Agitator Design Spreadsheet

Version 1.3
Details

Version: 1.3
Release Date: 7 August, 2019
Software: Excel
Size: 11MB

Design Type: Mechanical
Design Code: EEUAA
Agitator Type: Top Entry

Options:
Motor Position: Vertical and Horizontal
Coupling: Flexible, HRC, Rigid and Jaw
Shaft Seal: Single & Double Mechanical and Stuffing Box
Vessel Type: With and Without Baffle
Material: SS304, SS304L, SS316, SS316L, C22, CS and Custom to add
Bottom Shaft Support: With and Without

Calculations available:
For Agitator:
Motor HP
Shaft Diameter
Critical Speed
Blade Thickness
Coupling Selection
Bearing Selection
For Vessel:
Limpet Coil Shell Thickness as per ASME Sec.VIII Div.1

Output:
Agitator Drawing (N.T.S) in PDF File.
Purpose: Pre-Bid/Costing and making fabrication drawing
(Not to use for fabrication purpose)

Input Sheet

IMPPELLERS
Disk turbine
Straight-blade turbine
Curved Full Blade Turbine
Pitched-blade turbine
Propeller
Anchor
Chemineer HE-3 (Hydrofoil)
Sawtooth

Np GRAPH

Input Sheet for Aagitator Design Spreadsheet V1.3

NOTES:
1. Shaft Seal: Stuffingbox used only when:
   a. personnel below 2000
   b. temperature is below 120 C
   c. NHP below 2000
   d. If any of these conditions are not satisfied then better replace stuffingbox with mechanical seal.
2. Multistage Impellers: At a given distance between two impellers is smaller than overlap and then the joint is maintained by second impeller to separate foot agitator,
   b. when distance between two impeller is less than overlap, the second impeller has to be designed separately.

INDEX

Input Sheet

Drawings for Agitator Drawing (Not to use for fabrication purpose)

2/7
### Inputs

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vessel MOC</td>
<td>SS304</td>
</tr>
<tr>
<td>Liquid Density p</td>
<td>1498 kg/m³</td>
</tr>
<tr>
<td>Liquid Viscosity µ</td>
<td>12 CP</td>
</tr>
<tr>
<td>Required Rotation N</td>
<td>90 RPM</td>
</tr>
<tr>
<td>Power Number Np</td>
<td>6</td>
</tr>
<tr>
<td>Reynolds Number Nre</td>
<td>69675.73</td>
</tr>
</tbody>
</table>

### Motor Position
- Vertical: 5
- Motor HP: 4.8
- Motor HP Req.: 4.8
- Shaft Seal: Stuffing Box
- Shaft Support: Required
- Baffle: Yes

### Vessel Dimension
- For Shaft Dia. Cal.
  - Vessel MOC: 75
  - Output RPM: 1830
  - Motor HP: 4.8
  - Vessel Dimension: 388
- For Motor HP Cal.
  - Liquid Density: 1498 kg/m³
  - Liquid Viscosity: 12 CP
  - Shaft Dia. Req.: 73.00
  - Baffle/Unbaffle vessel: Yes
- Type of Impeller (Np): 6
- Sweep Dia. of Impeller: 610

### Impeller Sheet
- Blade Position:
  - Top: Name, 6, B, 0.177, 45
  - Middle: Name, 8, B, 0.177, 45
  - Bottom: Pitched blade turbine, 8, B, 0.177, 45

### Gearbox & Motor Sheet
- MOTOR
  - HP: 4.8
- OUTPUT RPM
  - 1830
- FRENCH FLANGE MOUNTED GEARBOX
  - Bearing Size: 38.1
  - Ratio: 5
- COUPLING
  - Size: 38.1
- VESSEL SHAFT DIA
  - 4.8

Inputs shown in colored cells, Other cells are programed and can be edited as per requirement.
**How to use Np Graph**

**Example:** Vessel Dia. 1830, Liquid density 1498 kg/m³, Viscosity 12 CP, 90 RPM, Turbine impeller 610 dia.

What will be the power required to operate the mixer if the tank was baffled? Also check without baffle.

### Solution (a) baffled

<table>
<thead>
<tr>
<th>Vessel MOC</th>
<th>Motor Position</th>
<th>Liquid Density</th>
<th>Motor HP</th>
<th>Liquid Viscosity</th>
<th>Motor HP Req.</th>
<th>Required Rotation</th>
<th>Shaft Seal</th>
<th>Shaft Support</th>
<th>Baffle</th>
<th>Power Number Np</th>
<th>Reynolds Number Nre</th>
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</thead>
<tbody>
<tr>
<td>SS304</td>
<td>Vertical</td>
<td>1498 kg/m³</td>
<td>5</td>
<td>0.012 N.s/m²</td>
<td>4.8</td>
<td>90 RPM</td>
<td>Required</td>
<td>Required</td>
<td>Yes</td>
<td>6</td>
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### Solution (b) unbaffled

<table>
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<th>Vessel MOC</th>
<th>Motor Position</th>
<th>Liquid Density</th>
<th>Motor HP</th>
<th>Liquid Viscosity</th>
<th>Motor HP Req.</th>
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<th>Shaft Support</th>
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<th>Reynolds Number Nre</th>
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<td>SS304</td>
<td>Vertical</td>
<td>1498 kg/m³</td>
<td>3</td>
<td>0.012 N.s/m²</td>
<td>2.1</td>
<td>90 RPM</td>
<td>Required</td>
<td>Required</td>
<td>No</td>
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**Diagram:**

- **Np 6**
- **Nre 69675**
Demo Video

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http://tiny.cc/lxqsaz

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<td>PT.Musim Mas, Indonesia</td>
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Contact Us

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