



SCOTLAND ELECTRONICS (INTERNATIONAL) LIMITED

DRIVING SMART DRILLING **Downhole Motion Products**

E-actuation and motion control downwell worldwide use since 2005 on:

- Fishing
- Jarring
- Plugging
- Well Setting
- Flow Control Positioning
- Casing Repair
- Tractors
- Snubbing
- Comms over Power
- Battery Slick Line or E-Line

■ Our company has developed motion products for major blue chip clients in the Oil, Gas, Defence and Aerospace Markets, covering numerous downhole requirements for land, air and sea.

High Performance at system level in motion control systems bringing technical and managerial experience required to deliver the clients application requirements.

■ Development of market relationships with leading high performance motor manufacturers to provide a low risk sub system solution to meet market requirements. SEIL delivered sub system downhole products with specialist motor manufacturers on numerous programs with excellent technical and commercial relationships existing between the companies, working together to provide the end customers requirements.

■ The company strategy is to focus on the key area for the future and ensure continuity of supply to our client base. The company has personnel and resources, which work as a focused, dedicated team to deliver our client's requirements with the capital equipment and application tools to develop and deliver the product. SEIL has developed inertial test rigs for system level applications to test the motor in as near to representative system conditions as possible for specific application requirements. This includes 32000ft E-line cable and temperature testing to +225°C and pressure safety pit.

■ SEIL has full internal servo system, electronic design and manufacturing capabilities to ensure subcontract activity is limited, low risk product performance and meeting delivery schedules. Our approach is based on utilizing proven skills and abilities to ensure best performance.

The scope of work varies depending on clients requirements. We can and have included simulation of system performance, thermal reliability, FMECA, Acceptance Test Procedure, Qualification Plans and Reports for validation and verification requirements and qualification tests for temperature (-80°C to +225°C), vibration, shock and humidity.

SEIL has achieved full temperature and environmental product status on it's down-hole product applications.

SEIL is ISO9001-2010 accredited and manufactures to internationally recognised IPC-A-610 and IPC-WHMA-A-620 as standard.



SEIL Product Overview

SEIL has a series of products to address it's target markets specific application requirements.

The products use common building blocks to provide custom and semi-custom design solutions which minimise risk for any specific application development and maximise product heritage read across for custom designed product solutions.

The Product Series types have been developed and qualified over a range of application programs.

Products are available as semi or fully customised to meet specific program requirements.

- **Series 50 – Stepper** – deployment and position systems
- **Series 100 - DC Brushed** – Multi purpose applications
- **Series 200 - Trapezoidal** – Precision Servo Applications
- **Series 300 - 3 phase Sinewave** – Smooth Torque Applications
- **Series 400 - 2 phase Sinewave** - Smooth Torque Applications
- **Series 500 - Sensorless** – Constant Rotation Applications
- **Series 600 – Linear** – Low Power drive Applications
- **Series 1000 – Motion Control System** – Full Servo Control System

SEIL has over 300 downhole drives operating in the field.

Its products and application service include:


- Custom and semi-custom application
- Product provision testing
- Cable operation of up to 10km from HV surface power supply
- Provision of comms over power systems
- Surface software to provide a user interface

SEIL has the ability to provide Bench Tests of loaded Motors for application simulation and Environmental Temperature Qualification of up to 225°C

SEIL'S ability to provide a customised solution based on it's proven harsh environment technology provides an ideal match with potential tool system application providers.



Downhole Product Electrical Actuation



150 °C Downhole Motor Drive Electronics shown 2kW with Communications over Power and Down-hole Housekeeping Power Supply Generation. Status reporting for Motor Speed, Motor Current, Down-hole Temperature and Drive Supply Voltage.

SEIL's manufacturing services come from a background of supporting the company own designed product and applications for Oil and Gas products. SEIL has designed and delivered down-hole drive technology providing as slim-line integrated custom and semi custom products for numerous Oil and Gas applications.

SEIL's application experience includes

- 10km cable operation
- Temperature Qualification and screening testing to 175°C and 225°C
- Comms over Power operating with high voltage Motor switching applications

A picture portfolio is shown demonstrating the products and application support services provided from the SEIL customised product range for some of our previously delivered down-hole Oil and Gas applications

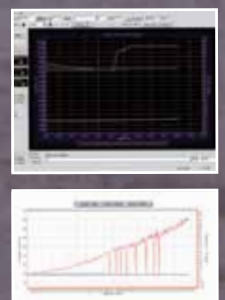
175 °C Downhole Motor Drive Electronics shown 2kW Motor Drive with Down-hole House-keeping Power Supply Generation. Automatic Voltage detection and Power On Operation with Start Ramp.



Motor Loading with Oil Immersion for bench test and acceptance of drive and subsystem delivered products.



SEIL can perform bench testing of motor drive subsystems with the capability to evaluate the tool operation under bench test conditions.



SEIL can provide "Topside" Controllers to provide a hardware interface for PC Communications to the Cable System. SEIL additionally can provide the PC Based Topside Software available configured for the specific customer application requirements.

SEIL Reconfigurable Technical Demonstrator / Bench Test Products



200-3446 270V/ 5A, 3PH Trap Drive



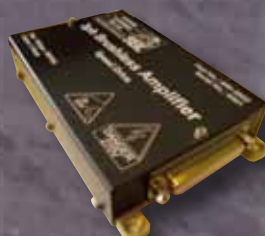
200-3888 28V/ 25A, 3PH Trap Drive



200-3793 28V/ 10A, 3PH Trap Drive



400-3718 270V/ 5A, 2PH Sine Drive



200-3892
270V/ 5A, 3PH Trap Speed Drive



Sensorless Drive



200-3799 270V/ 2A, 3PH Trap Drive

SEIL has available standard, reconfigurable at factory, solutions which provide the ability to deliver a quick turn configured for application solution to meet customer development program requirements.

Product solutions are delivered with a unique product identification to provide configured repeatable product.

These products are targeted at customer's requiring a "customised for Application Motor Performance" solution to assist with Technical Demonstrator Programs or Bench Test requirements.

The products can be configured for 270V, 100V or 28V range of operation and scaled for 5A, 10A or 30A or intermediate values to provide up to 1kW drive capability.

The drives can be configured, as Transconductance or Speed Controllers, and various options exist for system interfacing control and monitor feedback.

The heritage program products have been delivered in a two to five week timeframe depending on application customisation requirements.

The units are delivered with a product specific Operator's Manual, ICD and release tested against a product specific Acceptance Test Procedure.



Scotland Electronics (International) Limited

Nova House, The Enterprise Park,
Forres, Moray, Scotland, UK, IV36 2AB

Tel: +44 (0)1309 678900 Fax: +44 (0)1309 678909

E-mail: sales@scotlandelectronics.co.uk

Internet: www.scotlandelectronics.co.uk

Registered in Scotland: SC 0113309

