Helix | The Electric Powertrain Experts

Dr Mike Bolen 2025

25 YEARS
Powertrain Advantage

Our History – 27 Years of Innovation

- Founded in 1998, Helix has a long history of pushing the boundaries of electric powertrain technology.
- We have consistently delivered cutting-edge solutions for a wide range of applications.
- Our commitment to innovation has earned us a reputation as a trusted partner for high-performance electric solutions.

1998

Founded as an Internal Combustion Engine Consultancy, by former **Cosworth engineering** management team, who remain directors / shareholders

2009

Awarded contracts for the design and development of **a family of motors for a hybrid supercar and Formula E racing car**

2013

Contract to produce a hybrid motor and **Formula E** derivative; **First 'Ultra-Premium Motorsport' client** contract

2014

Supply of electric motors into 'premium' applications, achieving power densities greater than 20kW/kg continuous

2018

Powertrain for the Pikes Peak **VW Motorsport I.D. R race car** – Helix wins the prestigious **Dewar Trophy**

2019

Production awards for five high-profile hypercars, including the **Aston Martin Valkyrie** and **the Lotus Evija**

2020

Opening of the Shenley Technical Centre – Helix's brand-new world-class **engineering and manufacturing facility capable of producing 10,000upa**

2025

Launch of the **Helix** rebrand; Majority ownership stake **acquired by MiddleGround Capital**, accelerating Helix's growth strategy and production capacity

Powertrain Advantage

Who are Helix?

- Since 2009, Helix has been designing and manufacturing ultra-high-performance radial flux electric motors & silicon carbide motor controllers
- Helix products have achieved 30 kW/kg peak and 24 kW/kg steady state
- ~200 employees across 3 sites, all based in Milton Keynes, UK
- Annual turnover of £40M ($53M) in 2024
- All Helix products are UK manufactured & assembled
- Public domain applications include Formula E, Lotus Evija, Aston Martin Valkyrie, and propelled the VW IDR Pikes Peak vehicle to outright record victory
- In addition to the applications mentioned above, Helix has featured in many other cross-sector confidential customer applications

FIA Formula E Championship
72 vehicles | 0-60mph ~2.5-3sec
(various vehicle average)

Lotus Evija
130 vehicles | 0-60mph <3.0sec

VW I.D Pikes Peak
2 record-breaking vehicles
0-60mph 2.2sec

MiddleGround Capital

MiddleGround Capital is a private equity firm headquartered in Kentucky, USA that invests in B2B companies in the automotive, industrial and speciality distribution sectors in both Europe & the USA.

Helix

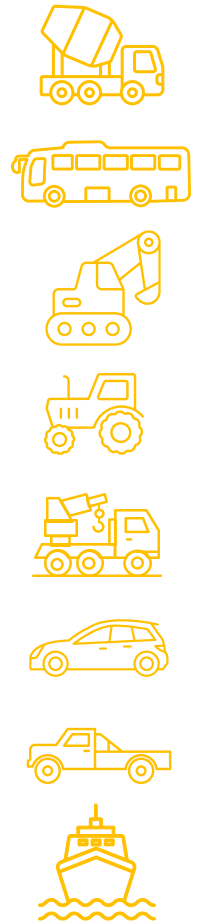
Designer and manufacturer of powerful, compact & efficient electric motors & motor controllers

Xtrac

World leading supplier of high-performance transmissions for ICE, EV, & hybrid vehicles

New Eagle

Trusted cross-sector engineering partner and supplier for electronic systems and control software



TRANSMISSION TECHNOLOGY

TAKE CONTROL

Global Presence

Helix has:

- A **highly diversified sector base** with global OEM partners
- Built a strong reputation for **performance** & **reliability**
- A detailed **investment** & **growth** plan in **new territories**
- Its **first overseas office** in the US opened April 2025

Helix & Scalability Technology

Definition:

Scalability is the property of a system to handle a growing amount of work.

One definition for software systems specifies that this may be done by adding resources to the system.

In an economic context, a scalable business model implies that a company can increase sales given increased resources. FedEx more delivery vehicles more packages, maybe. However, if all packages had to first pass through a single warehouse for sorting, the system would not be as scalable, because one warehouse can handle only a limited number of packages.

Helix is Scalable in two ways…..scalable motor technology and separate manufacturing facilities

Locations

Headquartered at our Shenley Technical Centre in Milton Keynes, UK.

- A purpose built 59,000 sq ft advanced manufacturing facility completed in 2020.
- Volume production of Motors and Inverters
- Research & Development Facilities
- 8 purpose built regenerative test cells
- Warehousing & stores
- Offices and general administration

FMF (Flexible Manufacturing Facility)
Milton Keynes
20,000 sq ft
Dedicated to flexible manufacturing of low volume products

Emissions and Climatic Test Centre
Milton Keynes
24,000 sq ft for ICE and e-Drive
Climatic Testing
(Sister company within the group)

Helix Motors

Configured to order scalable electric motors featuring the latest state-of-the-art electromagnetic technology

25 YEARS

Powertrain Advantage

Helix | Scalable Core Technology

SPC

SP*X*

SP*X*330 PLATFORM
(150-2000kW, 400-3000Nm, up to 6krpm)

SP*X*242 PLATFORM
(120-1400kW, 200-1500Nm, up to 17.5krpm)

SP*X*177 PLATFORM
(100-600kW, 100-500Nm, up to 30krpm)

Common, <u>scalable</u> architecture

Key to product abbreviations

SPC

- Scalable Core Technology made accessible at scale
- Designed for high volume manufacture

SP*X*

- Scalable Core Technology **where performance matters** delivered from Helix's X-Division
- **Fully Custom** Products where the **Ultimate performance** is required

SP*X*242-94

SP*X*242-50

Scalable Core Technology Platform – [SPX]

Series	Model	Peak Power [kW]	Continuous Power [kW]	Peak Torque [Nm]	Continuous Torque [Nm]	Mass [kg]	Max Speed (rpm)
SPX	177-45	150	120	120	77	13.7	23500
	177-80	250	200	200	135	19	23500
	242-50	250	203	250	165	23.2	17000
	242-94	400	300	470	286	31.3	17000
	242-175	400	300	925	566	51	8700
	330-75	210	210	670	600	48	6000
	330-95	400	300	1000	615	51.4	6000
	330-150	250	208	1670	1268	67.8	2000

Core DNA

Common, scalable architecture

Scalable Core Technology Platform – [SPC]

Series	Model	Peak Power [kW]	Continuous Power [kW]	Peak Torque [Nm]	Continuous Torque [Nm]	Mass [kg]	Max Speed (rpm)
SPC	177-40	150	98	105	60	16.2	23500
	177-80	250	187	210	124	21	23500
	177-160	320	293	410	258	30.6	23500
	242-50	250	172	270	161	26.9	17000
	242-100	400	300	495	297	38.4	17000
	242-175	600	481	975	606	56.6	17000
	330-75	255	244	670	633	49.2	6000
	330-150	650	590	2000	1267	73.4	6000

Core DNA

SPC177 Platform *SPC242 Platform* *SPC330 Platform*

Common, scalable architecture

How Helix Compares…

"Where space and weight is at a premium, Helix can provide a more powerful, lighter, and smaller electric powertrain"

Product/Technology Overview

A range of fully scalable high power density electric motors, inverters and EDUs are engineered and manufactured in-house for single-source expertise, cost efficiencies and simpler integration.

A diverse range of high-performance radial flux motors

- Class leading power and torque density.
- Leverage Helix intellectual property.
- Utilise patented cooling and rotor technology.

State-of-the-art, SiC high-voltage inverters

- Class leading in current output for package size & mass
- Leverage in house electronics and software intellectual property.
- Benefits to efficiency and control dynamics are realised when matched to Helix motors.

Integrated motor, inverter and transmission (EDU)

- Designed to be class leading in power & torque density
- Work with OEMs and Tier 1 suppliers.
- Optimised for high efficiency across specific duty/drive cycle.

Expert electric powertrain consultancy services

- Class leading in house design and development
- Sector specific powertrain experts
- Leverage advanced simulation tools
- State-of-the-art testing facilities & methodologies

Helix | Trusted by World Leading Brands

Aston Martin Valkyrie - Hybrid

Mass: 20.7 kg
Max Power: 100 kW
Max Torque: 280 Nm
Max Speed: 11,500 RPM
Peak Efficiency: >98%

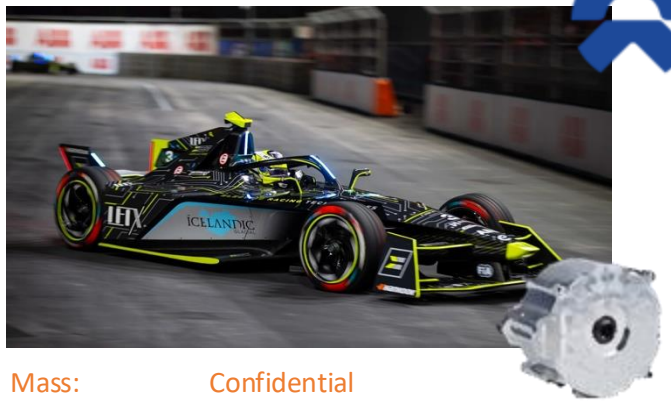
Lotus Evija - BEV

Mass: 88 kg
Max Power: 735 kW
Max Torque: 850 Nm
Max Speed: 17,000 RPM
Peak Efficiency: >98%

Triumph TE-1 - BEV

Mass: 15 kg
Max Power: 130 kW
Max Torque: >100 Nm
Max Speed: 25,000 RPM
Peak Efficiency: >97%

KIRO Race Co Formula E - BEV



Mass: Confidential
Max Power: 350 kW
Max Torque: Confidential
Max Speed: 21,000 RPM
Peak Efficiency: >98%

VW I.D R Pikes Peak WINNING BEV

Mass: 23.7
Max Power: 365 kW
Max Torque: 430Nm
Max Speed: 17,000 RPM
Peak Efficiency: >98%

Czinger 21C - Hybrid

Mass: 13.8
Max Power: 150 kW
Max Torque: 115Nm
Max Speed: 17,600 RPM
Peak Efficiency: >98%

Sectors and applications we supply

Aerospace

Automotive

CVOH

Marine

Defense

Motorsport

Integrated Units Example Case Studies

Production E-Axle for Lotus Evija

Low volume production vehicle

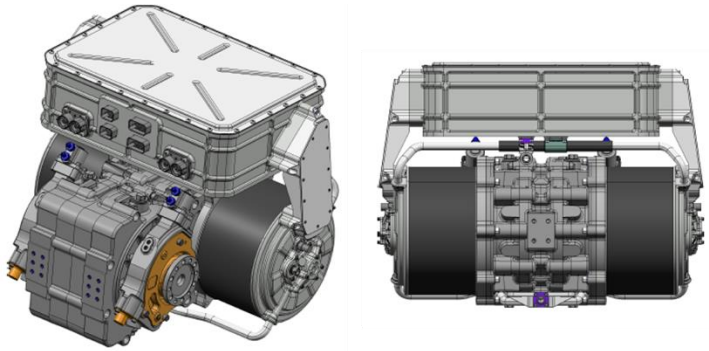
Low volume production vehicle

eVTOL and eSTOL propulsion system

Motor and Inverter for VW.ID Pikes Peak race

McLaren, Hewland and Helix R&D concept

Motorsport application (Motor and GB only)



Concept for High Performance BEV (Full EDU with SiC MCU)

X-Division

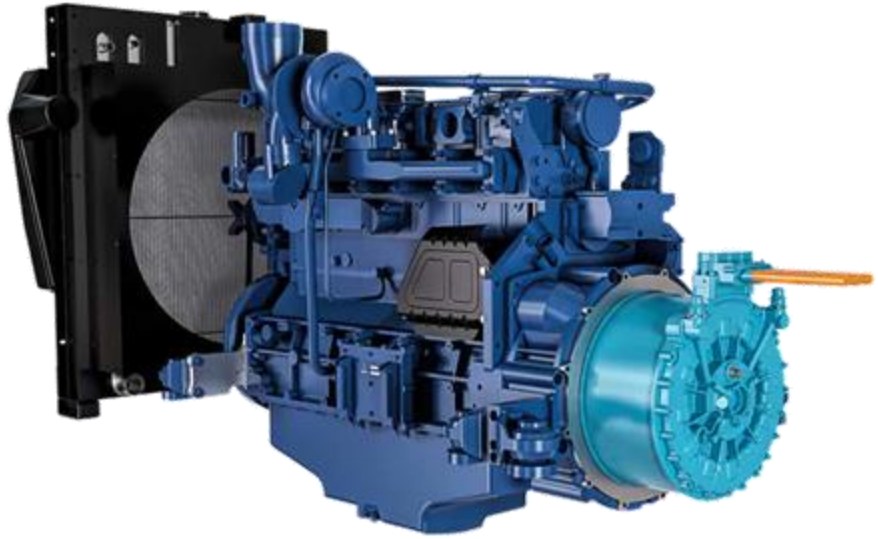
helix

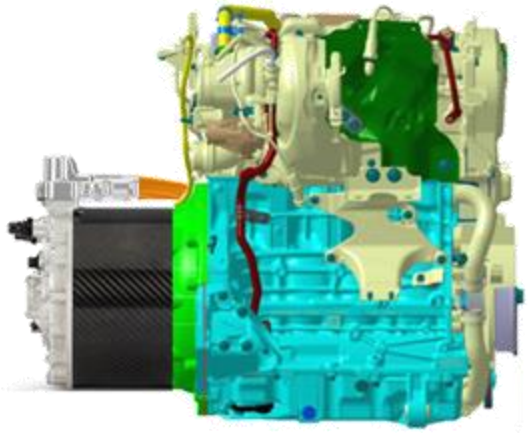
Evolving Helix DNA to give you future powertrain advantage.

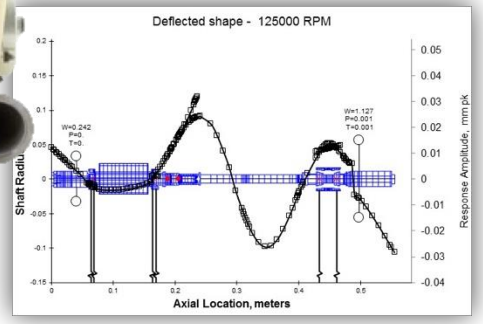
25 YEARS
Powertrain Advantage

Application Engineering - Series-Hybrid

- Helix has delivered very high-power density 200kW generators for series-hybrid applications in marine
- Developing systems with lead Clients in Defense, Aerospace, Marine and Automotive for generators in the 40kW – 1MW range.





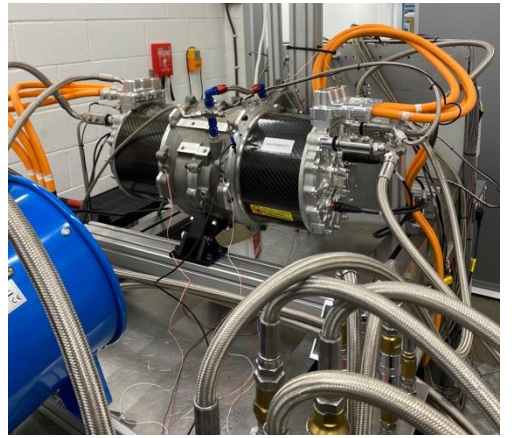


Testing Capability

Current Facilities

- 7 active test cells operational for component/product level testing MGUs, MCUs & full EDUs and EPUs:
  - 6 cells dynamic loading
  - 1 cell rig-based (environmental, pressure & current cycling)
- 6 PSUs on a distributed & selectable DC bus
  - Drive cabinets offering up to 550kW at 1000VDC & ~600A continuous.
- 160kW Chiller
- Testing conducted
  - Performance validation testing; Const. Power, Inst. Power, Durability testing to clients req., Efficiency mapping & Reg 85 certification.
  - Test to failure; Overspeed, Pressure & Thermal cycling.
  - Static testing; Isolation resistance, HIL rig for power electronics (with dSpace), ACI rig, Tooth winding studies, PDIV & In-house NDT laboratory.
  - Environmental testing in accordance with ISO 16750/19453-3 2023, MIL 810 & DO-160:
  - IPX7 tank
  - Test chamber for temperature, pressure & torque cycling (temperature range: -72 to +200degC)

External partners: Combined environmental, Chemical, Fungal, IPX, EMC/ Resilience, Vibration & shock testing



Thank you

Questions ??