



# High Performance e-Drive Systems

engineering the future

# Committed to being the best

Electric drives are evolving and we are passionate about maintaining technology leadership in our business. At the premium end of the market we are pushing to ever increasing power density with internal projects and to assuring compatibility with hostile environments.

Other recent innovations include a precision winding system for low-cost, high-volume 14-48V machines and a 48V inverter capable of 30kW weighing under 350g.

The lessons learned from these and other R&D activities are continuously incorporated into our core technologies keeping our products at the top as the market evolves.

## Scalable Core Technologies; our competitive advantage

### What are core technologies?

Our motors are a combination of technologies which we have developed and validated through R&D so that they can be applied with high confidence to new projects.

These 'core technologies' cover materials, mechanical design, electromagnetics, insulation system, thermal management, windings, high frequency loss mitigation, inverter power stage and software and controls.

In each case the technology is understood from design through supply base and manufacturing process. By having these technologies on our 'shelf' we can respond rapidly and with confidence to create products that match your needs.

### Current platform derivatives

Integral e-Drive currently has a wide range of existing platforms ranging from a high volume engineered 14-48V IPM with integrated inverter to a 130,000 rev/min ultra-high-power density family designed to work with turbo machinery.

By changing active length and the core technology package within these existing platforms we can cover a wide range of applications from 2kW to more than 500kW with different voltages and performance requirements.





# Discover intelligent e-Drive solutions

## Core technology bespoke drives

A true differentiator of our business is the capability to configure our core technology to meet your precise performance and package requirements. Using our Advanced Intelligent Design (AID) tool-set we can achieve a fully customised product with high confidence and within tight timescales.



**'Our Core Technology Bespoke drives uniquely enable us to hit the specification 'bullseye' with confidence'**

*Luke Barker, Director*

## Special projects

Occasionally there are projects where a client requires a specification that is not fully compatible with some of our core technologies. Our dedication to meeting client needs and our proven ability to engineer from first principles means we are usually able to propose a solution either by modification of core technology or substitution of a new approach to some aspects.



*120kW Ultra High Speed e-Booster weighing 3.7Kg.*



*DLA platform motor/inverter for road car, aerospace and premium racing applications up to 400Nm, 300kW.*



*High performance, efficiency and power dense product platform, designed at rule level, validated through R&D.*

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# A revolution in motion

Electric machines have been undergoing a major transformation. Semiconductor technology, processing speed and mastery of mechanical, thermal and electromagnetic design are enabling enormous power to be deployed flexibly in small spaces with exceptional efficiency and controllability.

Our mission at Integral e-Drive is to engineer and supply the highest performing electric drive systems configured precisely to our clients' requirements.

The electric revolution started with the desire for sustainable power; now it is the key to a world of amazing products.

## The right solution

What is the optimal solution for you?

At Integral e-Drive we are passionate about applying our world class technology to make your products exceptional.

You will find us focussed on understanding your specific product requirements so that we can propose a specification and project delivery model that works for your business.

## Applied

Our background in powertrain engineering in automotive, motorsport and aerospace markets means that we understand the OEM environment. Interfacing effectively with your project management, engineering, quality and manufacturing functions and systems our applications team will help you to achieve robust and cost-effective delivery.

***'With a 20 year track record of powertrain engineering, our ability to engineer motors into demanding applications is second to none'***

*Roger Duckworth, Director*

## Supplied

Integral e-Drive completed its first full lifecycle supply to an OE (concept to end of production) between 2009 and 2016 placing it among a very small number of suppliers of advanced electric drives with this experience. We can provide you with a quality assured, dependable manufacturing solution.





## From concept to manufacture



### Validated product

From advanced CAE tools, through state-of-the-art inspection equipment to a range of efficient rigs designed to push our products to the limits, our e-Drive technical centre is fully equipped to support our expert teams on the journey from idea through validation of production representative prototypes and into production.

Drawing on our experience of automotive best practice you will find engineering, supplier management and manufacturing activities managed within an industry standard quality process.



### Niche/specialist manufacture

Small numbers of bespoke machines are typically handled in our prototype build facility. Since this is designed for validation builds the process control and component traceability supports a much higher quality level than would normally be available at this volume point.

### Low volume manufacturing cells

We supply low volume series production (up to approximately 10k UPa) through our own efficient manufacturing cells. By focussing on compatible prototype and production manufacturing processes we ensure a smooth transition into production whilst the increased volume of similar product allows streamlining of production operations, logistics and quality systems. The result is high performance product delivered cost effectively to automotive quality standards.

### High volume production

Integral e-drive has designed machines and inverter systems for high volume automotive products including optimisation of component and process costs and direct liaison with supply base and manufacturing plant. A high-volume production solution usually depends on capital, timing and logistical requirements particular to each opportunity; we look forward to understanding your requirements and recommending how we can help.



*SuperGen 5-25kW motor with integrated inverter.  
Designed for production of 400K UPa.*

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*integral*  
e-drive

*integral*  
powertrain