PATRIA LNG ISO Tank Development

October 26th, 2016

PT. United Tractors Pandu Engineering
www.patria.co.id
United Tractors Pandu Engineering (UTE) Group in Brief

❖ Organization Development

❖ Product Sector
Our Company

Ship Builder

- Area: 14 Ha
- Prod. Capacity: 60,000 DWT per year, eq. 8 upto 10 Tag Boats, or 4 upto 6 bargs

Ship Repair

- Area: 22 Ha
- Prod. Capacity: 1,700 ton per year, eq. 22 upto 24 Tag Boats, or 35 upto 42 bargs

Batam

- Area: 14 ha
- Factory Area: 42,500 m² (under roof)
- 41,500 m² (open yard)
- Building: 44,581 m²

Barito Kuala

Bekasi

Heavy Industry Manufacture

- Area: 22 Ha
- Prod. Capacity: 1,700 ton per year, eq. 22 upto 24 Tag Boats, or 35 upto 42 bargs

Armada:
- Tug & Barg = 30 Set
- Self Propelled Barg = 1 unit
- Transloader = 1 unit

Ship Operator
95 % of total sales

Domestic Market

Sinarmas Agro
Semen Padang
BGR
SCR
Semen Merah
Putih
AAL
Transindo
Samindo
PTBA
SBS
KPC
KPP
Pama
Thiess
UT

Pertamina
Shell
Petronas
Semen Gresik
SIS
KWN
Elma
MTL
Semen
Tonasa
Samudra
Indonesia
Inco / Vale
Freeport
PTPN
Petrosea
Overseas Market

5% of total sales

Russia
Coal Body
HD 785-5

USA
Snowplow

France
Transformer Tank

India
SST74

Malaysia
Wireline Eqp.

Mongolia
SDT 65

Myanmar
Medium Vessel

Vietnam
Medium Vessel

Philippine
WT50 & LT50
HD Vessel 785

Australia
WT & LT
SBT20
United Tractors Pandu Engineering (UTE)  

Milestone

Business Development  

Pride of The Nation 2020

- **1983 & 1990**
  - Compo fabrication
  - Forklift own design
  - Heavy Transportation

- **2000**
  - Provide engineering solution in mining sector
  - Ship Repair

- **2008 & 2011**
  - Maritime logistic business
  - Ship Repair

- **2012**
  - Shipbuilding
  - Overseas trailer

- **2014**
  - Coal
  - Oil & Gas

- **2016**

  - Energy
  - Fishery

**Patria Energy** to support national energy security

**Penetrate Overseas Market, Export Patria mining eq. & trailer to Mongolia and Asian countries**

**Strengthen National maritime industry through Patria maritime business**

**Develop Heavy duty Equipment to support national mining sector business growth**

**Develop National forklift under PATRIA brand**
Business & Product Development

LNG ISO Tank

PT UNITED TRACTORS PANDU ENGINEERING
www.patria.co.id
Why is Natural Gas?

Gas Reserves

Gas Reserves (in TSCF)

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<tr>
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<tbody>
<tr>
<td>Proven</td>
<td>106.00</td>
<td>112.50</td>
<td>107.34</td>
<td>108.40</td>
<td>104.71</td>
<td>103.35</td>
<td>101.54</td>
<td>100.26</td>
<td>103.35</td>
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<tr>
<td>Potential</td>
<td>59.00</td>
<td>57.60</td>
<td>52.29</td>
<td>48.74</td>
<td>48.18</td>
<td>47.35</td>
<td>48.85</td>
<td>49.04</td>
<td>49.04</td>
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<tr>
<td>Total</td>
<td>165.00</td>
<td>170.10</td>
<td>159.63</td>
<td>157.14</td>
<td>152.89</td>
<td>150.70</td>
<td>150.39</td>
<td>149.30</td>
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</table>

PRODUCTION (in MMSCFD)

<table>
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<tr>
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<tr>
<td>7,283</td>
<td>7,460</td>
<td>7,962</td>
<td>8,857</td>
<td>8,415</td>
<td>7,110</td>
<td>6,826</td>
<td>8,218</td>
<td>8,102</td>
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Major LNG Plants

<table>
<thead>
<tr>
<th>Major LNG Plants</th>
<th>Capacity (MMTPA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bontang</td>
<td>22.5</td>
</tr>
<tr>
<td>Tangguh</td>
<td>7.6</td>
</tr>
<tr>
<td>Donggi Senoro</td>
<td>2</td>
</tr>
<tr>
<td>Abadi FLNG (Planned)</td>
<td>2.5</td>
</tr>
<tr>
<td>Sengkang (Planned)</td>
<td>0.5</td>
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</table>

Sources: ESDM, PWC
Gas Transportation

Marine Gas Transportation Market

- **Pipeline**: Fixed in volume, Short – medium distance
- **CNG**: Flexible in volume, Short – medium distance
- **LNG**: Flexible in volume, Medium – long distance

**Transportation Cost**

- Gas Pipeline: Onshore
- Gas Pipeline: Offshore
- LNG

Source: Institute of Gas Technology, statoil
1. LNG offers greater flexibility than pipeline gas
   - in volume
   - in distance & scattered area

2. LNG is more efficient than CNG
   
   \[
   \begin{align*}
   \text{CNG} &= 120 \times \text{Natural Gas} \quad (15^\circ\text{C}, 1 \text{ atm}) \\
   \text{LNG} &= 600 \times \text{Natural Gas} \quad (15^\circ\text{C}, 1 \text{ atm})
   \end{align*}
   \]
   
   \[
   \text{LNG} = 5 \times \text{CNG}
   \]
LNG Logistic Model

LNG Plant

Big Volume for Export

- LNG Plant
- Large / Very Large LNG Vessel

Low Volume for Domestic

- LNG ISO Tank
- Small LNG Vessel (Tanker)

Transportation

- Sea Transport
- Inland Transport
- Railway Transport

User

- LNG Storage Tank
- Power or Heat Generator

Flexibility in Transportation

The benefit of the LNG ISO Tank is able to transferred by land transportation (trucking, train), and sea transportation (tug & barge, LCT, SPB)
## LNG ISO Tank Principal

### Source: product brochure, quotation (LNG Iso Tank 40')

<table>
<thead>
<tr>
<th>ITEM</th>
<th>CHART</th>
<th>VRV</th>
<th>CRYO CONTAINERS</th>
<th>KARBONSAN</th>
<th>M1 Engineering</th>
<th>NK</th>
<th>CIMC Enric</th>
<th>LNG Tainer</th>
<th>Daewoong</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brand Origin</td>
<td>USA</td>
<td>Italy</td>
<td>Afrika Selatan</td>
<td>Turkey</td>
<td>England</td>
<td>South Korea</td>
<td>China</td>
<td>Finland</td>
<td>South Korea</td>
</tr>
<tr>
<td>Net Capacity</td>
<td>43.8</td>
<td>40.8</td>
<td>42.8</td>
<td>42.8</td>
<td>43.7</td>
<td>39.0</td>
<td>0.0</td>
<td>43.32</td>
<td>41.8</td>
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<tr>
<td>Energy Capacity</td>
<td>1029</td>
<td>959</td>
<td>1007</td>
<td>1004</td>
<td>1027</td>
<td>915</td>
<td>0.0</td>
<td>1018</td>
<td>982</td>
</tr>
<tr>
<td>Empty weight of ISO container</td>
<td>12855</td>
<td>10955</td>
<td>11925</td>
<td>12500</td>
<td>10700</td>
<td>13850</td>
<td>14850</td>
<td>9.428</td>
<td>12500</td>
</tr>
<tr>
<td>Inner Tank Material</td>
<td>ASME SA240 TYPE304 SS</td>
<td>X5CrNi18-10 (EN 10028-7)</td>
<td>304 Stainless Steel</td>
<td>SA240 TP304</td>
<td>Stainless Steel 304 L</td>
<td>Stainless Steel TP304/SS 304</td>
<td>Stainless steel</td>
<td>Stainless Steel</td>
<td>SA240-304</td>
</tr>
<tr>
<td>Outer Tank Material</td>
<td>ASME SAGB713 Q345R CS</td>
<td>SA 516 Material Gr.70 or Eq.</td>
<td>Carbon Steel</td>
<td>P355 GH</td>
<td>Stainless Steel 304</td>
<td>carbon steel or SS/Carbon steel or SS</td>
<td>Carbon steel</td>
<td>Carbon steel</td>
<td>A516-70</td>
</tr>
<tr>
<td>Insulation Material</td>
<td>Super Insulation</td>
<td>Multi Layer Super Insulation under vacuum</td>
<td>Multilaminar (super)</td>
<td>Super Insulation</td>
<td>Vacuum Insulated</td>
<td>Super Insulation /Perlite</td>
<td>Vacuum with multi-layer insulation</td>
<td>Honeycomb/perlite in vacuum</td>
<td>Multi-layer insulation</td>
</tr>
<tr>
<td>Net Evaporation Rate (%/day)</td>
<td>0.20%</td>
<td>0.25%</td>
<td>0.20%</td>
<td>0.30%</td>
<td>0.20%</td>
<td>0.20%</td>
<td>0.20%</td>
<td>0.20%</td>
<td>0.20%</td>
</tr>
</tbody>
</table>
Main market of LNG Iso Tank is distribute gas for supporting Gas Power Plant (PLTG/PLTMG)

- Apx. 13,700 MW total gas based power plant

- Apx. only 700 MW is the gas power plant with capacity under 20 MW

Potential market of LNG ISO Tank around 1,150 units until 2024 (equivalent ISO Tank 20’)

Total of Gas Power Plants are 120 units (13,700 MW)
LNG ISO Tank Development Phase

Milestone

Year 1\textsuperscript{st} & 2\textsuperscript{nd}
Technology Study Phase

- June’1st
- Dec’1st
- Dec’2nd

Year 3\textsuperscript{rd}
Production Phase

- May
- July
- Sept

Year 4\textsuperscript{th}
Commercial Phase
(full manufactured by UTE)

- Mass Production

Market Study

- Searching LNG Iso Tank Tech. Provider
- Searching Standard Certification Provider

- Final License Agreement
- LNG Iso Tank Engineering Design

- ASME Certification
- Production Facility Preparation
- Testing Facility Preparation

Prototyping

Prototyping

as a trader of LNG Iso tank
Terms of Development

Regulations & Standards Compliance

- ASME, for pressure vessel
- IMO, for seas transportation
- Design Approval & Testing Certification (Lloyd’s CSC Container Certification)
- National Standard (not available)

Engineers:
- Design Engineers
- Production Engineers
- Testing Engineers, etc

Software:
- Design
- Finite Element Analysis

Manufacturing Facilities

- Cutting Machine
- Bending Machine
- Welding Machine

Quality Control Facilities

- Measuring machine
- Ultrasonic Detection Test
- Welding quality tools

Product Design License
(Quick win)

Container Testing Facilities

- Lifting Test
- Load Test (7 stacks)
- Vertical Impact Test (Drop Test)
- Other Tests – including internal loads on walls, doors, removable sides; 30° tilt test, fork pocket lift test and internal restraint tests on tank container
LNG ISO Tank Development
Partner

• Turkey technology
• Established in 1994
• Proven technology
• Popular in the world, especially in Europe & South America
• Has complete product range
• Open to transfer technology

License proposal discussion
(VP of Karbonsan with BOD of UTE)

Product Range

LNG ISO Tank & LNG Trailer
LNG Storage Tank (Vertical & Horizontal Type)
LNG Evaporator
Gas Power Generation

LNG Plant
PATRIA Product Design Conceptual

**Outer Tank**
Carbon Steel SA 516 Gr70

**Insulation**
Multi-layer Super insulation

**Inner Tank**
Stainless Steel SA204 – 340L

**Container Frame**
Carbon Steel SAGB713 Q345

**Piping** (not viewed)
Stainless Steel Type 304

### Table

<table>
<thead>
<tr>
<th>Description</th>
<th>20 feet</th>
<th>40 feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approval</td>
<td>Lloyd Register</td>
<td></td>
</tr>
<tr>
<td>MAWP : Mpa (Inner/Outer)</td>
<td>10 / 1</td>
<td></td>
</tr>
<tr>
<td>Design Temperature °C (Inner/Outer)</td>
<td>-196 / +50</td>
<td></td>
</tr>
<tr>
<td>Nominal Capacity (M3)</td>
<td>21</td>
<td>45</td>
</tr>
<tr>
<td>Net Capacity (M3)</td>
<td>19,95</td>
<td>42,75</td>
</tr>
<tr>
<td>Outline Dimension, L x W x H (mm)</td>
<td>6060 x 2440 x 2590</td>
<td>12190 x 2440 x 2590</td>
</tr>
<tr>
<td>Empty weight of ISO container (Kg)</td>
<td>8000</td>
<td>12500</td>
</tr>
<tr>
<td>Payload weight</td>
<td>9464</td>
<td>19360</td>
</tr>
<tr>
<td>Max. Total weight</td>
<td>18000</td>
<td>36000</td>
</tr>
<tr>
<td>Nett Evaporation Rate per day</td>
<td>0,20%</td>
<td></td>
</tr>
</tbody>
</table>
- Unproven domestic market of LNG ISO Tank
- High cost of investment for the development (more than USD 10 millions)
- Uncertain Government regulations, particularly regulations for sea transport (not available)
- Imported most of raw materials & components (high production cost)

Government should provide both incentives and protections for the local manufacturers