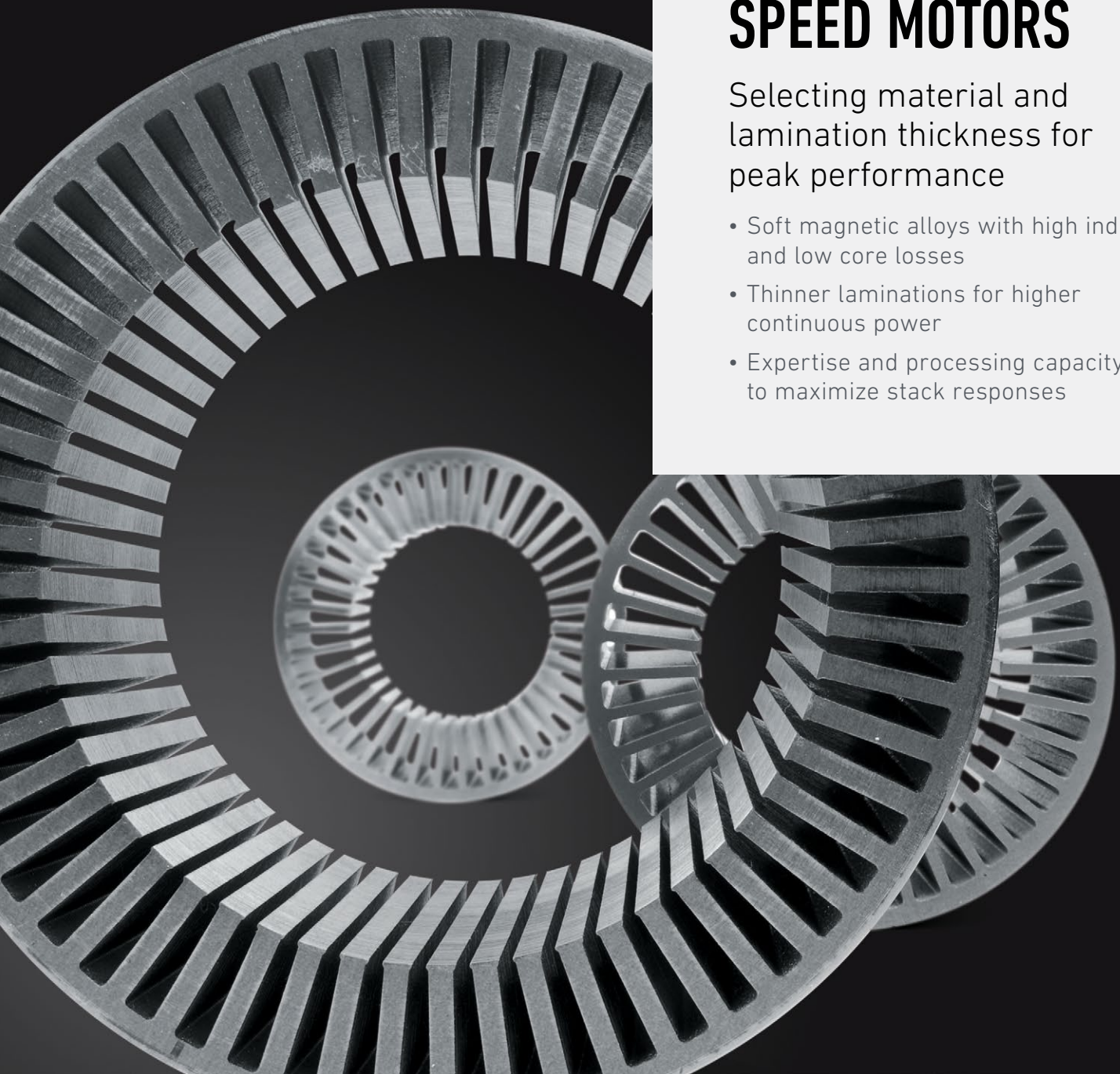
CARPENTER ELECTRIFICATION®

CarpenterElectrification.com

HIGH-PERFORMANCE STACKS FOR HIGH-SPEED MOTORS

Selecting material and lamination thickness for peak performance

- Soft magnetic alloys with high induction and low core losses
- Thinner laminations for higher continuous power
- Expertise and processing capacity to maximize stack responses



CARPENTER ELECTRIFICATION®

Soft magnetic alloys for high-torque, power-dense E-motors

As electric motors become more advanced, the demands on their component materials increase. Enhanced power and torque density, in combination with smaller form factor, are critical for high-speed motors and are made possible by high-performance soft magnetic alloys.

The magnetic properties of soft magnetic alloys depend on their thickness and mechanical response. As motor speed increases, using the correct combination of alloy and lamination thickness is essential to keep iron losses low and achieve the highest possible continuous power density, along with high torque responses.

For high-frequency motors used in the aerospace, defense, automotive, and medical sectors, thinner soft magnetic laminations in stator and rotor stacks help achieve higher continuous power.

REDUCTION IN CORE LOSS AS LAMINATION THICKNESS DECREASES

ALLOY	THICKNESS (MM)	INDUCTION (T) AT 200 OE	CORE LOSS 400 HZ, 1.5 T (W/KG)	CORE LOSS 1000 HZ, 1.5 T (W/KG)
Hiperco® 50A	0.10	2.30	13	44
	0.15	2.30	14	55
	0.25	2.30	21	90
	0.35	2.30	30	141
Hiperco® 50	0.10	2.30	19	52
	0.15	2.30	19	66
	0.25	2.30	24	102
	0.35	2.30	31	159
Hypocore®	0.10	2.00	18	54
	0.15	2.00	21	74
	0.25	2.00	27	122
	0.35	2.00	39	168
High Permeability 49	0.10	1.56	5.3	32
	0.15	1.56	7.5	38
	0.25	1.56	15	82
	0.35	1.56	26	150
Non-oriented Si steel	0.10	~1.90	29	~85
	0.15	~1.90	29	~95
	0.25	~1.90	32	~135
	0.35	~1.90	42	~200

GET MORE FROM YOUR MATERIALS

Carpenter Electrification stocks high-performance soft magnetic alloys with the highest induction available on the market, as well as high permeability and low core losses. Iron-cobalt and nickel-iron alloys are available in a range of standard thicknesses to support various frequencies, and thicknesses can be customized for specific applications.

UP TO 30% HIGHER POWER DENSITY

UP TO 30% SMALLER MOTOR SIZE

UP TO 25% MORE TORQUE

COOLER RUNNING TEMP (20°C OR MORE)

GET MORE FOR YOUR MOTOR

No solution is one-size-fits-all. Carpenter Electrification's team of soft magnetic experts will help you choose the right material, thickness, and stack combination to fit your high-speed motor application. We'll guide you to the best options for optimal output, taking Eddy current and hysteresis losses into consideration.

As a one-stop shop for stator and rotor stack solutions, we will then walk you through prototyping and mass production options to choose the best manufacturing pathway.

Our decades of materials expertise and unique stack processing capabilities maximize your stack responses with the best possible lamination stacking factor—so you can bring next-generation motor solutions to market today.

Contact us for a free consultation

We'll look at induction, magnetic field, and core loss at different frequencies for your motor and conduct preliminary simulations.

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