

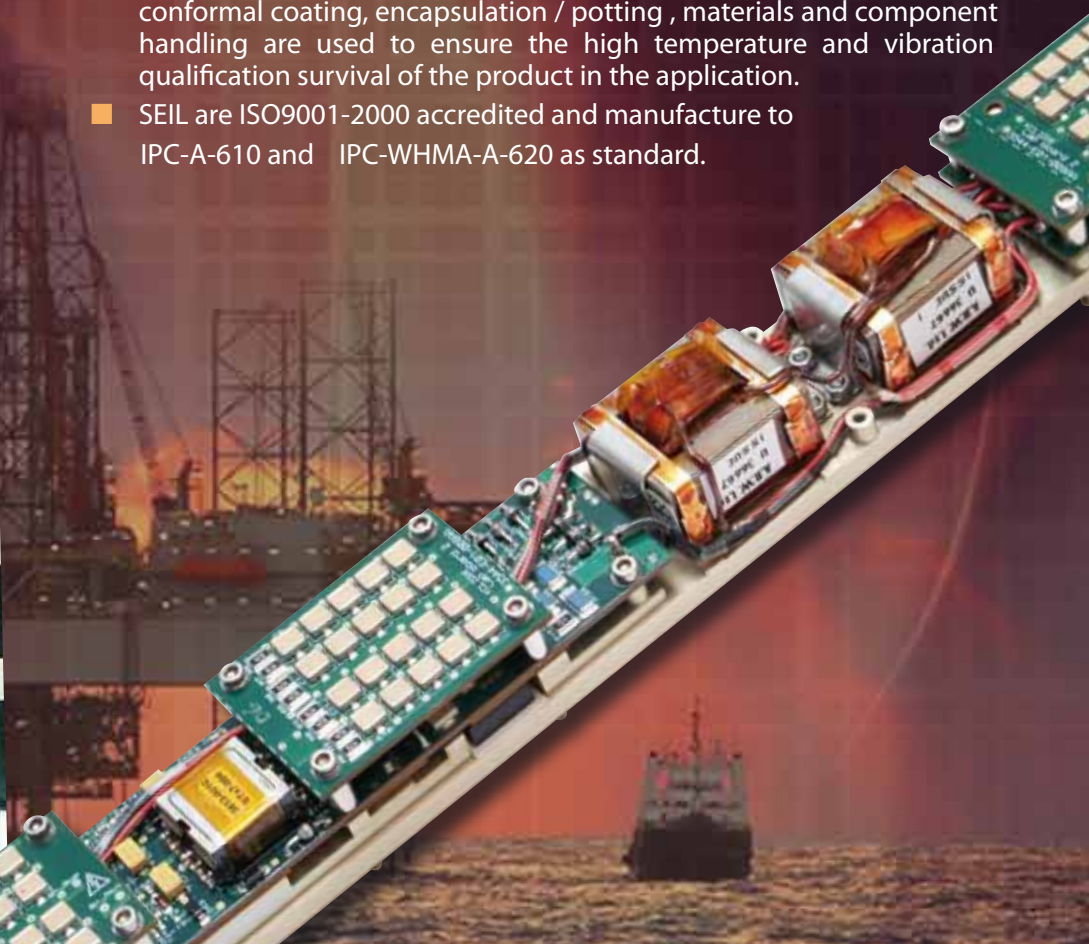


# SCOTLAND ELECTRONICS (INTERNATIONAL) LIMITED

## Oil and Gas Manufacturing Services



- Since 1979, Scotland Electronics (International) Limited (SEIL) design and manufacturing facility located in Forres, Scotland has been supplying a range of quality electronic products to harsh environment markets.
- The company have developed and qualified motion products for major blue chip clients in the Oil and Gas , Defence and Aerospace Markets covering numerous applications for down-hole, sub-sea, seaborne , land vehicle, airborne and aerospace applications.
- SEIL 's own designed motion products have achieved full temperature and environmental product status for down-hole product applications.
- Harsh environment manufacture provide the capability to support the specialist marketplace requirements. The harsh environment products are manufactured and tested by a dedicated, focused, multi-disciplined team.
- SEIL has comprehensive in-house design tools to support PCB design and layout, which integrate with the manufacturing facilities and provide a seamless transition from design to manufacture.
- The SEIL manufacturing and qualification facilities provide the full support for harsh environment product manufacture and test for customer's product applications.
- SEIL has wide-ranging experience of down-hole application products including down-hole PCB manufacture and system product wiring. Experience of component selection, procurement and screening, high temperature solder operations, Polyamide PCB manufacturing, PCB conformal coating, encapsulation / potting , materials and component handling are used to ensure the high temperature and vibration qualification survival of the product in the application.
- SEIL are ISO9001-2000 accredited and manufacture to IPC-A-610 and IPC-WHMA-A-620 as standard.





# SEIL Harsh Environment Production Support Services



**LPKF Protomat95s**

SEIL has the capabilities to support the manufacturing requirements for harsh environment applications whether they are prototype design and test support or medium volume production services.

SEIL is equipped with the full range of facilities for PTH & SMT PCB manufacture.

This QSV-1 has 2 placement heads for higher speeds of 7000 components per hour. The maximum component specification range is 0402-QFP 400-.0018 pitch. Maximum PCB size is 17.5 inches wide x 24 inches long.

The Quad QSP-2 Pick and Place Machine - Multifunctional SMT Machine capabilities

- On board vision system
- Dual gantry
- Off line programming
- Detachable feeder bases for quick change over
- Speed: 0.24 seconds per placement
- Component range: 0402 to QFP 400, 10mm tall
- Capacity: Up to 14,000 component placements per hour

Micriflow 11 Reflow Oven is a 20' long forced convection reflow oven with 8 heat zones and air/nitrogen capabilities. Fully lead free capability

The SMTECH Sigmaprint AVX 400 is a fully automated, in-line, camera controlled solder paste printer with active vision system and is windows based. Maximum board size: 420 x 360mm, Minimum board size: 50 x 25mm, Print area: 420 x 350mm, Standard stencil frame size: 508 x 508 x 25mm.



**Quad QSV-1 & QSP2 SMT Lines**



**Mechatronika MM500**



**Quad IVc Assembler**

The computer-controlled **Quad IVc Assembler** places surface mount components onto PCBs. The assembler picks up components from feeders and very accurately places them on the PCB at the locations and in the orientation predefined by the operator under software control.

The **LPKF Protomat 95s** is a computer controlled mill / drill unit that is used for producing **fast turn prototype PCBs**. Following circuit design, the resultant Gerber data is input to the machine via the attached PC, This provides SEIL the capability to quickly manufacture and validate customer requirements prior to release of PCB's to the full production process.

The **DEK248** is a flexible, semi-auto, surface mount **screen printer** that is used to accurately and repeatedly apply solder paste onto a PCB prior to population and soldering. The printer is micro controlled and menu driven.

The semi-automatic **Mechatronika MM500** places SMD components on PCBs and can dispense solder paste. This machine is used for lower volume manufacture PCBs.

The **CRD Ultrasonic cleaner** is a 3-stage system for the thorough cleaning, rinsing and drying of populated and unpopulated PCBs.

The **Surfair 510 Convection Reflow Oven** is used to meet the demanding requirements of SMT manufacture. Temperatures profiles and oven functions are controlled by an integral PC.

The **Electrovert EPK-I** is a completely automated, medium capacity wave soldering system for the production of printed circuit boards.

Conformal coating and high mass component stress bonding.

Design Manufacturing in compliance with:

- ATEX
- CENELEC for IS
- FM, CSA
- FDA
- IS Intrinsic Safety
- SIL 1,2,3 & 4
- ZONE 1,2,3
- EEx p, EEx i, EEx e,
- EEx d, EEx m, & EEx q.



**CRD Ultrasonic cleaner**



**ESD 15000 sq ft  
Manufacturing floor area**



**Pressure Safety Pit**



# SEIL Harsh Environment Production Support Services



**ERSA IR 500A  
Rework Station**

The **ERSA IR 500A Rework Station** facilitates the soldering and desoldering of a wide range of components, including BGA,  $\mu$ BGA, SMT, Through-hole, connectors including Socket 7 and bigger. Using the latest heating technology with precise temperature control for the safe removal and replacement of virtually all component types.



**Ersascope  
Inspection  
System**

The **Ersascope optical inspection system** provides extremely detailed non-destructive viewing of electronic assemblies and components, and the inspection of concealed soldering joints under a component.

Each stage of the manufacturing process includes inspection, which is specified and monitored under our ISO 9001 Quality System to IPC-A-610. Final inspection is carried out using stereo microscopes.



**Lynx Stereo Microscopes**



**VS8 Optical Inspection System**



**ACE FSHV360-SP40-A-09  
Environmental Test Chamber**

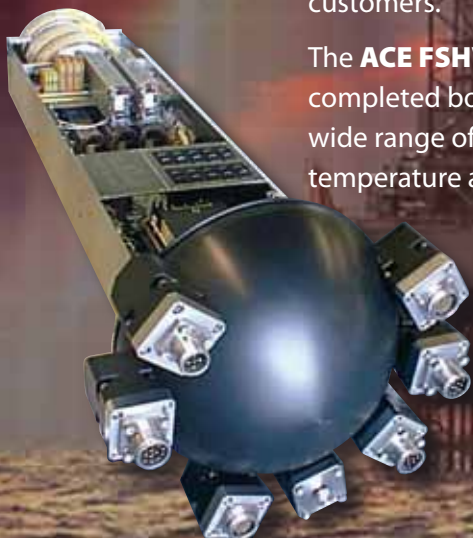


**Lynx Stereo Microscopes** are used for precision manufacture and soldering, and for the inspection of PCBs and components.

The **Vision Engineering VS8 Optical Inspection System** is based on a Lynx Stereo Microscope and includes a scanning table and video camera/monitor. The inspection system allows the precision examination of PCBs.

All vision inspection systems are on line and can be viewed by our customers.

The **ACE FSHV360-SP40-A-09 Environmental Test Chamber** enables completed boards and assemblies to be tested and evaluated over a wide range of environmental and climatic conditions, including high temperature and humidity.





# SEIL Own Design - Oil and Gas , Down-hole and Application Products

**150°C/175°C/225°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/225°C
- Comms over Power operating with high voltage Motor switching applications
- Safety Pressure Test

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.

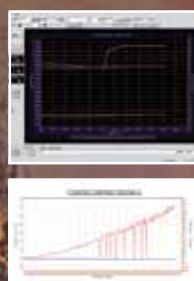
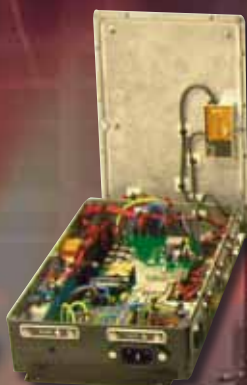
**175°C/225°C**  
Downhole Motor Drive Electronics shown 2kW Motor Drive with Down-hole House-keeping Power Supply Generation. Automatic Voltage detection and Power On Operation with Start Ramp.



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.



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