

Introduction

Levitronix Pump Tank Mixer joins two functions in one system:
Mixing a liquid and pumping out of a tank.

Concept

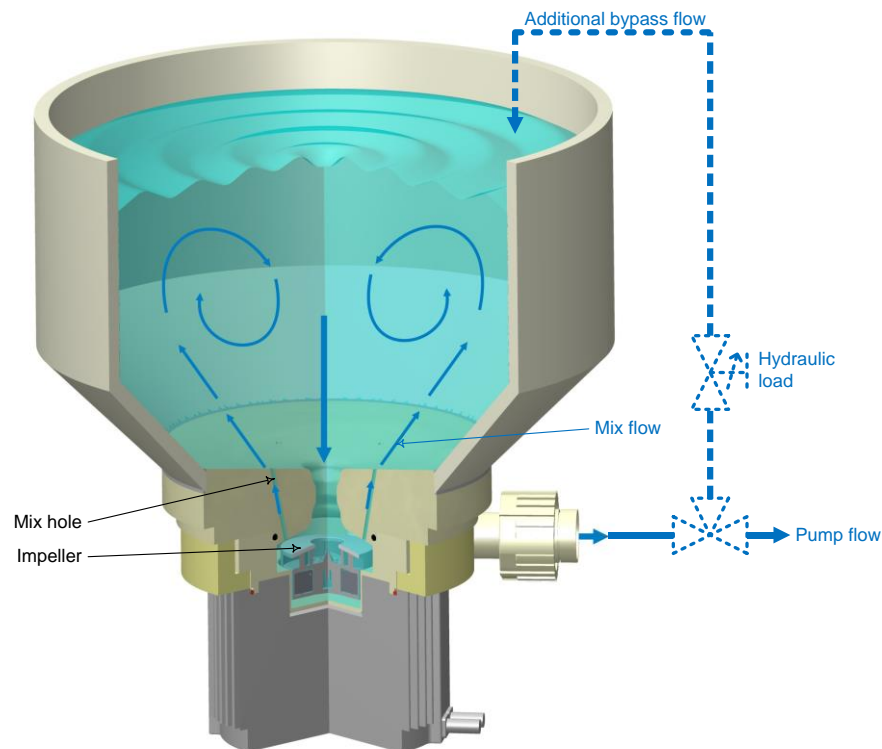


Figure 1: Levitronix Pump Tank Mixer Concept

Advantages

- Pump and mix with one system
- Mixing possible without pump flow
- Perfect efficiency/performance to pump outgassing chemicals
- Homogeneous mixture with temperature stability
- Decrease mixture time
- Possible flow or pressure control loop with the pump
- Total emptying of the tank
- Motor change without tank emptying

Mix performance can be controlled with:

- Number, diameter and angle of mixing holes
- Pump speed
- Flange position at the tank
- Additional mixing with bypass flow

Pump performance can be controlled with:

- Pump speed
- Pump size

Approach for the design

1. Definition of tank shape and tank material

In general all tank shapes are possible and has match to the liquid primarily. Some inputs for liquids with sediment particles (e.g. Slurry):

- No sharp edges (radius if possible)
- No gaps
- Cylindrical main body with conical bottom inside

2. Definition of pump size and mix flow

First approach to define the pump size:

- Tank Size 100 Liter (26.5 gallons) ⇒ PTM-1
- 200 Liter (53 gallons) ⇒ PTM-3
- 400 Liter (106 gallons) ⇒ PTM-4
- >400 Liter (106 gallons) ⇒ PTM-4 with additional mixing feature

This list is for estimation. One decisive factor can be the turnover time.

For every Levitronix Pump Tank Mixer System (PTM) a flow-pressure curve with mixing flow load curves is available.

To determine the pump size and the number of mixing holes the following information is required:

- **Tank size**
- **Needed pump pressure**
- **Needed pump flow**

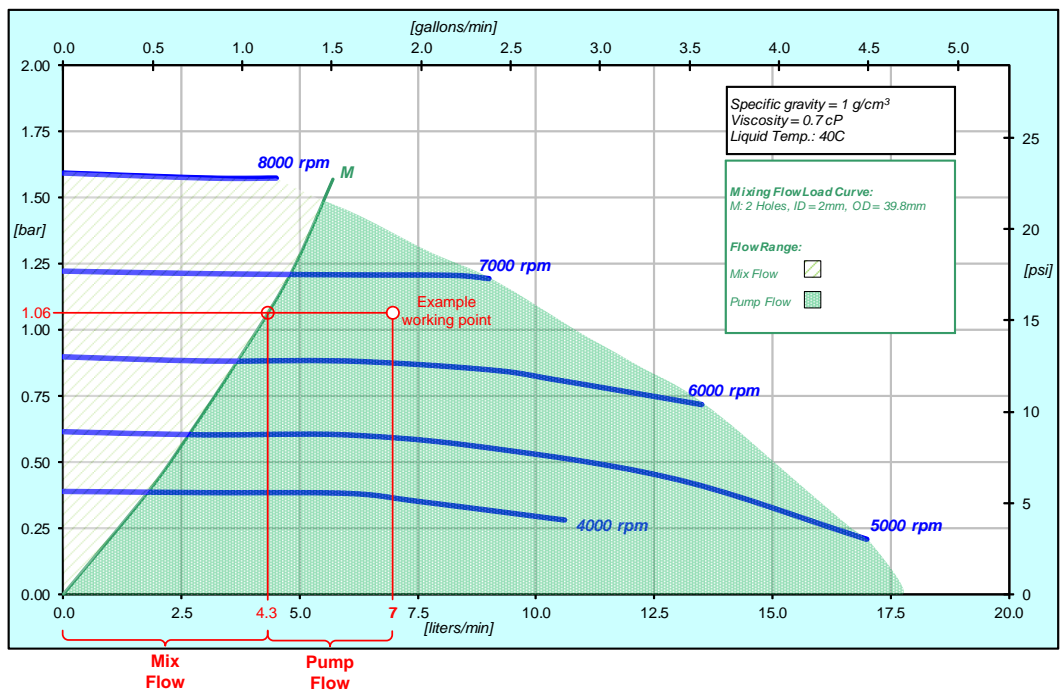


Figure 2: Pressure-Flow curve of PTM (for example PTM-1)

Example (red lines in Figure 2):

- needed pressure: 1.06 bar
- needed pump flow: 2.7 liters/min
- ⇒ Mix flow: 4.3 liters/min
- ⇒ turn over time for a tank with 30 liters: 7 minutes

3. Definition of tank flange

The design, production and integration of the tank flange has to be done on customer side. Exact dimensions to fit the flange to the PTM are defined in the drawing “Pump tank mixer flange – design guideline” and is available at Levitronix support (contact details see last page).

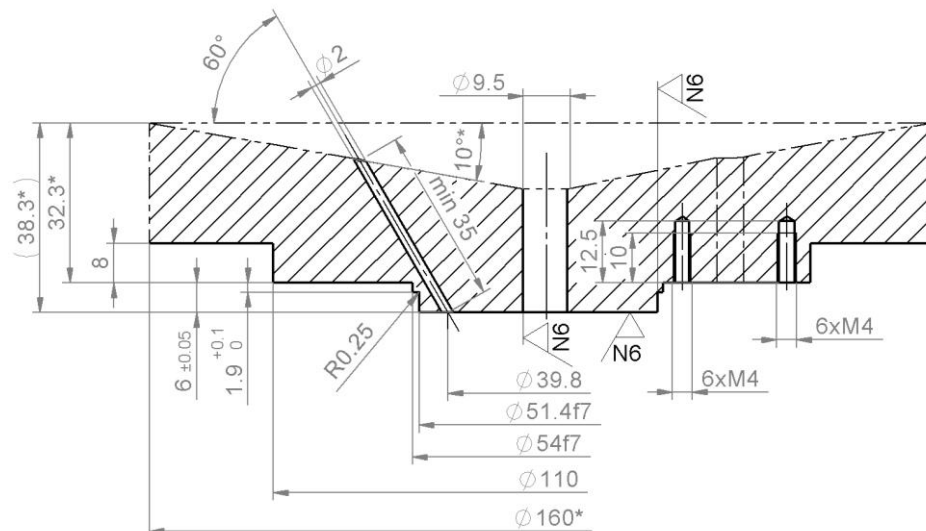


Figure 3: Part of “Pump tank mixer flange – design guideline” (for example PTM-1)

All dimensions with * are free to define, all other has to be exact as per drawing defined. So it's possible to integrate the flange in the tank with a welding or screwable design. For a welding design the material of the flange and the tank has to be the same.

Position of the flange at the tank can be on the bottom or on a side wall (better access for maintenance, less tank height but more difficult empty procedure and higher minimal medium level necessary).

For a Slurry application (or a medium with sediment particles) it advises to use the bottom design with a conical bottom on the inside.

Reducing turnover time and increase mixing effect

Following possible options to reduce turnover time and increase mixing effect:

1. **Increase mix flow**
 - More mixing holes
 - Higher pump speed \Rightarrow higher pump pressure
 - Bigger pump size
2. **Additional bypass flow**
 - Bypass flow with 3 way valve (Figure 4) \Rightarrow same pump flow for process
 - Bypass flow with T-union (Figure 5) \Rightarrow lower pump flow for process
 - Bypass flow with mixing jet (Figure 5) \Rightarrow higher homogenization in tank or lower time to homogenize a batch

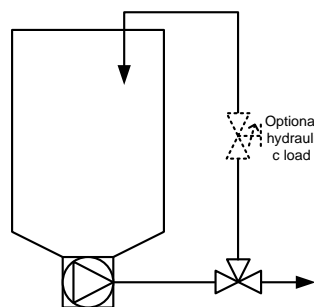


Figure 4: Bypass flow with 3 way valve

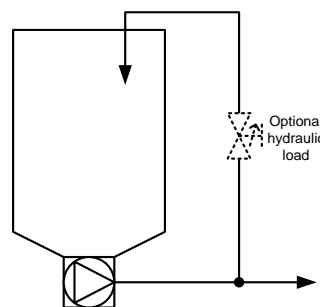


Figure 5: Bypass flow with T-union

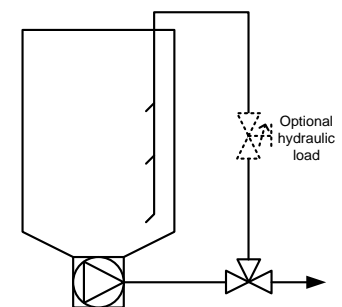


Figure 6: Bypass flow with mixing jet

**Technical
Support**

For troubleshooting, support and detailed technical information contact *Levitronix[®]*
Technical Service Department.

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