1 Robotics and Spatial Intelligence

1.1 Use your favorite search engine to locate servos manufactured by at least two different companies. Paste links to the product listings.

The Manufacturers I selected are Siemens and ABB. The links to Product Listings of each of the above manufacturers for Servo Motors are as followed:

1. Siemens - Product Listing Link
2. ABB - Product Listing Link

1.2 Compare and contrast the specifications for those servos, as listed in the product descriptions or data sheets.

I am going to compare the following products:

- Siemens- Simotics S-1FK7, S-1FT7, S-1FG1
- ABB- eSM and HDS Servo Motors

Table 1 shows the comparison among these models of Siemens and ABB in terms of specifications as mentioned in their respective Data Sheets. Adding to the specifications, I would like to discuss few more interesting points here.

The servo motors developed by Siemens stand out due to their naturally cooled design with high power density, being compact and highly dynamic along with optional absolute or incremental encoders to decouple from any oscillation or vibration.

Coming to the ABB motors, the HDS servo motors achieve higher torque, reduced cogging, accurate positioning, high speed and efficiency and the eSM servo motors have high torque precision and low torque ripple. Additionally they have high control on speed, torque and position with high precision and quality , thereby improving efficiency and productivity of the servo sytem.

	Siemens			ABB	
Servo Motor Models	S-1FG1	S-1FT7	S-1FK7	eSM04X-101 302-T1N0A00	HDS130C-1829B
Input Voltage	-	-	-	AC 230V	AC 400V
Angular Velocity	Rated-13 -1279rpm	Rated- 1500 -6000 rpm	Rated-2000- 6000rpm	Rated-3000rpm	Rated-1500rpm Max-4000rpm
Torque	Rated-up to 3070 Nm	Rated-1.4- 250Nm	Rated- 0.08 -37Nm	Rated-0.32 Nm Max-0.95 Nm	Peak- 54Nm
Power	Rated-0.5 -1.8kW	Rated-0.88 -45.5kW	Rated- 0.05- 8.17kW		Rated-2.9kW
Current	-	-	-	Max-3A	Rated- 14.8A Peak-51A
Inertia	-	-	-	0.041Kg-cm2	17.70 Kg-cmˆ2
Torque const	-	-	-	0.32Kt	1.40Kt
Voltage const	-	-	-	-	84.7 Ka
Operating Temperature	-	-	-	0-10 C	
Weight	-	-	-	0.48 kgw	
General descriptions	-Natural Cooling -medium complexity	-Natural Cooling -Forced Ventilated -Water-cooled -low torque ripple	- Natural Cooling -Forced Ventilated -high performance applications		-High Torque density and Power Density->Low volume & weight -Low clogging torque & torque ripple->excellent performance at low speed and system control - Outstanding overload performance -Precise shaft machining and flange ->low noise and vibration ->High density, accuracy and efficiency

Table 1: Comparison Table

1.3 For each of the two devices, suggest a scenario or application in which that servo would be a suitable choice to include in a robot.

Applications of the above servos would be in the following areas:

- **Siemens**- Siemens servo motors, owing to the encoders and the natural cooling mechanisms, are more suitable for their use in conveyor technology and handling systems, digital printing machines, wood-glass-ceramic-stone processing machines, dosing pumps etc.
- **ABB** - Owing to their high torque, accurate positioning and high efficiency, ABB servo motors are more suitable in pick-and-place jobs, food and beverage industry, manufacturing, medical or packaging industries for applications like cut-to-length, labeling, machining or material handling.

References

1. https://new.abb.com/drives/low-voltage-ac/servo-products/e-series-servo-motors

2. https://new.abb.com/motors-generators/nema-low-voltage-ac-motors/ac-servo-motors/ac-brushless-servo-hds-motors

3. https://www.siemens.com/us/en/products/drives/electric-motors/motion-control-motors/simotics-s.html

4. https://assets.new.siemens.com/siemens/assets/api/uuid:b6bf2d53-f062-4ecf-9197-bcc7666ca2a9/SIM MC-Motors-Brochure.pdf