Nominal Stiffness Variation Time	with no load	[s] 2
5		with nominal torque	[s] 3
6	Peak (Maximum) Torque	[Nm]	80
7	Maximum Speed	[rad/s]	12
8	Maximum Stiffness	[Nm/rad]	Inf.
9	Minimum Stiffness	[Nm/rad]	0
10	Maximum Elastic Energy	[J]	5.8
11	Maximum Torque Hysteresis	[%]	-
12	Maximum deflection	with max. stiffness	[°] 17
13		with min. stiffness	[°] 0
14	Active Rotation Angle	[°]	*-/150
15	Angular Resolution	[°]	0.02
16	Weight	[Kg]	1.4
Electrical			
17	Nominal Voltage	[V]	24
18	Nominal Current	[A]	2.3
19	Maximum Current	[A]	6.2
Control			
20	Voltage Supply	[V]	24
21	Nominal Current	[A]	2
22	I/O protocol	[]	Ethernet

BLUE		+5 TO 24 VDC 2.7K OHMS 2.7K OHMS 2.7K OHMS GND	
BROWN			
ORANGE			
YELLOW			
GREEN	OUTPUTS		
SENSOR ASSEMBLY		USER SUPPLIED	(PROVIDED WITH EMOTEQ DRIVERS)



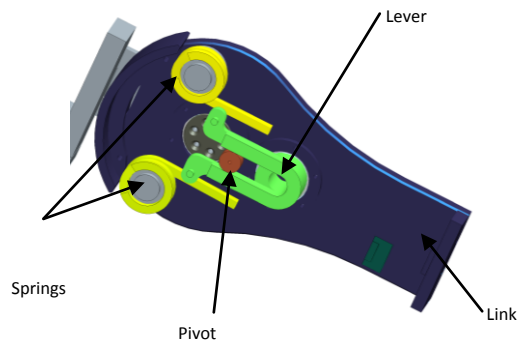
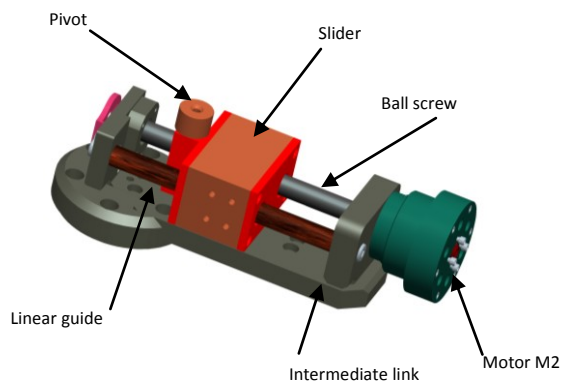
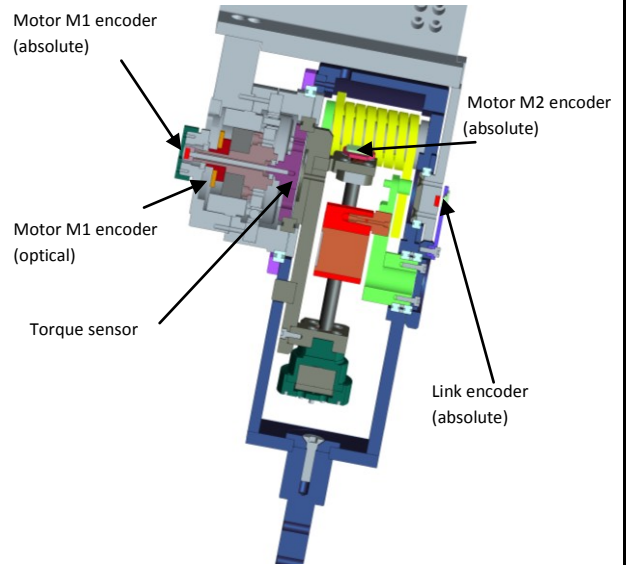
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Additional Characteristics



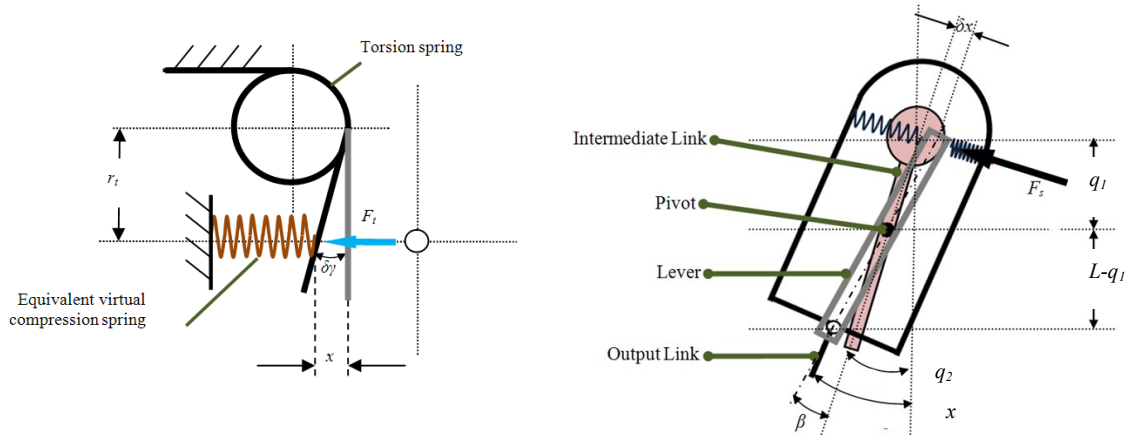
Sensor Map

Additional sensors data			
#	(quantity)	(unit)	(value)
a0	Encoders		
a1	Resolution	[°]	0.09
a2	Range	[kHz]	244
a3	I/O protocol	[yyy]	Ethernet
ax	(specific sensor properties)	[yyy]	xxx



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Model



Mathematical model ($K_s=10\text{Nm/rad}$, $l_0=1\text{ rad}$, $L=0.05\text{m}$, $r_t=0.015$)

101	Recoil Point Function	$x_e = q_2$
102	Energy Function	$H = 1/2 K_s [(l_0 + (L/r_t)(q_1/L - q_1)\sin(q_2 - x))^2 + (l_0 - (L/r_t)(q_1/L - q_1)\sin(q_2 - x))^2]$
103	Output Torque Function	$\tau = 2 K_s [(L/r_t)(q_1/L - q_1)]^2 \sin(x - q_2)\cos(x - q_2)$
104	Output Stiffness Function	$\sigma = 2 K_s [(L/r_t)(q_1/L - q_1)]^2 (2\cos^2(x - q_2) - 1)$
105	Spring Torque Function	$e_s = e_s(q_1, q_2, x)$
106	Springs to Motors Transmission Ratio	$A = (L/r_t)(q_1/L - q_1)\cos(q_2 - x)$
107	Springs to Output Transmission Ratio	$B = -(L/r_t)(q_1/L - q_1)\cos(q_2 - x)$