

**NORR
HYDRO**

Partner in Success

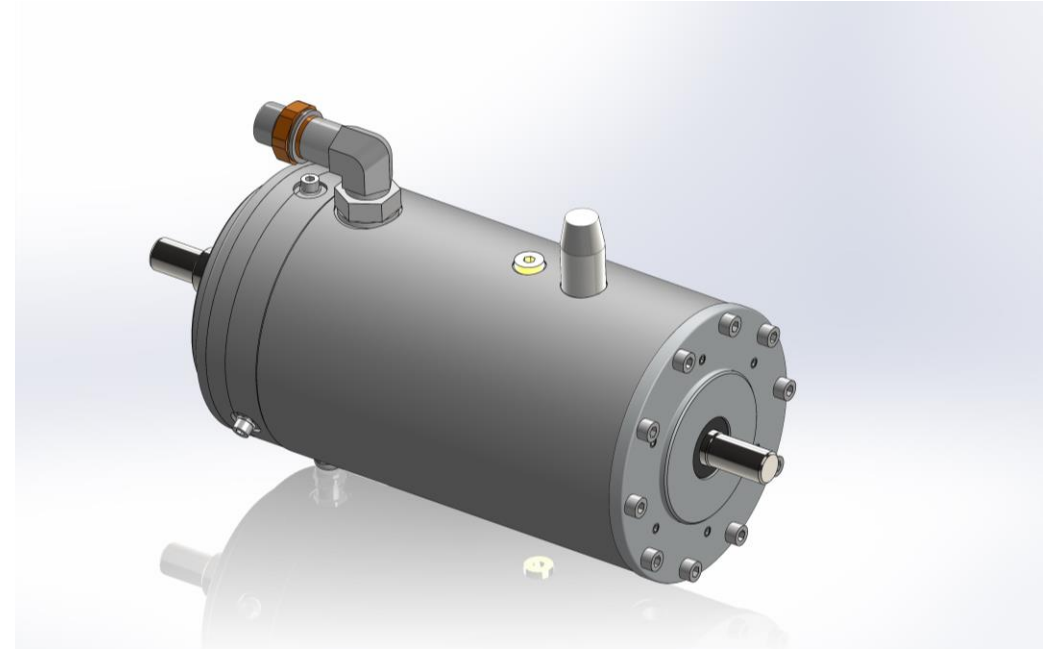
NorrDigi® SSG –Seamless Shift Gearbox

www.norrhydro.com



SSG – New Innovation for Linear Movement

- Seamless Shift Gearbox
- **Automatic gear** with 2 (or more) gear ratios
- Utilizing electromagnetic clutches with electric controls
- Patented by Motiomax (subsidiary of Norrhydro)
- Developed for Electromechanical Actuator (EMA), but can be used also for rotary movement
- When both high velocity and high force are required in the same application — but not at the same time — SSG allows the use of a smaller motor to perform the task

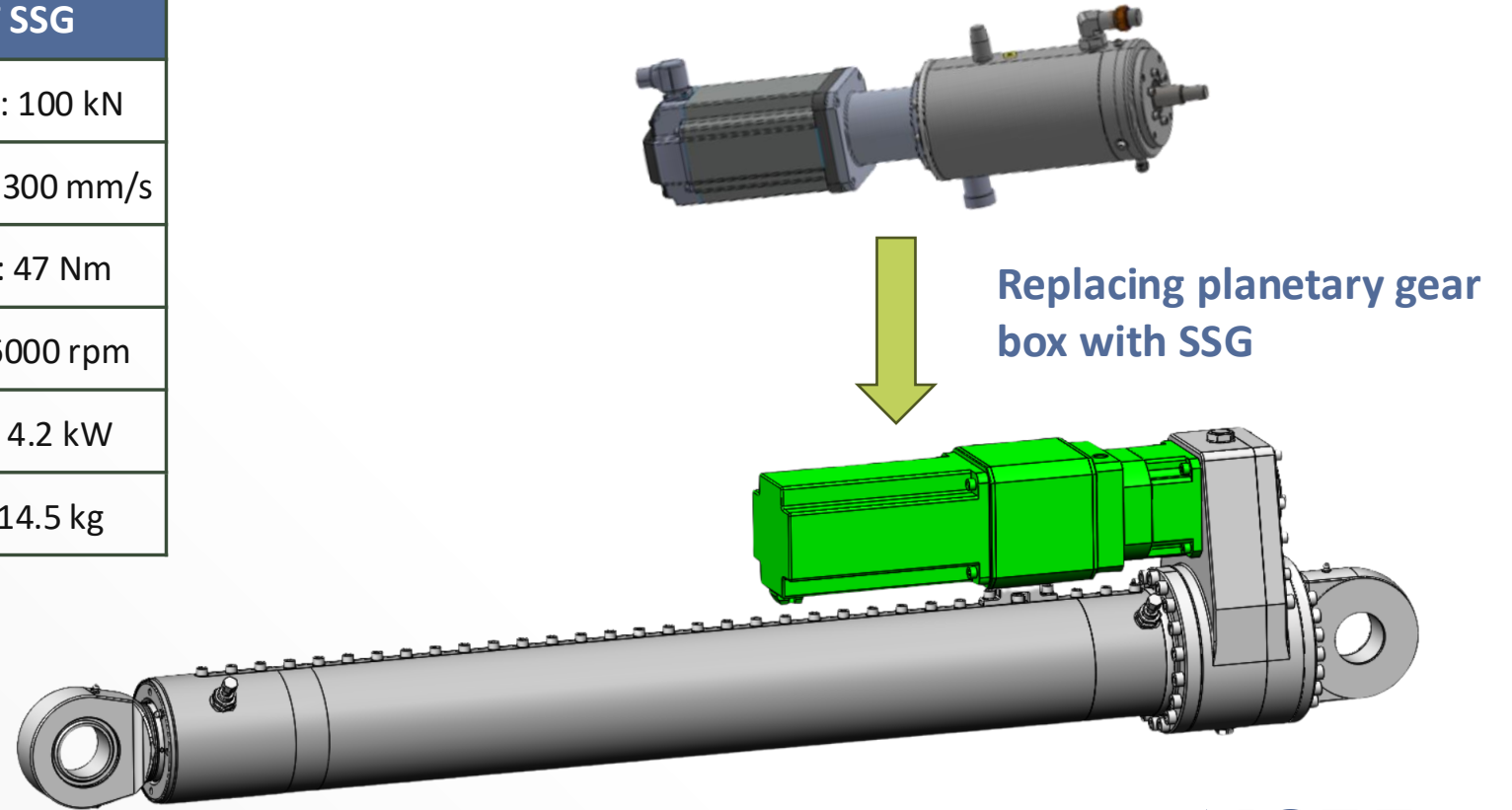


SSG cuts cost as it reduces motor size and weight!

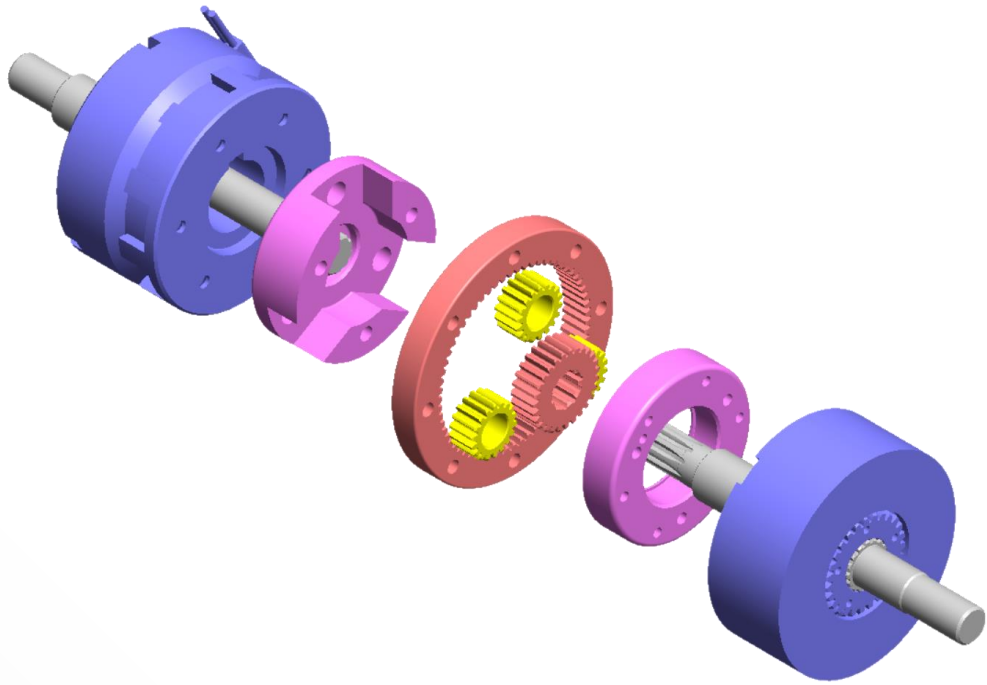
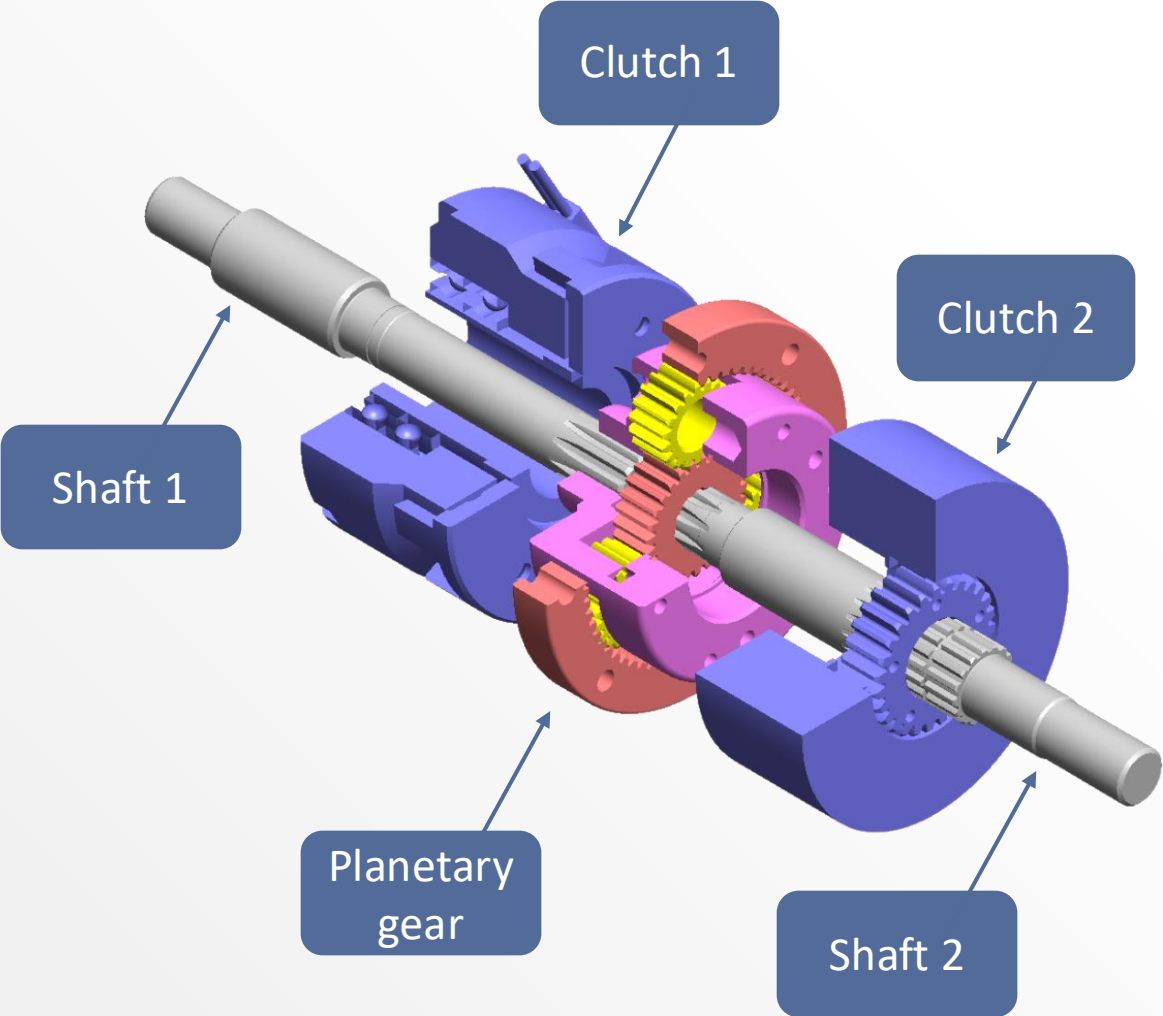
EMA Cylinder with Seamless Shift Gearbox

WITH SSG
Required force: 100 kN
Required speed: 300 mm/s
Motor torque: 24 Nm
Motor speed: 4000 rpm
Motor power: 1.7 kW
Motor mass: 7 kg

WITHOUT SSG
Required force: 100 kN
Required speed: 300 mm/s
Motor torque: 47 Nm
Motor speed: 6000 rpm
Motor power: 4.2 kW
Motor mass: 14.5 kg

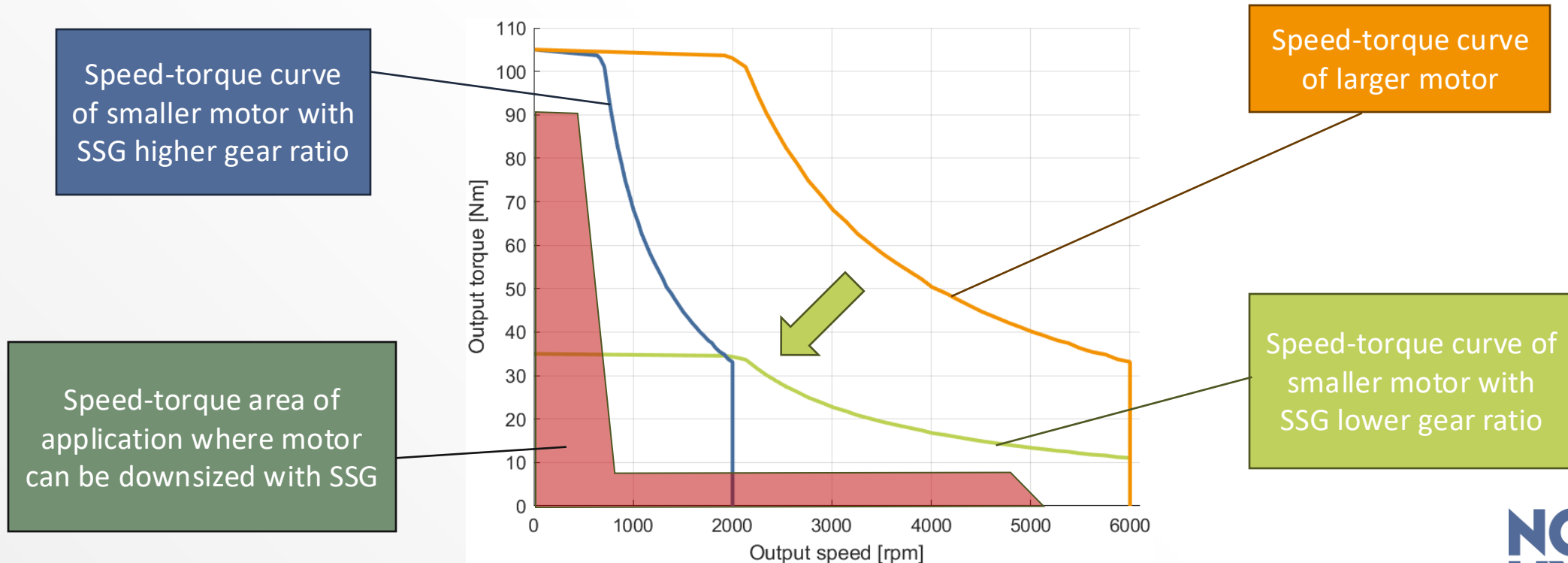


How Does it Work – Main Components



Downsizing the Motor by Using SSG

When both high velocity and high force are required in the same application — but not at the same time — SSG allows the use of a smaller motor to perform the task.



SSG Control System Features

- System changes gear automatically during the movement based on motor speed and torque
 - Example:
 - Motor torque increases quickly and speed decreases over set threshold → shift to higher gear ratio
 - Motor torque decreases and speed increases over set threshold → shift to smaller gear ratio
- Manual shift of the gear ratio is also possible
- Smooth shifting without drop in torque or vibration/pull effect
- Seamless integration with motor and break control



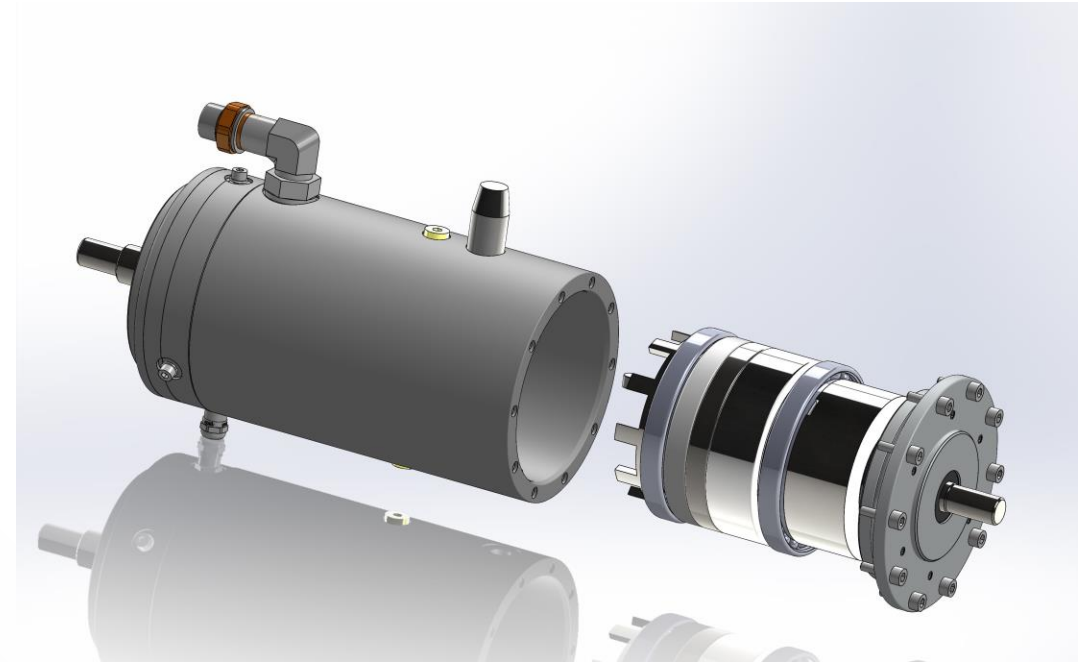
SSG Case – Motor Downsizing Calculation

SSG RATIO	SERVO MOTOR POWER WITH SSG			
	5kW	10kW	15kW	20kW
1:3	30%	31%	32%	33%
1:4	40%	41%	43%	44%
1:5	50%	52%	53%	55%
1:6	60%	62%	64%	66%
1:7	70%	72%	75%	77%

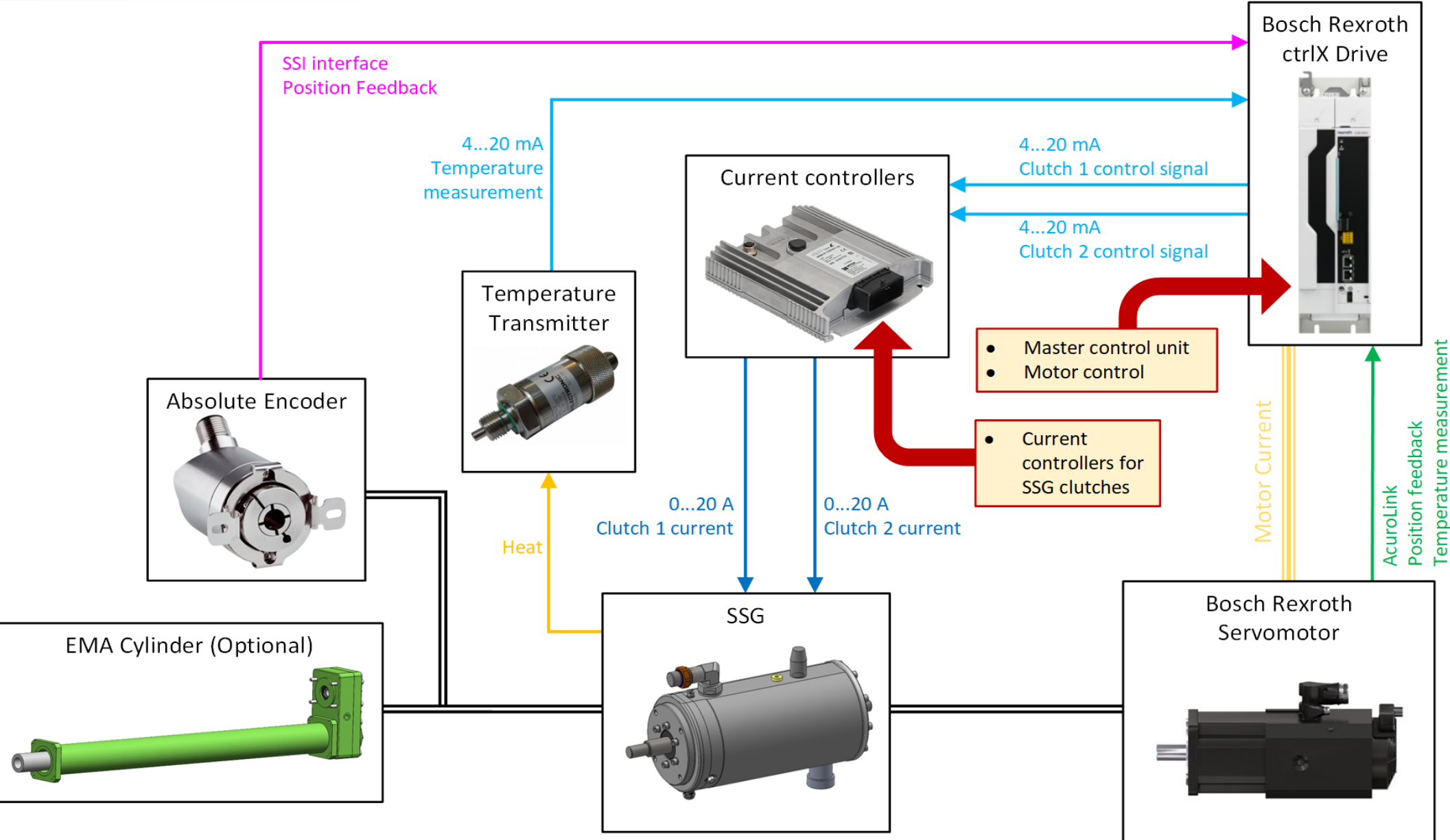


Innovative Housing – New Perspective on Serviceability

- The gearbox is built around two main modules; making maintenance and customization remarkably efficient
- Designed for quick adaption to different applications
- The interchangeable gear module can feature varying gear ratios, enabling the same gearbox housing to be reused across multiple configurations
- Both the input and output shafts of the SSG are fully customizable to match the specific requirements of the target application



Control System with Bosch Rexroth Servo Drive and SSG



Customers

– Diversified customer base spanning multiple industries



FORESTRY



MATERIAL HANDLING



CONSTRUCTION EQUIPMENT



MINING



MARINE & OFF-SHORE



RECYCLING & LIFTING





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Thank you!

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