Dowtec: Customer-focused
A dedicated organization with ISO9001 accreditation offering tailored engineering solutions in produced water and effluents treatment as well as solid waste management.
INTRODUCTION

DOWTEC is a Singaporean registered limited company in the business of providing engineering solutions for produced water and effluents treatment for various industries. It is a wholly owned subsidiary of CIC Environmental Services Sdn Bhd (CIC) in Brunei Darussalam.

CIC was established in 1996 as an approved service provider to Brunei Shell Company and oil and gas companies based in Brunei oilfields till today. CIC formed DT in Singapore to expand its activities and explore business opportunity outside Brunei. Dowtec had recently incorporated PT CIC Environmental Services in Jakarta, Indonesia. CIC and DT are both accredited with ISO 14000 and 9000.

Dowtec is continuously looking at ways of improving the clients’ profit margins by introducing better effluent treatment processes that deliver high yield-quality water for the purpose of discharging to the environment as well as for Water Flooding and Enhanced Oil Recovery Projects.
With most of existing oilfields entering the mature phase, oil companies are opting for secondary injection or tertiary EOR projects to extend life of the oilfields which translate to better Ultimate Recovery.
SERVICES

Water Treatment

WATER TREATMENT PLANT
- MEMBRANE TECHNOLOGY
- ION EXCHANGE TECHNOLOGY
- ELECTROLYTIC TECHNOLOGY

WASTEWATER TREATMENT PLANT
- PHYSICAL TREATMENT
- CHEMICAL TREATMENT
- AEROBIC SYSTEM
- ANAEROBIC SYSTEM (UASB)
- MBR
- MBBR

RECYCLE WATER PLANT
- DOMESTIC RECYCLE WATER
- INDUSTRIAL RECYCLE WATER

WATER INJECTION FOR OIL & GAS INDUSTRY
TECHNOLOGY OVERVIEW

OUR WATER TREATMENT TECHNOLOGY

- Production Fluid (Above 400ppm OG & TSS)
- Effluent Water (Below 400ppm OG & TSS)
- Produced Water (Below 400ppm OG & TSS)
- Unimax (output 20ppm)
- Decore (5ppm OG & TSS)
- Porefon (<1 ppm OG&TSS)
- Carbonizer
- Recover to tank
- 5 PPM Discharge Water
- 1 PPM Spec Water
- DRIED GRANULAR SOLIDS
- DRIED PRODUCT

Ongoing technological advancements in water treatment technology for efficient and sustainable solutions.
Why Clean Tanks and Recover Hydrocarbons with CIC Way?

**Time**
- Faster Process
- One full process

**Cost**
- Quick asset use
- Minimize waste

**HSE**
- Safer Work
- Environment Friendly
- Degassing

Our Methodology And Work Flow:

- Initial & Survey
- Close Loop System
- Desludging & Degassing
- Decontamination

PT. CIC Environmental Services
TANK CLEANING

* HSE Standard and Highly Trained manpower

1. Certified training team member.
2. Dowtec High HSE Standard operation.
3. Sophisticated and Atex certificate equipment So Can be use in Clas 1 Division 1 Zone (Explosion Proof)
4. High in experience

* Final Result

1. 100% Oil Free
2. Ready for Hot Work
Dowtec started a Research & Development programme in year 2006 to develop a customized treatment process for Produced Water with the following objectives:

a. Low operating cost.
c. Wide range of application for treated water.
d. Reliable and consistent quality of treated water.

The result of the R&D programme is a novel treatment process which combines electrolytic treatment with physical separation - **DECORE + POREFLON**
**DECORE + POREFLON**

The DECORE + POREFLON Technology has been field proven in treating produced water at Oil field with excellent results.

Typical Water Quality After Decore + Poreflon:

<table>
<thead>
<tr>
<th>Contaminants</th>
<th>After DECORE</th>
<th>After POREFLON</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suspended Solids (mg/l)</td>
<td>&lt; 5</td>
<td>&lt; 1</td>
</tr>
<tr>
<td>Oil-in-Water (mg/l)</td>
<td>&lt; 5</td>
<td>&lt; 1</td>
</tr>
</tbody>
</table>
DECORE+POREFLON® Plant at Oil Field
DECORE Unit
POREFLON Unit

DECORE + POREFLON has the following advantages:

A. Wide range of applications
   • Re-charging aquifer, Irrigation, Dilution water for polymer flooding, Water for steam Produced used in Enhanced Oil Recovery.

B. Process flexibility
   • RO system can be added on if higher quality of water is needed.

C. Modular design
   • High reliability, easy maintenance, easy expansion, high operational flexibility.

D. DECORE (EC/EF)
   • Highly effective and efficient in removing oil and grease (as high as 95% removal)
   • Remove significant amount of oil whereby reducing the loading on subsequent treatment processes → low chances of membrane fouling, higher flux rate, longer membrane life span.
   • No chemical added → environment friendly, lower operating costs, minimal change to chemical properties of oil sludge therefore higher chances of oil recovery.
   • Easy operation → simple process tuning (Voltage and current) to easy process optimization to match influent quality.
   • Easy operation → lower cost of monitoring and control instrumentation.
   • Small footprint → Suitable for Onshore as well as offshore installation.
   • Muti-function → Coagulation, oxidation, disinfection and floatation occur simultaneously.

E. POREFLON (MF)
   • Physical separation → reliable and consistent quality of treated water.
   • Use of PTEE material → oil resistant, longer life span, ease of cleaning → lower operating costs
   • Acting as pre-treatment to RO system, if higher quality of water is needed at lower quantity.
The DECORE system is development based on three fundamental technologies: Electrochemistry, Coagulation and Flotation.

The DECORE reactor consists of two zones: Electro-Coagulation (EC) zone and Electro-Floatation (EF) zone,

<table>
<thead>
<tr>
<th>EC Zone</th>
<th>EF Zone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxidation / Metal Hydroxides / Active Free Radicals (Disinfection) / Coagulation / Flocculation / Flotation</td>
<td>Solid-Liquid Separation / Micro-bubbles – Mixing &amp; Transportation of Particles</td>
</tr>
</tbody>
</table>

In the EC reaction zone, oxidation, formation of metal hydroxides and active free radicals, coagulation, flocculation, and floatation occur simultaneously. Electrolytic cells are used with each cell containing an anode and a cathode, where separate oxidation and reduction reactions occur respectively. In the anode, several oxidation reactions occur, which produce metal hydroxides and chlorine. Smaller organic substances can be destructed by the oxidations. Organic wastes with large molecular size can be removed by the coagulation caused by the metal hydroxides. Water of disinfected due to the production of free radicals and chlorine.

In the EF or separation zone, several electrodes are used for generation of micro-bubbles to further enhance solid-liquid separation. These micro-bubbles serve two purposes: create turbulence in the system to enhance mixing and transport insoluble coagulated particles to the surface with great efficiency.

DECORE is highly customized technology to treat produced water at high flow rate. The design balances the electrode consumption, hydraulic retention time and energy consumption to achieve maximum treatment efficiency at maximum operational costs.

**IMPORTANT OPERATIONAL PARAMETERS**

- Investigated and customized to characteristics of produced water:
POREFLON

POREFLON is the only hollow fiber membrane made of PTEE material in the world.

What is PTEE?
- PTFE = Polytetrafluoroethylene
- Chemical Resistance (Stable against all acids, alkalis and solvents)
- Heat Resistance (--90°C - 260°C)
- Hydrophobic
- Non Stick

Why PTEE membrane for produced water?
Because of its:
- **High mechanical property**
  PTFE has 8 to 10 times higher tensile strength than other common membrane materials such as PVDF, PSF and PE.
  Higher strength → longer life → lower operation costs
- **High chemical resistance**
  PTEE material is resistant to many types of chemicals including NaOH, HCl, HNO3, NH3, NaClO4, Acetone, Methylene Chloride, H2SO4. This means that there are more cleaning options
  → Complete recovery and lower maintenance cost

- **High flux rate**
  The non-stick PTEE material allows more through-flow filtration for produced water whereas other materials are more prone to oil fouling
  → High efficiency, High resistant to oil fouling, High recovery.

- **High heat resistant**
  → High temperature resistant enables filtration up to 90°C
  → Excellent for use in high ambient temperature conditions

- **Easy Handling**
  Unlike other membrane materials, it is possible to keep dry in storage
  → No solvent replacement, Long storage period, Lightweight.

**Towards Zero Discharge - Converting Wastewater into Value Stream!**

With DECORE + POREFLON technology, the produced water is no longer a waste stream that requires expensive and problematic disposal. The treated water is not only environmental friendly and safe to dispose, it is now possible to turn it into a value stream.
HOW?
We are able to offer complete solution for the following:

1. Potential use of treated water for Bio fuel Crops
   - Special strain of Jatropha curcas from Guangzhou Biotechnology Group

2. Potential use of treated water for Salt Tolerant Poplar Forestry from Guangzhou Biotechnology Group

3. Converting treated water into commercial grade mineral products using SAL-PROCTM Technology
   Commercial grade mineral products:
   - CaCO_3
   - CaSO_4·2H_2O
   - Mg(OH)_2
   - MgCO_3
   - NaCl
   - Na_2CO_3 và HCO_3^-
   - CaCl_2
The UNIMAX™ system, by contrast, uses cyclonic separation principles that rely primarily upon centrifugal force to more effectively separate the mixture.

**Conventional** separating processes are based on gravity settling and the gravity difference between oil and water.

- Combines Gravity, Accelerated Coalescence and Centripetal Vortex Separation in One Unit
- Lower Capital Costs
- Lower Operating Costs
- Oil/Water Separations can normally be accomplished with little or no thermal energy addition.
- No Chemicals

UNIMAX™ can be adapted to suit changes in production, The compact design and high hydraulic loading capability provide capital and operating savings over conventional processes.

UNIMAX™ is ideal for the following applications:
UNIMAX™ Cyclonic Separation has several advantages over gravity based settling systems.

Here are just a few to consider:
UNIMAX™ Multiphase Dewatering

- No Process Heat Required
- Efficient separation can normally be accomplished in a single pass unit at ambient well conditions, offering significant operating savings
- No Chemicals Required
- Separations can normally be performed without the use of water clarifier or demulsifier chemical additives

UNIMAX™ Dewatering Performance

UNIMAX™ is best utilized in Dewatering flows located close to producing wells prior to Group Line transport or as an Inlet Separation (FWKO) meaning ahead of Oil Treaters

In either application, Dewatering using the UNIMAX™ technology is targeted at removing a minimum of 85% to 95% of free water volumes.

This results in a significant reduction in fluid volumes to existing facilities.

De-Oiling

Oily Water can be treated prior to injection

or

In series with or without other water treatment technology.
Jäger Envirotec manufacture virtually all kinds of products for diffused air aeration. Almost all shapes, sizes and materials are possible. We are not limited to certain materials or any other specifics when it comes to diffuser design and fabrication. We are the only source in the world to give you unbiased advice for the right choice in diffusers.

**JetFlex TD™ tube diffuser**

<table>
<thead>
<tr>
<th>Diffuser Length (A)</th>
<th>Perforation Length (B)</th>
<th>Perforation area</th>
<th>Square Tube (C)</th>
<th>Thread (D)</th>
</tr>
</thead>
<tbody>
<tr>
<td>[mm]</td>
<td>[mm]</td>
<td>[m²]</td>
<td>[mm]</td>
<td></td>
</tr>
<tr>
<td>1060</td>
<td>1000</td>
<td>0,16</td>
<td>80</td>
<td>3/4&quot; 1&quot;</td>
</tr>
<tr>
<td>810</td>
<td>750</td>
<td>0,12</td>
<td>80</td>
<td>3/4&quot; 1&quot;</td>
</tr>
<tr>
<td>560</td>
<td>500</td>
<td>0,08</td>
<td>80</td>
<td>3/4&quot; 1&quot;</td>
</tr>
</tbody>
</table>

**JetFlex HD™ disc diffuser**

<table>
<thead>
<tr>
<th>JetFlex™ Disc Type</th>
<th>Diameter total/effective</th>
<th>Perforated area</th>
<th>Orifice</th>
<th>Standard Air flow</th>
<th>Available materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>HD 200</td>
<td>233/184</td>
<td>0.025</td>
<td>6</td>
<td>1,5 – 4,0</td>
<td>x x x</td>
</tr>
<tr>
<td>HD 270</td>
<td>268/218</td>
<td>0.037</td>
<td>6</td>
<td>1,5 – 7,0</td>
<td>x x x</td>
</tr>
<tr>
<td>HD 340</td>
<td>346/295</td>
<td>0.067</td>
<td>10</td>
<td>2,0 – 10,0</td>
<td>x x -</td>
</tr>
</tbody>
</table>
OUR PEOPLE

Dowtec Key Personnel & Staff Profiles

We are able to deliver our solutions through our teams of highly motivated and experienced specialists. They are trained to be highly innovative so that we are able to help our clients identify the method or equipment that will best suit their needs with the least use of resources.

Our teams are well qualified in their respective fields and with valuable working experiences to ensure that commitments are met, the projects properly executed to stringent requirements, and delivering solutions within the given time and budget.

Contact us :
PT. CIC Environmental Services
Menara Kuningan 6th Floor, Unit C-D
Jl. HR. Rasuna Said Blok X-7, Kav. 5
Jakarta 12940 – Indonesia
T: (62) 21 – 30015974
F: (62) 21 – 30015974
Email : inquiry@cic-es.co.id
Website : www.cic-es.co.id
www.dowtec.com.sg