



Elinco Research and Development
Engineering Department



Elinco JPC Engineering Product Offering



Medical



Industrial/Office



Military

Elinco Product Focus

- Designing High Performance/ High Quality Slotted and Slotless Brushless Motors that meet our customers needs and expectations.
- Building the motors in a Consistent, Quality Conscious & Cost-effective manner

New Product Development Experience

- Our engineering group is made up of engineers with senior level experience and credentials, Masters Degreed engineering at all levels, and all with practical design work in meeting project goals
- Market experience within our design group.
 - Industrial, Office, Defense, Medical, Consumer, Air Handling.
 - This varied experience allows us to look at design solutions from one market and apply the concept to solve issues in another market, yielding a competitive advantage to our customers.
- White paper designs. IE fully custom to meet the requirements of the customer.



Engineering Support and Interface

An engineering department you can reach.

Technical issue, question, concern, you can talk directly to an engineer at Elinco.



A partner and a team member for your engineering team.

Can directly interface with your design/product development team

Reduce back and forth and project cycle time

Provide direct and timely feedback

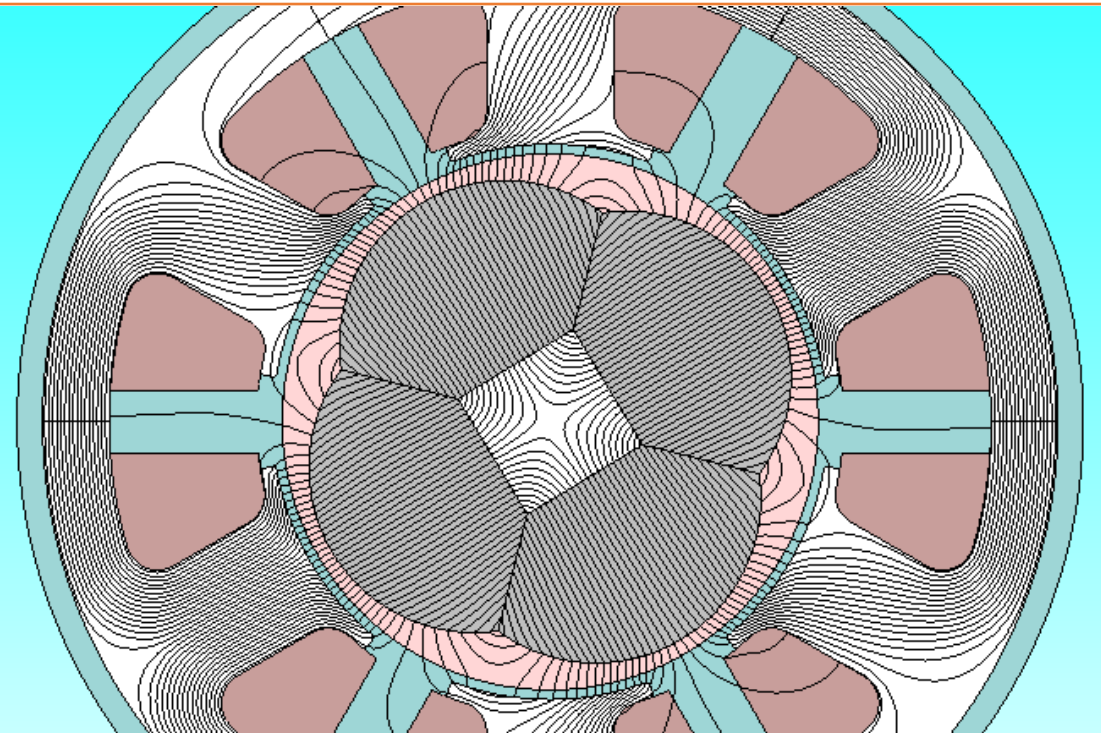
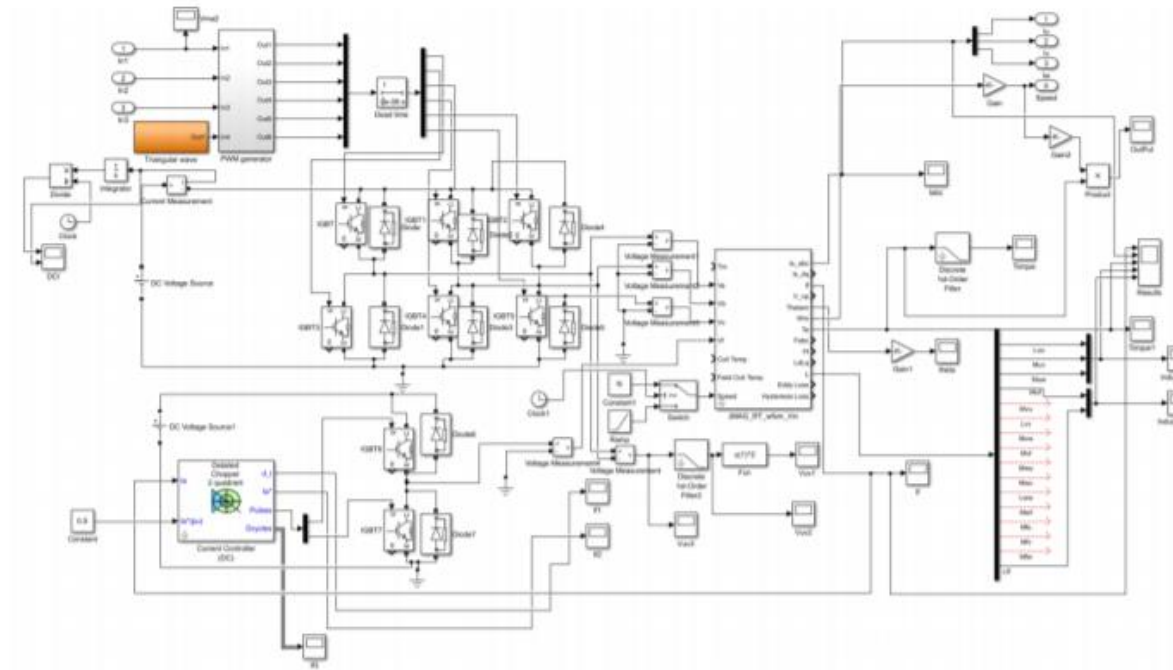
Offering up project ideas that we can do on the motor end to:

- Save cost
- Increase Quality
- Reduce build time.

Creates an open and direct dialog between engineers to solve design challenges

Design and Build Capabilities

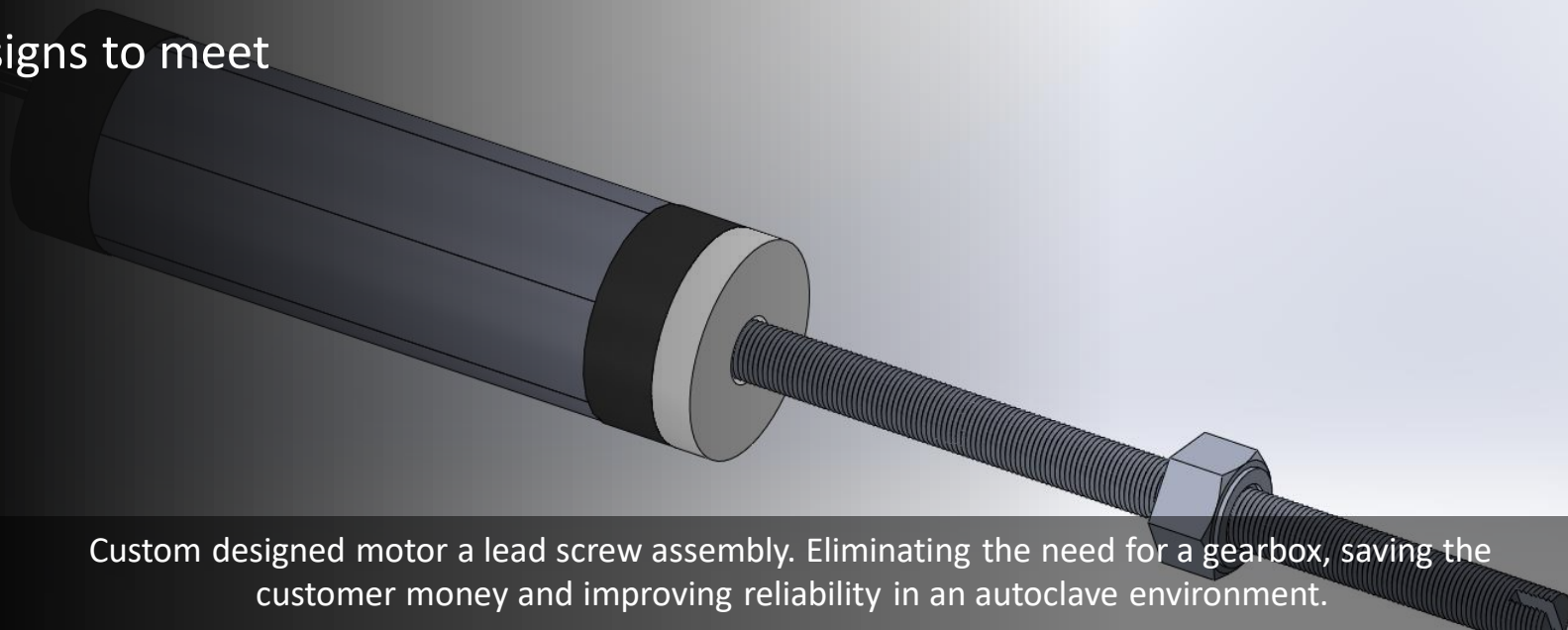
- Design capabilities:
 - FEA
 - Magnetic
 - Mechanical
 - Solid modeling design
 - Custom MatLab Simulink blocks for system design modeling
 - Failure mode analysis
- Build capabilities
 - Highly custom to stock part
 - ISO 9001 facility
 - Unmatched quality
 - Strong US, and friendly nation-based supply chain to ensure business continuity for our US based production facility



Application Specific Designs

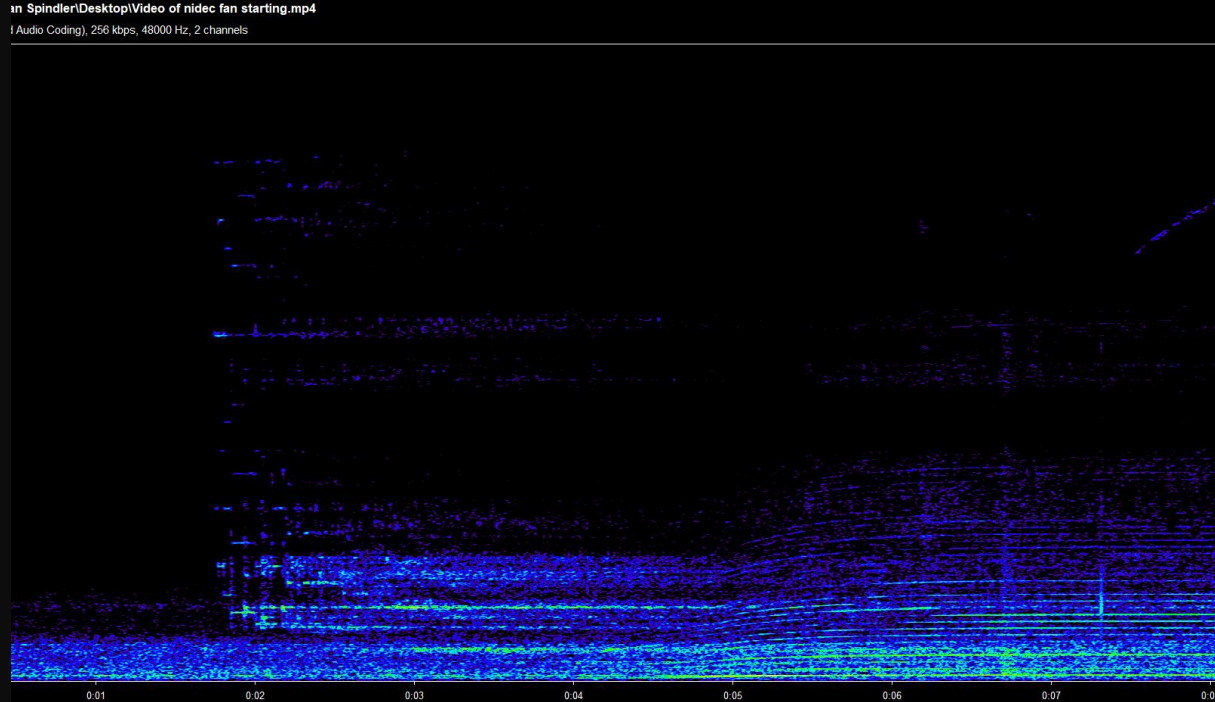
Customized to be a high-volume low-cost frameless motor, With superior performance and quality.

Elinco is capable of customizing designs to meet customer requirements



Custom designed motor a lead screw assembly. Eliminating the need for a gearbox, saving the customer money and improving reliability in an autoclave environment.

Product Advantages



- Smaller package by use of higher energy materials
- Magnet retention:
 - Embedded magnets for simple manufacturing, elimination of the need for a rotor speed, improved part to part rotor balance consistency
 - Surface mount magnet for the design that need that little bit extra
- Product can be sold as framed, frameless, or integrated into a custom housing of the customers' design.
- Magnetic designs optimized for the criteria that make our customers successful.
 - Power density
 - Noise
 - Weight
 - Cost
 - Vibration
 - Efficiency

Elinco Electronics Capability

- Medical
- Industrial
- Military
- Aerospace








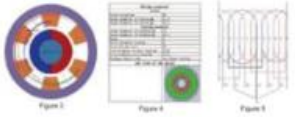
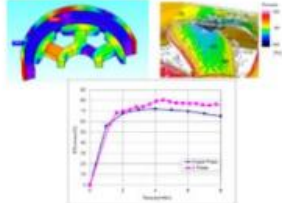



Elinco Electronics Capability

We manage all design documentation using Solidworks PDM. This includes the following: -Part models and prints -Assembly models and prints -Schematics for PCB, Gerber file for PCB build, Assembly drawings for parts on the PCB. -Code for PCB (stored here)

Sourcing is done by our Strategic Sourcing Manager and the information on who we are working with is stored in the MRP Module. QA is taken care of by Director of Manufacturing Operations through the MRP module.

VALUE ADDED MANUFACTURING

Elinco value-added manufacturing offer our strong capability to manufacture motors specific to your environmental, mechanical, and dimensional requirements. Value Added Manufacturing for motors include pulley and coupling installation, encoders, gearboxes, special shafts, dampers and more.

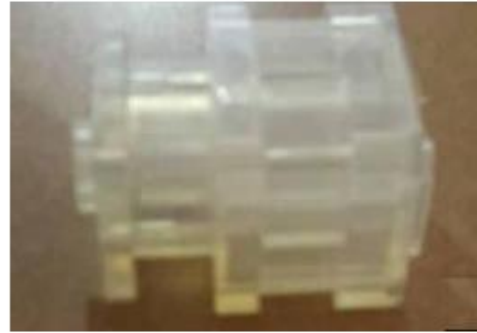
<p>Encoders</p>  <p>Verification & Accuracy with Encoders</p>	<p>Vibration</p>  <p>Resonance & Vibration with Dampers</p>	<p>Gearboxes</p>  <p>Precision Gearbox Options.</p>	<p>Intelligent Motors with Electronic Design</p>  <p>Intelligent Motors with Electronic Design</p>
<p>Shaft options</p>  <p>Many Shaft options easily and quickly Configured</p>	<p>Custom Housings</p>  <p>End Bell Design</p>	<p>Customized Windings</p>  <p>Semi-Custom or Custom</p>	<p>Electro-Mechanical Design</p>  <p>Software Analytics Neodymium, Ferrite, or FCC Magnets</p>
<p>Thermal Analysis</p>  <p>Fluid Dynamic analysis Vibration analysis Magnetic field analysis/ circuit design Strength analysis Electrical Power force calculation Mold-flow analysis</p>	<p>Enviromental Proection</p>  <p>Standard Coating, E-Coating, Various IP Ratings</p>	<p>Bearings</p>  <p>Bearings</p>	<p>Connectors & Wiring</p>  <p>Special Lead wires and Connectors</p>

ELECTROMECHANICAL SUB-ASSEMBLIES

From Prototype to Production **Elinco International JPC** is your Single-Source Supplier for Contract Manufacturing and Electromechanical Subassembly requirements. Our custom engineered OEM solutions utilize expertise in process controls of precision components, gearing, assembly, testing, of precision motion control build to print as well as best practices. Factories in Asia are ISO certified. US factory is ISO compliant working toward certification.

OUR CORE STRENGTHS ARE:

- Contract Manufacturing – Motion Control Assemblies
- Precision positioning and motion systems
- Fine-pitch, custom, and standard gearing experts to AGMA
- Specialists in gears, bearings, motors, precision assemblies
- Unique engineered solutions from initial design to production
- Manufacturing excellence and ultimate quality
- DFMEA, PFMEA, FAI, PPAP, Control Plan
- Reliability in design, and total partnership with our customers
- Vertically Integrated Manufacturing
- Manufacturing and Assembly of small to large Motion Control and Electro-Mechanical Assemblies



INTERNATIONAL STANDARDS ON MEDICAL ASSEMBLIES

- ISO 13485(MDD): Management system for medical devices
- IEC 60601-1-1: Medical equipment and electrical equipment
- IEC 60601-1-2: Electromagnetic compatibility for medical devices
- IEC 60601-2-24: Safety of infusion pumps and controllers
- ISO 14971: Application of risk management to medical devices
- IEC 62304: Medical device software – software life cycle processes

Product Overview and Roadmap – Slotless BLDC

Medical
Industrial
Military
Aerospace

Slotless SBLDC – SL Series Performance

Motor Sizes. Speeds and Power Out.

-Commonality of Parts across three product lines.

-Designs can be made for any size and power output to meet customer requirements.

-Other Diameters can be considered for good OEM designs utilizing our Technology.

Motor OD	13mm	25mm	30mm	36mm	44mm
Operating voltages	150 Max	150 Max	150 Max	150 Max	150 Max
Operating speeds	50k Max	50k Max	50k Max	50k Max	50k Max
Torque	64 oz-in max	120 oz-in max	167 oz-in max	220 oz-in max	325 oz-in max
Drop in Resistance over Swiss competitors	5% to 25%				

Slotless SBLDC – HE Series High Efficiency

Motor OD	13mm	25mm	30mm	36mm	44mm
Operating voltages	150 Max	150 Max	150 Max	150 Max	150 Max
Operating speeds	50k Max	50k Max	50k Max	50k Max	50k Max
Torque	64 oz-in max	120 oz-in max	167 oz-in max	220 oz-in max	325 oz-in max
Drop in Resistance over from former SL series	10% to 50%				

Slotless SBLDC

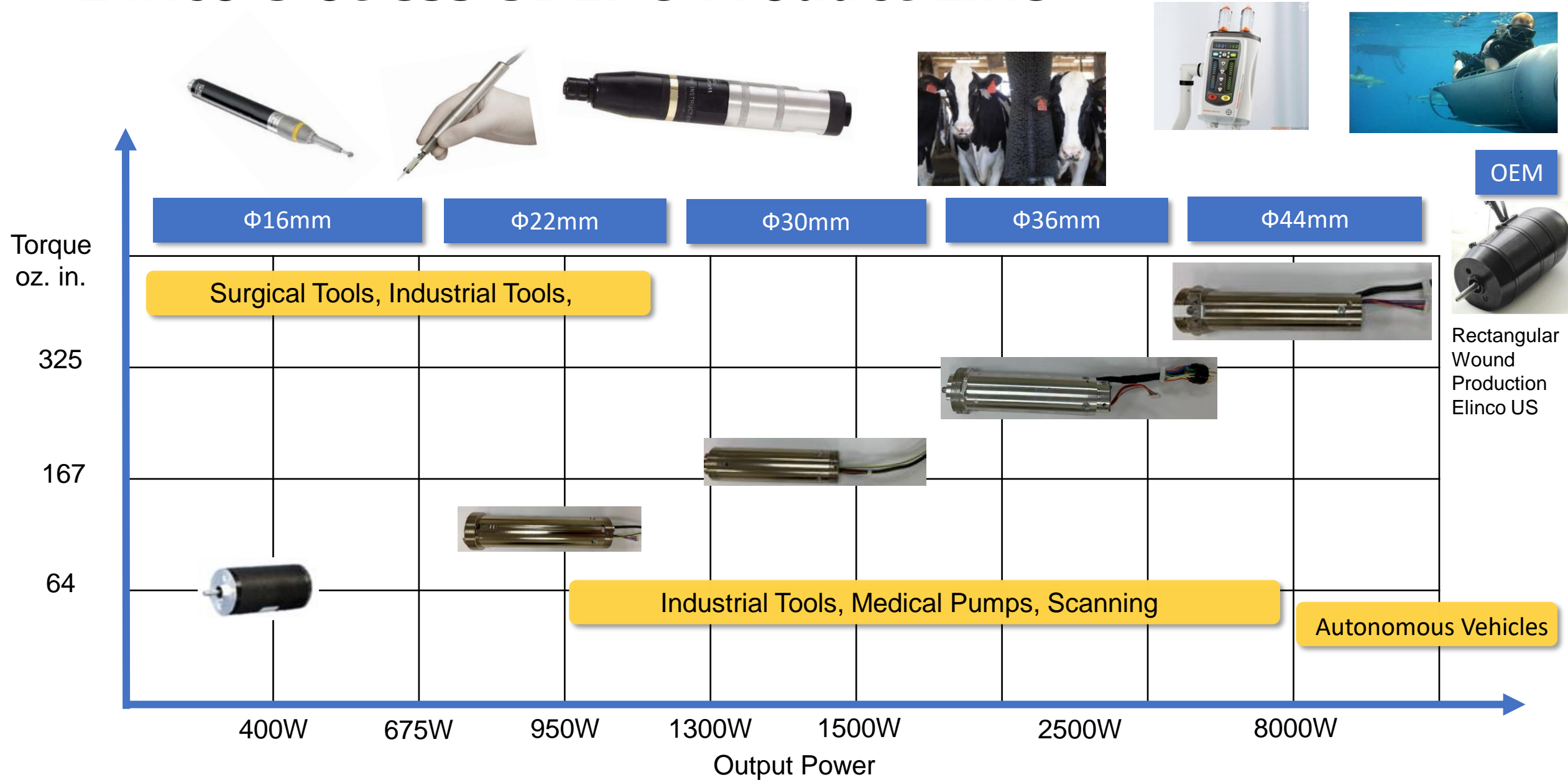
Elinco Bobbin vs Elinco Bobbinless HE Series

Housed Size	16mm DC	30mm	30mm	35mm	35mm	40mm	40mm	48mm	48mm
Voltage Range	12V-360V	12V-360V		12V-360V		12V-360V		12V-360V	
Operating Voltage	20V DC	20V DC	320V DC	20V DC	320V DC	20V DC	320V DC	20V DC	320V DC
BEMF @ 1800RPM	2.3	2.85	25.05	25.15	3.52	24.12	23.87	9.47	27.31
Resistance LL	1.6	0.122	11.39	5.99	0.045	1.51	1.56	0.078	0.881
Inductance LL	0.5	0.051	4.71	2.65	0.035	1.53	1.54	0.088	0.61
HE* estimated values									
BEMF @ 1800RPM	2.2	2.85	25.33	24.53	3.626	24	24	9.89	27.31
Resistance LL	1.45	0.084	5.8	3.87	0.025	1.36	1.36	0.053	0.798
% drop in resistance from STD	-37.16	-31.15%	-49.08%	-35.39%	-44.44%	-9.93%	-12.82%	-32.05%	-9.42%

Slotless BLDC HE New Series Specs

- Medical
- Industrial
- Military
- Aerospace

Elinco Slotless SBLDC Product Line



OEM



Rectangular Wound Production Elinco US

Typical size ranges Speeds and Power Out

-Commonality of Parts across three product lines.

-Designs can be made for any size and power output to meet customer requirements.

-Other Diameters can be considered for good OEM designs utilizing our Technology.

VH Series Line up

Sourced – Needle Wound (2010)

NEMA Size	8	11	14	16	17
Operating voltages	150 Max	150 Max	150 Max	150 Max	150 Max
Operating speeds	10k Max	10k Max	10k Max	10k Max	10k Max
Torque	6 in- lb max	9 in- lb max	14 in- lb max	19 in lb max	20 in- lb max
NEMA Size	23	24	34	42	
Operating voltages	150 Max	150 Max	150 Max	150 Max	
Operating speeds	10k Max	10k Max	10k Max	10k Max	
Torque	60 in- lb max	60 in- lb max	240 in- lb max	790 in lb max	

Slotted BLDC – SH High Performance Line up (2021-2022)

Ramping 2021 - 2022

NEMA Size	8	11	14	16	17
Operating voltages	150 Max	150 Max	150 Max	150 Max	150 Max
Operating speeds	10k Max	10k Max	10k Max	10k Max	10k Max
Torque	6 in- lb max	9 in- lb max	14 in- lb max	19 in lb max	20 in- lb max
NEMA Size	23	24	34	42	
Operating voltages	150 Max	150 Max	150 Max	150 Max	
Operating speeds	10k Max	10k Max	10k Max	10k Max	
Torque	60 in- lb max	60 in- lb max	240 in- lb max	790 in lb max	

Slotted BLDC

Elinco Slotted vs Elinco US Slotted HE Series

Housed Size	Nema 8	Nema 11	Nema 14	Nemz 16	Nema 17	Nema 23	Nema 24	Nema 34	Nema 42
Voltage Range	12V-360V	12V-360V	12V-360V	12V-360V	12V-360V	12V-360V	12V-360V	12V-360V	12V-360V
Operating Voltage	22mm	28mm	36mm	39mm	42mm	52mm	57mm	80mm	110mm
BEMF (Vrms/Krpm)	2.65		2.85	4.35	4.6	3.5	5.2	8.7	9.12
Resistance LL	11.6	4.63	0.93	1.3	0.4	0.35	0.2	0.25	0.042
Inductance LL (mH)	4.3	3.0	1.3	0.8	0.3	1.2	0.25	1.3	0.283
HE* estimated values					In Development			In Development	In Development
BEMF @ 1800RPM					4.5			Data in Process	Data in Process
Resistance LL (Ohm)					0.5				
% drop in resistance from STD					TBD			TBD	TBD

Slotted BLDC HE New Series Specs

- Medical
- Industrial
- Military
- Aerospace

Elinco Slotted BLDC (China)



Nema 8 Nema 11 Nema 16 Nema 17 Nema 23 Nema 24 Nema 34 Nema 42

mNm

325

167

24

Medical, Automation

Industrial Equipment, Automation

Military, Aerospace

OEM
Slotted
Brush
type



8W

15W

40W

131W

141W

280W

942W

Output Power