Application-oriented propulsion systems
Many extremely shallow waters cannot be navigated with conventional propulsion systems. SCHOTTEL recognized this problem at an early stage and developed the Pump-Jet (SPJ) as a solution. The SPJ not only sets standards as a shallow-water propulsion system but is also increasingly used as a robust, powerful and reliable manoeuvring system on ships and vessels of all kinds operating under exceptional conditions.

The application-specific characteristics

- Compact construction, space-saving installation and easy maintenance
- Minimum loss of displacement, especially significant for lightweight shallow-draft vessels
- Simple installation flush with the hull
- Operation in water depths < 0.5 m and beaching possible
- Reduced suction effect in shallow water on account of the much lower volume flow as compared with propeller-driven vessels
- As a manoeuvring aid in the bow, the SPJ can be used for main and auxiliary propulsion (take-home device), as required
- Virtually no risk of damage due to grounding or floating debris
- Low-noise and low-vibration operation due to encapsulated design

We are currently developing standard systems of up to 3500 kW, which are characterized by their perfection and reliability. We supply competent solutions and installation variants meeting the requirements of special applications too.

The Pump-Jet operates reliably and with full thrust at a minimum immersion of only 150 to 750 mm, depending on the model involved, and can be powered by engines or motors of any type. It can be rotated through 360°, providing full thrust in all directions and ensuring excellent manoeuvring performance with utmost smoothness and comfort.

An impeller sucks in water through the intake funnel, a protective grid in the bottom plate preventing foreign bodies from entering the Pump-Jet.
The impeller forces the energized water into a diffuser, as a result of which kinetic energy is converted into pressure energy.

This energy transformation process is continued in the diffuser, and the water is collected in the pressure casing.

The water is finally expelled through the outlet nozzles at an angle of 15°, and thrust is generated which can be steered through 360°.

The application of CAD in development and design, the implementation of advanced manufacturing technologies, the use of high-grade materials, skilful assembly and professional installation on site are the major foundations for the top quality of our products. This is impressively confirmed by the certification of our quality management system according to DIN EN ISO 9001 by American Bureau of Shipping, Bureau Veritas, Det Norske Veritas and Germanischer Lloyd.

Our tailored steering and control systems have been service-proven and type-tested for decades.

Measured-data acquisition onboard using the DIADEM software

Existing Pump-Jet models are optimized and new types developed using state-of-the-art calculation methods.

In close cooperation with internationally renowned research institutes we constantly upgrade our Pump-Jets so that they are always acknowledged throughout the industry as trendsetting.

Testing in the HSVA ice tank in Hamburg.
SPJ for main propulsion
Passenger ships, ferries

River cruise vessel (0.90 m draught), 3 x SPJ 82 (340 kW each) stern installation, 1 x SPJ 57 (190 kW) bow installation
Shipyard: DWE Deggendorfer Werft & Eisenbau GmbH, Germany
Owner: Peter Deilmann Reederei GmbH & Co., Germany

Double-ended ferry (1.40 m draught), 2 x SPJ 132 (505 kW each)
Shipyard: McTay Marine Ltd., United Kingdom
Owner: Caledonian MacBrayne, United Kingdom

Double-ended ferry (0.75 m draught), 2 x SPJ 57 (177 kW each)
Shipyard: Schmitt Stahlbau GmbH, Germany
Owner: Fährbetrieb Michael Schnaas, Germany
1. Double-ended ferry (1.70 m draught), 4 x SPJ 220 (640 kW each)
   Shipyard: Scheepswerf Bijlsma, The Netherlands
   Owner: Wagenborg Passagiersdiensten BV, The Netherlands

2. Ferry (0.75 m draught), 4 x SPJ 57 (178 kW each)
   Shipyard: Schiffswerft Lux, Germany
   Owner: Rheinfähre Königswinter GmbH, Germany

3. Double-ended ferry (0.85 m draught), 4 x SPJ 57 (178 kW each)
   Shipyard: P&A Ruitenber BV, The Netherlands
   Owner: Fährbetrieb Hirzmann GmbH, Germany

4. Underwater viewing boat (1.90 m draught), 2 x SPJ 132 (634 kW each)
   Shipyard: Cantieri Navali Vittoria S.r.l., Italy
   Owner: Italian owner

5. Double-ended ferry (0.90 m draught), 4 x SPJ 57 (186 kW each)
   Shipyard: Ship Constructors Ltd., New Zealand
   Owner: Far North District Council, New Zealand

6. Double-ended ferry (1.70 m draught), 4 x SPJ 57 (180 kW each), Navigator version
   Shipyard: Damen Shipyards, The Netherlands
   Owner: Gambia Public Transport Corporation, Gambia

Passenger vessel (0.95 m draught), 2 x SPJ 82 (340 kW each) stern installation,
1 x SPJ 22 (60 kW) bow installation
Shipyard: Deutsche Binnenwerften GmbH, Germany
Owner: Sächsische Dampfschiffahrts GmbH & Co. Conti Elbschifffahrts KG, Germany
SPJ for main propulsion
Other typical applications

Inland water tanker (2.50 m draught), 2 x SPJ 82 (340 kW each)
Conversion yard: Slob & Dolderman, The Netherlands
Owner: VTR Verenigde Tankrederij Rotterdam, The Netherlands

Bridge erection boat (0.45 m draught), 2 x SPJ 55 M (131 kW each)
Shipyard: SCHOTTEL GmbH & Co. KG, Germany
Owner: German Federal Armed Forces

Diving support vessel (1.50 m draught), 1 x SPJ 57 (250 kW)
Shipyard: Vervako BV, The Netherlands
Owner: Royal Dutch Navy
<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Details</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>Cockle fishing vessel (0.35 m draught),</td>
<td>2 x SPJ 57 stern installation (215 kW each), 1 x SPJ 57 bow installation (74 kW)</td>
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<tr>
<td></td>
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<td>Shipyard: Sandfirden Technics, The Netherlands</td>
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<tr>
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<td>Owner: Dirk Visser, The Netherlands</td>
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<td>2</td>
<td>Work boat (0.50 m draught),</td>
<td>2 x SPJ 32 (88 kW each)</td>
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<td>Shipyard and owner: SCHOTTEL GmbH &amp; Co. KG, Germany</td>
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<td>3</td>
<td>Passenger vessel (0.60 m draught),</td>
<td>2 x SPJ 57 (200 kW each)</td>
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<td>Shipyard: Chantier Galian, France</td>
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<tr>
<td></td>
<td></td>
<td>Owner: French owner</td>
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<td>4</td>
<td>Amphibious Floating Bridge M 3,</td>
<td>Smaller Standard Vessel (1.64 m draught), 2 x SPJ 82 (370 kW each)</td>
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<td>Shipyard: Danyard Aalborg AS, Denmark</td>
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<td>5</td>
<td>Antenna handling ship (1.20 m draught),</td>
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<td>6</td>
<td>Landing Craft Utility (1.50 m draught),</td>
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<td>Shipyard: Scheepswerf Visser B.V., The Netherlands</td>
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<tr>
<td></td>
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<td>Owner: Royal Dutch Navy</td>
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<tr>
<td>7</td>
<td>Oil recovery boat (0.70 m draught),</td>
<td>2 x SPJ 22 (94 kW each)</td>
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<td>Shipyard: Compelmada, Portugal</td>
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<td>Owner: Sines Port Authority, Portugal</td>
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<td>8</td>
<td>Fire-fighting boats (0.35 m draught),</td>
<td>1 x SPJ 22 each (60 kW each)</td>
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<td></td>
<td>Shipyard: Bodan-Werft, Germany</td>
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<td></td>
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<td>Owners: German fire-brigades</td>
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</tbody>
</table>
SPJ for auxiliary propulsion
Manoeuvring and take-home device

1. Survey vessel (3.60 m draught), 1 x SPJ 220 (1000 kW)
   Shipyard: Kröger-Werft GmbH & Co. KG, Germany
   Owner: Bundesamt für Seeschifffahrt und Hydrographie, Germany

2. Fishery research vessel (5.50 m draught), 1 x SPJ 220 (1000 kW)
   Shipyards: Peene-Werft / Detlef-Hegemann Rolandwerft, Germany
   Owner: Bundesamt für Ernährung und Forstwirtschaft, Germany

3. Ethylene tanker (2.50 m draught), 1 x SPJ 132 (375 kW)
   Shipyard: Bodewes Scheepswerf Volharding Foxhol BV, The Netherlands
   Owner: Reliance Industries Ltd., India

4. Motor coaster (3.39 m draught), 1 x SPJ 57 (194 kW)
   Shipyard: Shinwa Sangyo Company Ltd., Japan
   Owner: Japanese owner
1 Laboratory vessel (0.80 m draught), 1 x SPJ 22 (59 kW)
Shipyard: Neue Germersheimer Schiffswerft GmbH, Germany
Owner: Umweltministerium Rheinland-Pfalz, Germany

2 Motor yacht (4.00 m draught), 1 x SPJ 57 (195 kW)
Shipyard: Peene-Werft, Germany
Owner: Private

3 Sailing vessel, 2 x SPJ 22 (94 kW each)
Shipyard and owner: Bootswerft Rathjen / Jugend in Arbeit e.V., Germany

4 23.1 m rescue cruiser, 1 x SPJ 15 (75 kW)
Shipyard: Schweers Schiffs- und Bootswerft GmbH & Co., Germany
Owner: Deutsche Gesellschaft zur Rettung Schiffbrüchiger (DGzRS), Germany

5 Survey vessel (0.90 m draught), 2 x SPJ 32 (74 kW each)
Shipyard: Heinrich Grube Schiffswerft, Germany
Owner: GKSS, Forschungszentrum Geesthacht, Germany

6 Paddle-wheel steamer, 1 x SPJ 57 (195 kW)
Conversion yard: Scheepswerf en Maschinenfabrik De Biesbosch-Dordrecht BV, The Netherlands
Owner: Köln-Düsseldorfer Deutsche Rheinschifffahrt AG, Germany
1. **Ice-breaking multi purpose vessel**
   - (5.70 m draught),
   - 1 x SPJ 520 (2600 kW)
   - Shipyard: Volkswerft GmbH, Stralsund, Germany
   - Owner: Wasser- und Schifffahrtsdirektion Nord, Germany

2. **Research vessel** (3.95 m draught),
   - 1 x SPJ 132 (620 kW)
   - Shipyard: Detlef Hegemann Rolandwerft, Germany
   - Owner: Bundesministerium für Forschung und Technologie, Biologische Anstalt Helgoland, Germany

3. **Sea-going ferry** (3.60 m draught),
   - 2 x SPJ 220 (1000 kW each)
   - Shipyard: Astilleros de Huelva SA, Spain
   - Owner: Trasmediterranea, Spain
### Standard types

Specification is subject to change without notice. Status: July 2007.

<table>
<thead>
<tr>
<th>Type</th>
<th>Rating*</th>
<th>Input power Eingangsleistung max. kW</th>
<th>Input speed Eingangsdrehzahl (r.p.m./Upm)</th>
<th>Wellen Ø (mm)</th>
<th>Weight Gewicht (kg)**</th>
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<td>C</td>
<td>3500</td>
<td>1000</td>
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</tr>
</tbody>
</table>

* Rating A Full power continuous rating 24 hours service  
** Rating B Intermittent service with occasional full load  
*** Rating C Auxiliary installations  
** Weight only SPJ with oil (without outer well and resilient mounting)  
*** Vertical power input only

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1. Ro-Ro vessel (8.40 m draught), 2 x SPJ 220 (850 kW each)  
   Owner: DFDS AS, Denmark

2. 15 000 dwt barge (6.50 m draught), 1 x SPJ 220 (858 kW)  
   Shipyard: Keppel Singmarine Dockyard Pte Ltd., Singapore  
   Owner: P.T. Freeport, Indonesia

3. Chemical tanker (6.10 m draught), 1 x SPJ 82 (400 kW), Navigator installation  
   Conversion yard: Svendborg Vaerft AS, Denmark  
   Owner: Prime Commercial Investment Ltd., Isle of Man

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Additional notes:

- SPJ installation in a skeg
- Ro-Ro vessel (8.40 m draught), 2 x SPJ 220 (850 kW each)  
  Owner: DFDS AS, Denmark
- 15 000 dwt barge (6.50 m draught), 1 x SPJ 220 (858 kW)  
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