The Gwent Group of Companies
Gwent Group Ltd.

Suppliers to Major Multinational Companies in :-

The Automotive Industry.
The Fuel Cell Industry.
The Electro-ceramics Industry.
The Pharmaceutical Industry.
The Bio Science Industry.
The Electronic Display Industry.

and
General Electronics.
The Gwent Group of Companies

Gwent Group

Incorporating

Gwent Electronic Materials Ltd.
Applied Enzyme Technology Ltd.
Gwent Biotechnology Ltd.
Gwent Sensors Ltd.
LRH Ltd.
History

• Gwent Electronic Materials Ltd.
• Founded 1988 in Pontypool South Wales
• A company that was until Sept 2016 wholly owed by the principal Directors.
• Specialising in the production of custom made materials for the electronics / sensor industries.
• Currently turning over around 2M Sterling.
• Currently employs approximately 25 staff the majority of which are professionally qualified.
Acquisitions.

- Applied Enzyme Technology Ltd.
- Purchased from Leeds University in 2000.
- Specialising in stabilisation materials for Enzymes Proteins and Anti-bodies.
- Provides synergistic services so that GEM and AET both can service the sensor and biosensor markets.
Joint Ventures

- **Perpetuus Electronic Materials Ltd.**
- **50/50 venture between Gwent Group Ltd and Perpetuus Carbon Technologies Ltd**
- **Formed 2014**
- **Object to exploit potential market in “Graphene” based pastes and inks for the electronics industry.**
Group Operation Standards

- All companies operate and are covered by the highest quality standards.
- ISO / TS 9001 General Quality Standard
- Fully Computerised Accounting / Banking / Sales systems
Quality Qualifications

- ISO TS 16949
- ISO 13485:2003
- ISO 9001:2008
- UKAS QUALITY MANAGEMENT 005
Areas of Operation

- **UK and Europe**: here we sell either by directly, by customer visits or through a distribution company IMCD.
- **Taiwan / China**: here we have a distributor.
- **South Korea**: here we have a distributor.
- **Singapore**: here we have an a distributor for EL systems.
- **USA**: We distribute through the Sun Chemical Corporation.
- **Japan**: here we have a distributor.
- **India**: here we have a distributor.
- **Australasia & all of S.E. Asia**: here we have a distributor.
- **South Africa**: here we have a distributor.
Business Types

• Manufacturer of materials
• Contracted research for others
• Partner in government funded projects
• Direct support of university research projects
• Manufacturing of other companies products for them (Toll manufacturing)
• Consultancy
• Plant and Product Design
Operation Principals

- Work directly with customers to make materials that exactly suit their manufacturing process.
- Provide full technical back up and support.
- Be able to make the parts our customers are constructing so that we can assure full quality and reliability of our products.
Management Structure

Managing Director /CEO
Les Embury

New Technology and Innovations Director
Robin Pittson

Technical Manager
Gerson Vas

Site Manager
Steve Wall

Sales Manager
Maria Owen

QA Manager
Nick Walsh

Finance Manager
Kathryn Pearce
Gwent Group Products

Pastes /Inks

- High Temperature
  Fire above ca. 400deg C binder lost in firing

- Circuit materials products designed for their electrical properties

- Active Materials, The fired paste interacts with the substrate

Low Temperature
Curing Systems
Binder is retained

- Circuit materials products designed for their electrical properties

- Active Materials, The cured paste interacts with the substrate

- Printed Electrodes

- Printed Active Electrodes

- Instrumentation for Active Sensors

- Bio Materials

- Contracted Research

Sensors

Substrates
Gwent Group Research and Development

- Gwent Group uses the leverage of collaborative EU and UK funded projects to carry out fundamental research.
- We have been participants in over 60 multi-year, multi company, research projects, many as group leaders.
- Gwent carries out paid contract research for others.
Gwent Group
Published Papers and Patents

• Gwent Group has been an author or has been acknowledged though the provision of materials or expertise's within scientific papers published in major journals.

• So far the list is in excess of 100

• Gwent Group companies are owners or joint owners of a number of patents, in novel paste or stabilisation materials.
Company Manufacturing Capabilities - Dispersion

- Three Roll Milling, 100Kg, 25Kg, 5kg 1Kg Batches
- Bead or Sand Milling, 25Kg, 5Kg, 1Kg batches
- Torus Milling, 500Kg, 350Kg, 100Kg, 20Kg, 7Kg, Batches
- Number of Three Roll Mills Seven
- Number of Bead Mills Seven
- Number of Torus Mills Two
Company Manufacturing Capacity

- Three Roll Milling
  - 23,000 Kg p.a.
- Bead Milling
  - 12,000 Kg p.a.
- Torus Milling
  - 30,000 Kg p.a.
Dispersion Equipment
Bead Mill
Dispersion Equipment
T.R.M.
Dispersion Equipment

Torus Mill

Fully computerised large scale batch production
Company Manufacturing Capabilities - Printing

- Semi Automatic Printing 300x300mm
  - Three machines
- Fully Automatic Printing 400x500mm
  - Three machines
- Laboratory Printing 150 x 150 mm
  - Six Machines
- Tunnel hot air drying ovens
- Tunnel IR drying oven
- Tunnel Firing Furnace
- Batch ovens and furnaces
Printing Facility
Printing Facility
Humidity controlled printing
Drying ovens
Drying ovens
Firing Furnaces
Company Biosensor Facilities

- Printing of plastic or Ceramic Biosensors.
- Manufacture of stabilised enzyme systems.
- Freeze drying facilities.
- Humidity controlled assembly areas.
- Design of complete Biosensors.
- Contracted Research for Biosensor companies.
- Consultancy for Biosensor Manufacturing, Design and Installation.
Bio-Robot Applicator
Bio-Robot Applicator
Enzyme Application
Core Expertise

- Polymer Science Technology.
- Ceramic Processing Technology.
- Powdered Metals Technology.
- Dispersion Technology.
- Printing and Deposition Technology.
- Manufacturing Technology.
- Production Design.
- Turnkey Plant Consultancy.
Rheological Testing

Thermo Fischer
RheoStress 1
Typical Curves

- **Biosensor Paste**
- **Conductive Flexographic Ink**
- **Conductive Newtonian Glue**
- **Conductive Rotary Screen Paste**
Members of the Gwent Group to Sept 2016

- All Directors professionally qualified and major shareholders in the companies.
- All senior Staff professionally qualified.
- Over one hundred published papers on new materials Technology.
- Supervisors to many research projects within Universities.
- Leaders in many European funded projects.
Major Product Types

• Pastes for electro-ceramics
• Pastes for ceramic sensors
• Pastes for biosensors
• Pastes for electroluminescent lamps
• Pastes for solid oxide fuel cells
• Pastes for flexible electronics
• Paste for Automotive Components
Pastes for Electro-Ceramics
Pastes for Electro-Ceramics
Pastes for Ceramic Sensors
Pastes for Bio-sensors
Pastes for Bio-sensors
Paste for Electroluminescent lamps
Paste for Electroluminescent lamps

Examples of E.L. Lamps (Singapore)
Paste for Electroluminescent lamps
Electroluminescent lamps

Encapsulant
Rear Conductor (C, Ag)
Dielectric
Phosphor
Bus Bar (Ag)
ITO Polyester Film

AC
LIGHT
Electroluminescent lamps

Clear Encapsulant
Translucent Conductor (ITO)
Phosphor
Dielectric
Rear Conductor/Bus bars (C, Ag)
PWB Substrate
SimTech Continuous Printer
Shopping Mall

Current Advertising Display

➢ Fully lighted
➢ Stationery

Using E. L. Lamp

➢ Partial lighted
➢ Stationery & running effect
Billboard

Current Advertising Display

- Fully lighted
- Stationery

Using E. L. Lamp

- Partial lighted
- Stationery, running & fading effect
Pastes for Fuel Cells
Solid Oxide Fuel Cell
Pastes for Flexible Electronics
Bio Science

• Supply of Un-Stabilised and Stabilised.
• Enzymes, Proteins and Antibodies.
• Supply of Stabiliser Solutions.
• Supply of Research Stabiliser Kit Solutions.
• Supply of Printed Biosensors.
• Supply of Portable Potentiostats.
Stabiliser Kits

Protein Stabilisation Kit
Product Code: STKED
Biosensor (Agri-Food) Test Equipment
Future Possibilities

Pyruvate
(Sweetness of Onions)

Fruit Quality
(Acid and fructose levels)
Bio Applicator
Potentiometric Testing
Cyclic Voltammogram

Depletion of material at electrode surface

Max. diffusion

E (mV)

I (µA)
Potentiostat Curves
Biosensor Manufacturing

- Manufacture of Pastes for Biosensor Production.
- Manufacture of Enzyme pastes or solutions for Biosensor Production.
- Design of Biosensor strips for Customers.
- Selection of Manufacturing Equipment for Customers Plants.
- Consultancy on Biosensor production.
Biosensor Standard Designs
Medical Biosensors
Bioscience Trend Analysis

Trend shift from qualitative analysis to fine/quantitative analysis
Cheap/common porous NC membrane rather than expensive/technical microfluidics channel

On-off Qualitative (’80~)
- Porous NC Membrane
- The naked eye Test
- Pregnancy/Infectious
- Inverness, PBM

Fine/Quantitative (’02~)
- Micofluidics channel
- Fluorescence read-out
- Quantitative Test
- Cardiac vascular
- Biosite (Inverness)

Quantitative/Practical (’07~)
- Gold Nanoparticles (’07)
- CMOS camera sensor
- Roche Diagnostics
- Fluorescence Bead (’07)
- Photodiode
- Response Biomedical
- Magnetic Bead (’09)
- Magnetic sensors
- MagnaBioscience

Gold or Fluorescence or Magnetic Bead
Conductive inks: fresh growth

PV market experiencing a change of leadership at the paste and powder level.

Touch screen bezel edge market changing. Narrow bezel is the key driver of change.

Many new market opportunities emerge

Future Developments
End

Thank you.
The majority of this information can be found at

http://www.gwent.org

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