Chemilink Brand
- Green and Effective Engineering Solutions & Materials

Chemilink Technologies Group
Singapore
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1. Corporate Position

**Philosophy**
Towards a zero solid waste society

**Vision**
The leading standard in Zero Waste Engineering.

**Mission**
To construct environmentally friendly and sustainable infrastructure by investing in zero waste businesses, creating zero waste processes, employing and developing people with zero waste mindsets.

**Value Proposition**
Fast construction of cost effective, eco-friendly and durable infrastructure through very innovative and sustainable engineering solutions.

**Corporate Values**
Innovation & Passion, Process & Quality Driven Integrity & Honesty.
2. Product Series
--- We Provide Green & Effective Engineering Solution Comprising Supply of Engineering Compound and Provision of Technical Services ---

2.1 Chemilink SS-100 Series for Civil/Road/Pavement Construction

- SS-108 series for Soil Stabilization/Rehabilitation/Recycling
- SS-110 series for Stone Stabilization/Rehabilitation and Re-cycling of Construction Wastes
- SS-120 series for Road Surface Quick Repairing
- SS-130 series for Road Surfacing/Resurfacing
- SS-140 series for Semi-Rigid Pavement

2.2 Chemilink SS-200 Series for Building Construction

- SS-210 series for Wall Finishing
- SS-220 series for Floor/Car-park Surfacing
- SS-230 series for Concrete/Mortar’s Repair/Bonding and Water-Plug
- SS-240 series for Grouting
• **SS-250 series** for Waterproofing (floor, roof, …)

• **SS-260 series** for Tile-Adhesive

2.3 Chemilink **SS-300 Series** for Solid Waste Management

• **SS-310 series** for Slurry/Sludge Treatment

• **SS-320 series** for IBA/IFA Treatment

• **SS-330 series** for Land Reclamation

• **SS-340 series** for Landfill Liner & Capping

• **SS-350 series** for Coal Binding

A Glimpse of Chemilink Singapore Central Plant
3. Essences of Innovative Solutions

--- Premier, Unique & Innovative Solutions to Address Civil Engineering’s Challenges ---

• “Floating” Semi-Rigid Platform over swampy and soft ground. (15-year highways/roads in swampy areas without major repairing)

• Anti-Cracking Performance for high-grade flexible pavements. (Examples: airport runways and taxiways with stabilized base & sub-base courses)

• Excellent Workability for quick build and repair airport infrastructures under heavy operational limitations. (Iconic project: Singapore Changi International Airport runways widening, featured by Discovery Channel in “Man Made Marvels” program and broadcasted since 2008)

• Semi-Rigid Pavement with highest performances for heavy loadings (Examples: airport parking aprons, heavy traffic roads and junctions in Singapore)

• Reduce, Reuse & Recycle (3R) local soils and solid construction wastes for various sustainable pavement construction (Almost all Chemilink pavement projects internationally)
4. Major Projects

--- A Selection of Chemilink Projects for Past 20 Years Is Testament of Our Superior Engineering Solutions ---

Airfields

➢ Singapore Changi International Airport Runway Widening (2005)
➢ Singapore Changi International Airport Parking Apron (2007)
➢ Malaysia Senai International Airport Runway & Taxiway Widening (2007 & 2008)

(An iconic project featured & broadcasted by Discovery Channel in “Man Made Marvels” Program worldwide since 2008)
Singapore Changi International Airport Parking Apron, 2007
(A latest pavement solution)
Seaports

- Indonesia Batamas Shipyard (1997)
- Malaysia Port Klang Container Yard (2010)

Port Klang Container Yard, Malaysia, 2010
(A typical “3R” project)
Highways/Roads
- Brunei City Road Maintenance (2000)
- China Low Cost Roads (e.g. Tibet Public Roads, 2002~2011)
- Caltex Oil Field Access, Indonesia (2002)
- South-East Asia Public Roads in Swampy Areas (2004)
- Sri Palani Murugan Industrial Growth Centre, India (2010)
- Heavy Traffic Junctions, Singapore (2010~2011)

Jalan Tutong, Phases II & III, Brunei, 1997&1999
(A durable “Floating” Semi-Rigid Platform in swampy areas)
Road in Swampy Area, South East Asia, 2004

Road in Tibet, China with Severe Cold & Circumpolar Latitude, 2007

Rural Road in South East Asia, 2005

Singapore Heavy Traffic Junctions, 2010 - 2011
Buildings

- Jiangyan Secondary School in Jiangsu, China (1999)
- Nanzhen Building in Shanghai, China (2000)
- Upgrading of Swimming Pool for Westin Stamford Hotel, Singapore (2000)
- NTU Hostel Redevelopment, Singapore (2001)
- Kuala Belait Hospital in Brunei (2004)
- Reconstruct of Maktab Sains College, Jalan Muara Phase II, Brunei (2004)
- The Sail at Marina Bay, Singapore (2007)
- Singapore HDB Aprons (2007~2011)
- Multi-Storey Car Park at Chin Swee Road, Singapore (2011)
Upgrading of Swimming Pool for Westin Stamford Hotel Singapore, 2000

Flooring System for The Sail at Marina Bay, Singapore, 2007
Multi-Storey Car Park at Chin Swee Road, Singapore, 2011

Singapore HDB Aprons, 2007~2011
R&D Projects for Solid Waste Management
(Funded by Singapore Government)

- ETRP - Environment Technology Research Program with NEWRI of NTU (2009)
- IES - Innovation for Environmental Sustainability (2010)
R&D Project - ETRP

ENHANCED BIOLOGICAL AND PHYSICAL STABILIZATION IN LANDFILLS

Project Scope

Objectives
The target of the project is to develop a method for accelerated landfill stabilization, and to transform the landfill into a source of energy and a site for carbon sequestration. The developed method may be test-bedded at one of Singapore's landfill sites.

Brief Background
Landfilling is expected to be the most commonly employed waste disposal method worldwide since it is seemingly simple and economical. Poorly designed and operated landfills can, however, compromise human health and environmental quality with uncontrolled emissions of gas and leachate.

Even when properly operated, sanitary landfills can still potentially cause environmental difficulties because the natural decomposition process occurring within these landfills is slow and hence a long period of time is needed for stabilization. Given their widespread application and large land footprint, the environmental impacts from landfills may last for decades and likely into centuries. Nevertheless it is noted that the waste materials in the landfill are typically high in carbonaceous content – i.e. a potential source of energy.

Description
The project seeks to mitigate the impact of a landfill site by using novel techniques to recover biogas through enhanced biological means by controlling the aceticogenic and hydrogenolytic microbial consortia and to sequester carbon dioxide (CO₂) which is produced during the process. To enhance the biogas recovery, the completed landfill cells shall be operated with bios towards aciogenesis. The generated fatty acids is then extracted to produce methane (CH₄) and CO₂ under methanogenic condition. CO₂ is harvested and converted into polysaccharides with microbial intervention.

The project also seeks to address another potential solid waste management challenge faced by Singapore which is the disposal of incineration ash. The ash can, however, possibly have beneficial activity and it may be compatible with a carefully selected membrane liner material for the landfill. The project will look into the development of a landfill membrane material incorporated with incineration ash and hence address the issue of ash disposal.

Contributions to Singapore's Environmental Sustainability

The project outcomes allow for an enhanced solid waste management system based on the developed landfill technique and also provides a useful application for incineration ash. The accelerated stabilization of closed landfills would enable early return of the land for other useful applications. The enhanced biological process converts the landfill into a source of energy and such waste to energy effort represents resource reclamation. The conversion of CO₂ into polysaccharides to be used as landfill binder represents a method for carbon sequestration. A business model which can arise from the preceding would include landfill construction or remediation, landfill operation, energy recovery, carbon sequestration technology and higher value use of the remediated landfill site because of better ground condition.

Key Deliverables

- Operating protocol for fatty acids production.
- Enhanced methane and polysaccharides production process.
- An engineered system based on the above.
- Membrane liner formulation.
- Construction method for utilization of the membrane liner.

A research project supported by the Environment Technology Research Programme (ETRP)

Environment Technology Research Program with NEWRI of NTU, 2009
**Creating a Marine Clay Matrix with Incineration Bottom Ash (IBA) for Land Reclamation**

**Project Scope**

**Objectives**
- To develop a novel integrated engineered system using IBA-marine clay formulations for land reclamation.

**Value Proposition**
- Use of IBA and marine clay to significantly substitute imported sand as the primary fill in land reclamation.
- Practical solutions with time-, energy- and cost-saving.
- Provide a platform for further R&D works on the transforming Incineration Fly Ash (FA) for reuse.

**Description**
- Modular 1: Develop chemical additives to stabilise the IBA.
- Modular 2: Study the use of marine clay to encapsulate the stabilised IBA.
- Modular 3: Study the pozzolanic and other properties in the IBA-marine clay mixture.
- Modular 4: Develop a 3D non-linear finite strain (NFS) consolidation model of the mixture.
- Modular 5: Predict the long-term potential and consolidation process of the mixture.
- Modular 6: Investigate the use of marine clay and fly ash as an additional layer to prevent potential leaching.
- Modular 7: Integration of above into a complete engineering system for land reclamation using IBA and marine clay.

**Contributions to Singapore’s Environmental Sustainability**
- To transform IBA into “Singapore New Sand” which will reduce its dependence for importing raw materials for land reclamation.
- Assist NEA to achieve its vision of Towards Zero Landfill & Zero Waste.
- To develop an engineering technology to transform two waste materials: IBA and marine clay into valuable civil construction resources for land reclamation in both Singapore and exportable to other coastal countries.

**Key Deliverables**

- Treatment technologies for IBA
  - Leachate compliance
  - Enhancing the self weight consolidation of the IBA-marine clay
- IBA-marine clay formulations
  - Appropriate chemical and physical properties
- NFS consolidation system
  - Higher accuracy of mechanical and chemical modeling
- Capping and liner system
  - Minimising leaching
- Integrated engineering system
  - Complete engineering system for land reclamation using IBA and marine clay

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**Innovation for Environmental Sustainability, 2010**
5. Customer Services

1) Green and effective materials & products

2) Sustainable R&D / Project R&D with Customization and Localization.

3) Consultancy services including Pavement Design, Material Design and Construction Design.

4) Project Management (for SS-100 series)
   a. Construction Management
   b. Quality Control
   c. Site Supervision
6. International Market of Projects / R&D Works

(Asian countries mainly including South-East Asia, North-East Asia, South Asia and Middle-East Region; Australia and Pan-Pacific Region; Europe like UK; some of Africa; and America like Brazil & USA)