

Novomet-Perm JSC

ESP Calculator 1.1

User Manual

Perm
2011

Table of Contents

1.	Foreword	3
2.	Description	4
3.	System requirements	6
4.	Setup	7
5.	Use of ESP Calculator	8
	5.1 Interface	8
	5.1.1 Pump performance curves	8
	5.1.2 Multi Hz curves (Tornado)	11
	5.2 Operations sequence	13
	5.3 Troubleshooting	14

1. Foreword

Novomet-Perm JSC is proud to present a software tool intended to manage the centrifugal Pump performance curves. We truly believe that you will find it easy-to-use tool for your everyday work.

Thank you for your choice and we wish a pleasant and efficient work!

2. Description

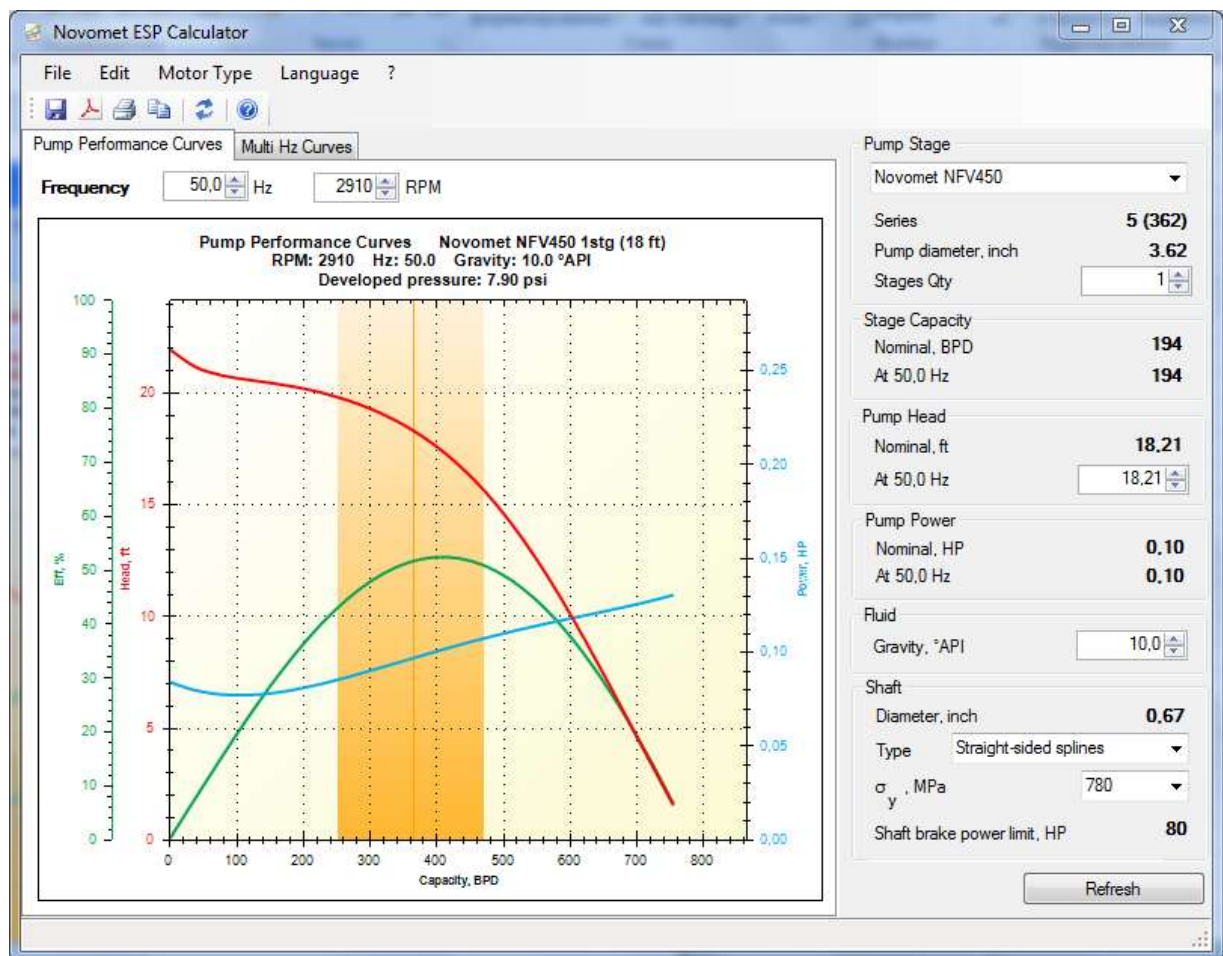
The Novomet ESP Calculator is developed for those who work with the ESP performance data.

It allows creating in real time stage and pumping performance curves based on fluctuating operation conditions and built-in stages database.

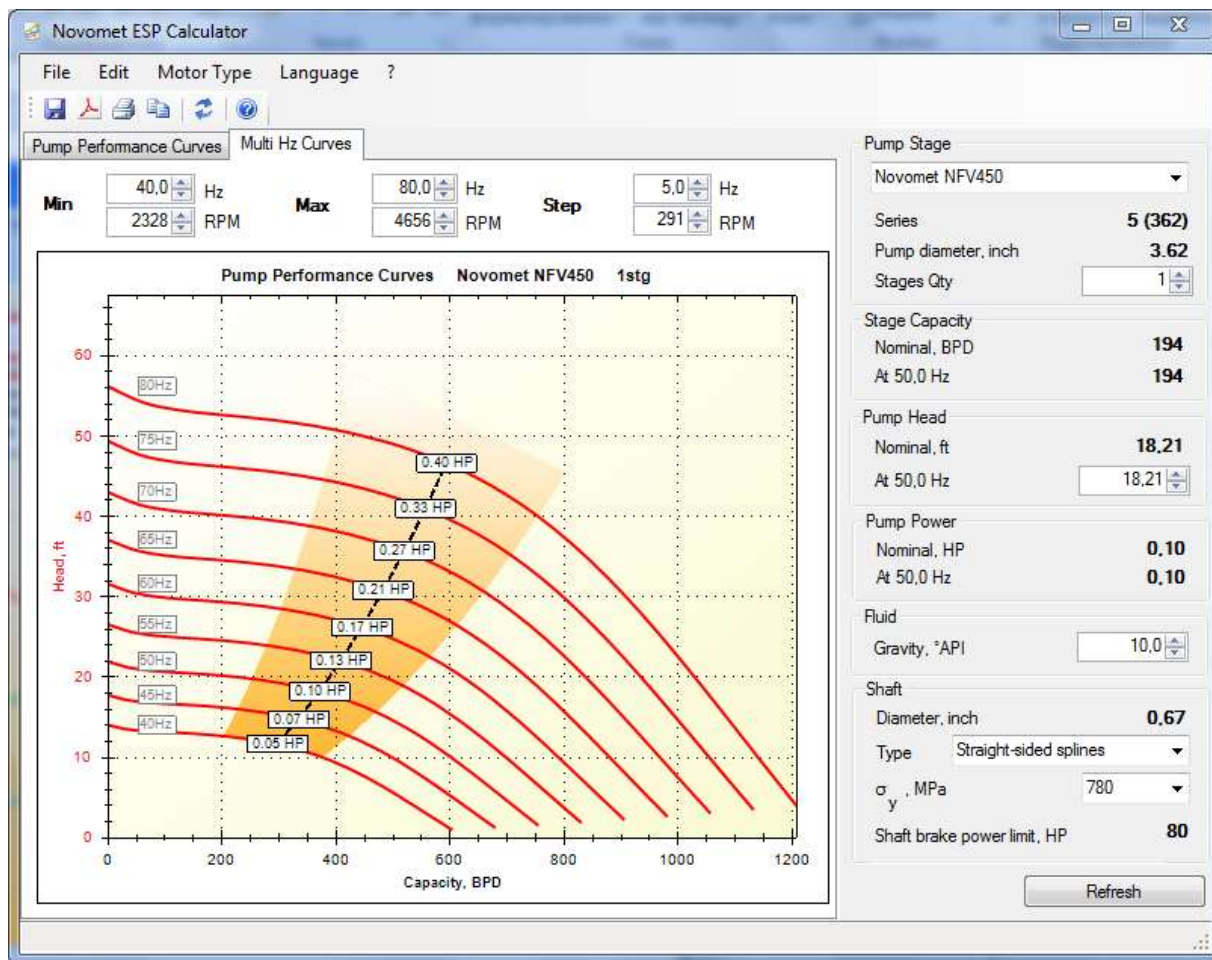
The main application window consists of two tabs.

The 1st one is 'Pump performance curves'; it is intended to provide hands-on management tool for ESP characteristic. It includes options for modification of frequency, rotation speed per minute, selection of stages amount or pump head and gravity of the pumped fluid.

You can select here the type of the pump shaft (straight-sided splines or involute splines) and limits regarding shaft yield strength. All of these parameters are available for manipulation by the User.



The 2nd tab 'Multi Hz curves' (Tornado) displays the modification of the stage head curve depending on preset frequency limits together with the selected increment of these frequencies.



All of the displays provide the option for wide range scaling of the charts; another feature is a popping-up tooltip which comes up when pointed by the mouse, that will show the key parameters of the Pump performance curves at the place which is pointed out by the User.

Any chart can be printed out, saved as *.pdf or image file.

3. System requirements

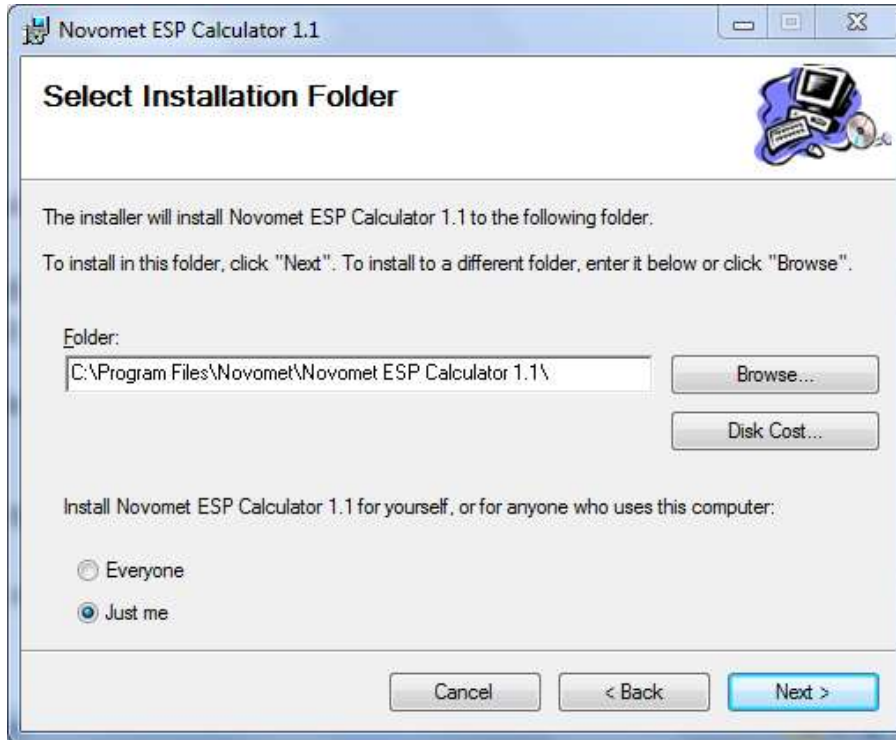
- Intel Pentium 4 or compatible processor;
- 512 Mb of RAM;
- Operating systems:
 - Windows XP with the pre-installed Net Framework 2.0,
 - Windows Vista or
 - Windows 7.

4. Setup

Setup requires Local Administrator's rights (or ask your system administrator).

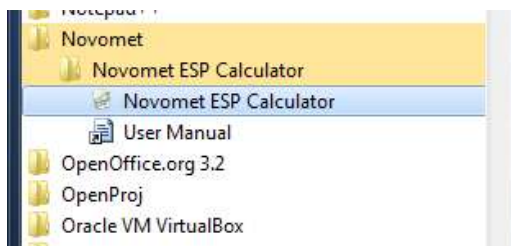
Before installing Novomet ESP Calculator on PC running Windows XP please check that you have Microsoft .Net Framework 2.0 (or higher) installed.

Run Setup file and select destination folder:



Press 'Next >' and wait while program is being installed.

After installation you may start Novomet ESP Calculator from Start → Programs menu or shortcut on Desktop.

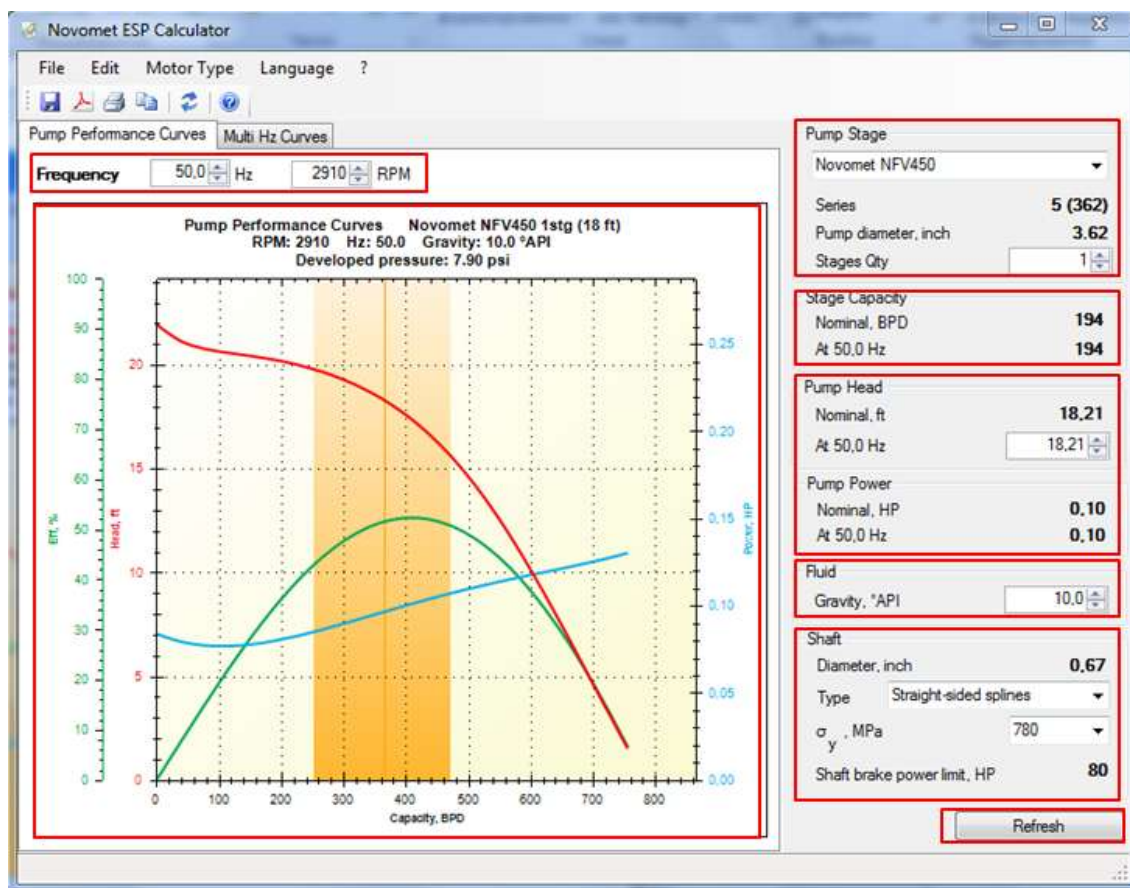


5. Use of ESP Calculator

5.1. User interface.

Before you start, select preferred language (English or Russian) in 'Language' menu and required units (US or SI) in 'Edit' menu.

5.1.1 Pump performance curves



Where:

In the 'Frequency' field

Frequency Hz RPM

select the required frequency, this will cause RPM to change and vice versa when changing RPM this will automatically change the frequency.

In 'Pump Stage' field

Pump Stage
Novomet NFV450
Series 5 (362)
Pump diameter, inch 3.62
Stages Qty

select the required pump of Novomet company, meanwhile the conventional series and pump diameter are displayed here, you can specify the required amount of stages and the head will be calculated automatically.

In 'Stage capacity' field

Stage Capacity	
Nominal, BPD	194
At 50,0 Hz	194

we can see the rated capacity of the selected pump based on the basic frequency and the rated capacity for the frequency specified by the User.

In 'Pump Head' field

Pump Head	
Nominal, ft	18,21
At 50,0 Hz	<input type="text" value="18,21"/>

we can specify the required head for the specified frequency, while amount of stages will be re-calculated. Additionally the SW will display the pump head for the rated base frequency.

In 'Pump power' field

Pump Power	
Nominal, HP	0,10
At 50,0 Hz	0,10

we can see the rated power of the selected pump stage based on the basic frequency and the rated capacity for the frequency specified by the User.

In 'Fluid' field

Fluid	
Gravity, °API	<input type="text" value="10,0"/>

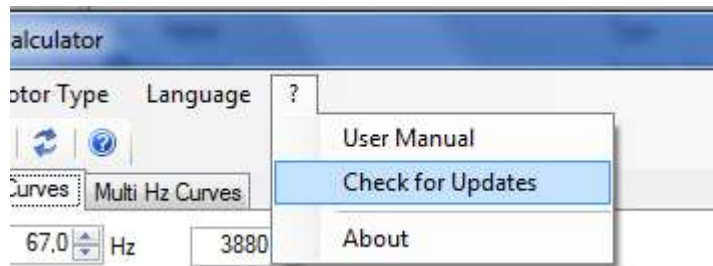
we specify the gravity of the fluid to be pumped by the pump.

In 'Shaft' field

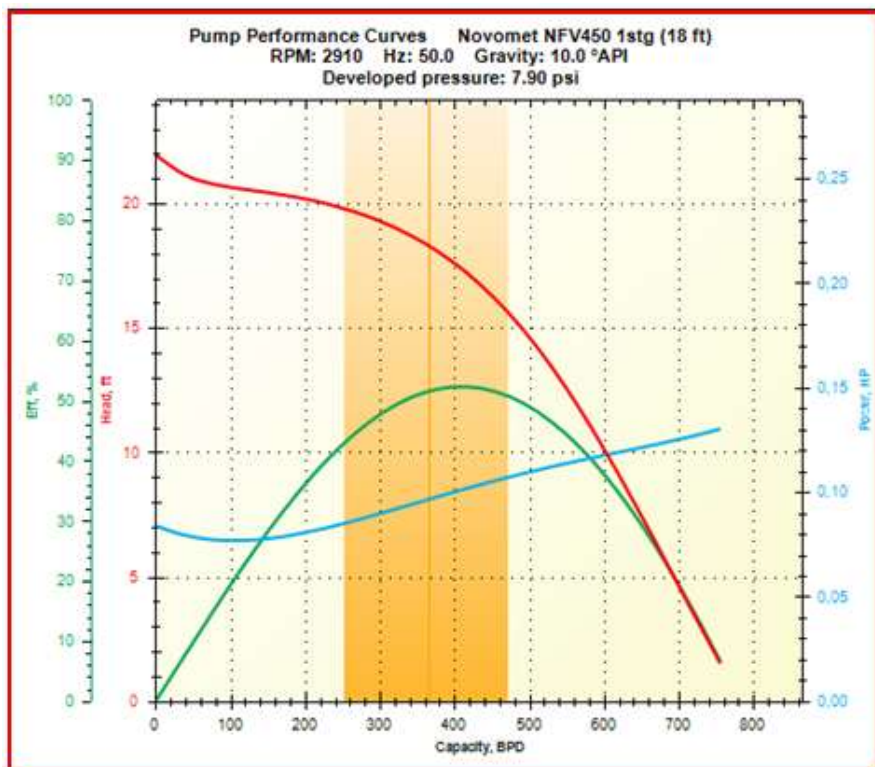
Shaft	
Diameter, inch	0,67
Type	<input type="text" value="Straight-sided splines"/>
σ_y , MPa	780
Shaft brake power limit, HP	80

We can select the type of shaft and its yield if necessary.

Menu item '? → Check for Updates' allows obtaining up-to-date Novomet stages data via the Internet.

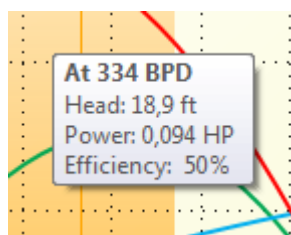


In 'Novomet Pump performance curves' field

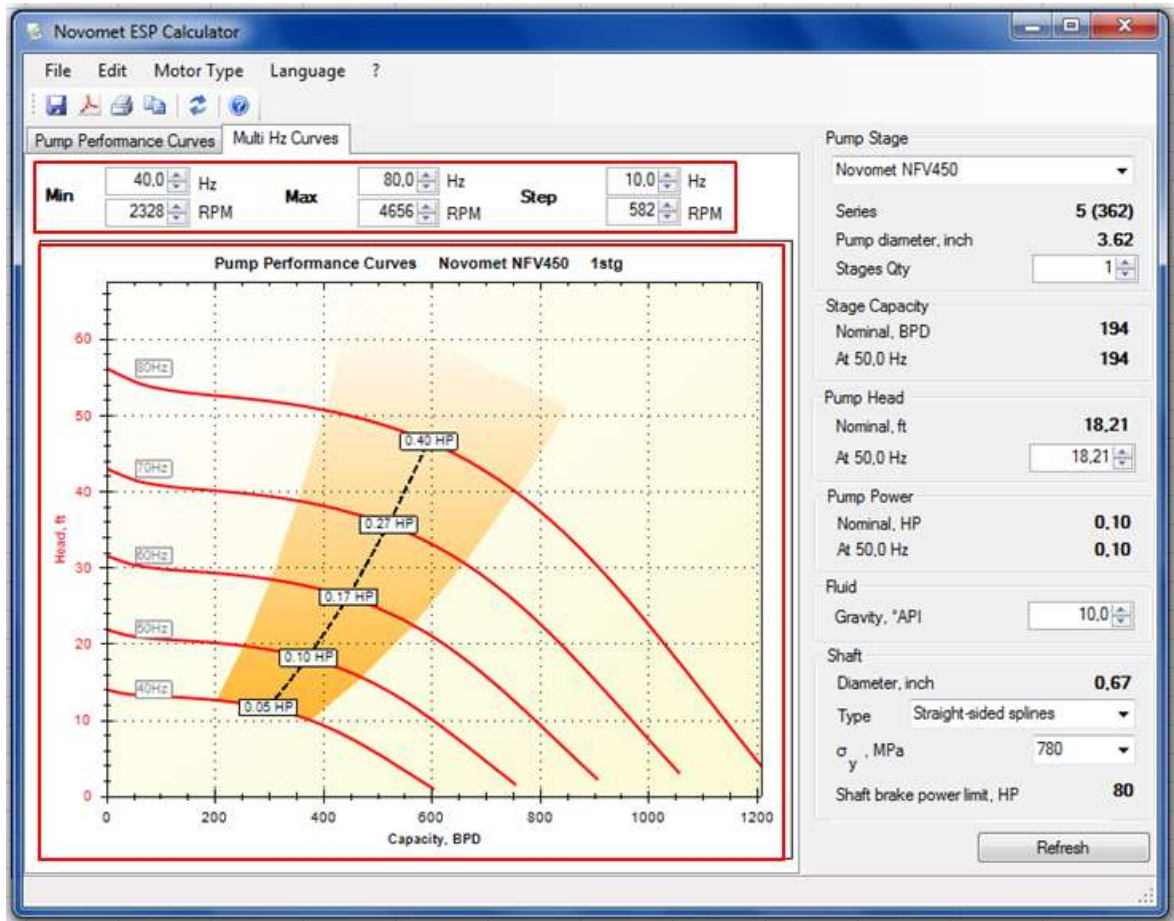


We can see the conventional designation of the pump, shaft rotation speed, frequency, fluid gravity, pressure developed by the pump and the curve itself displays all the modifications performed.

If we point the cursor to the curve at any place we will see the tooltip showing the capacity, head, power and efficiency in the pointed out spot.



5.1.2 'Multi Hz curves' tab

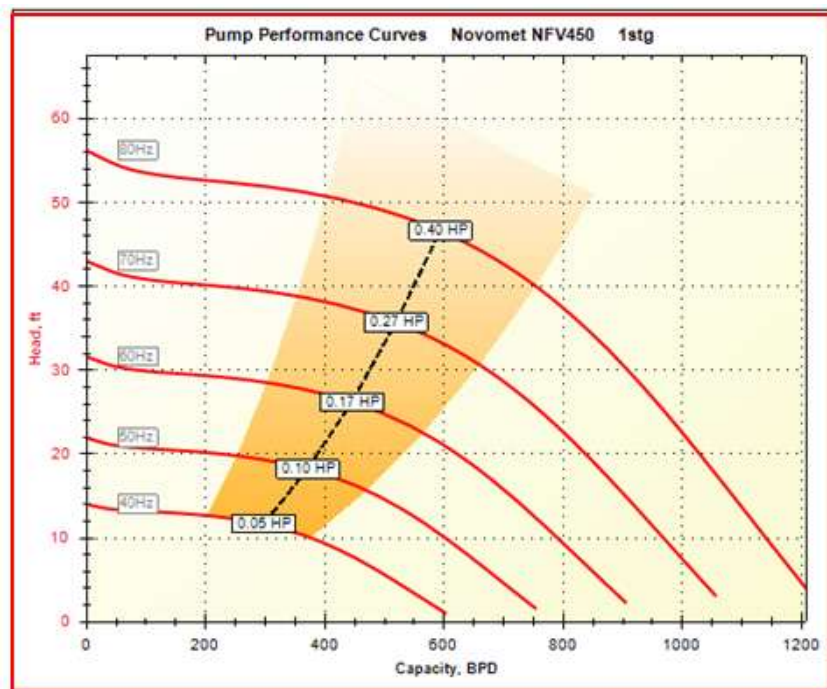


Where:

we may specify the minimum and maximum frequencies (RPM) and the required increment of the frequency (RPM). When changing the frequency program will re-calculate RPM and vice versa when changing the RPM the SW will re-calculate frequency.

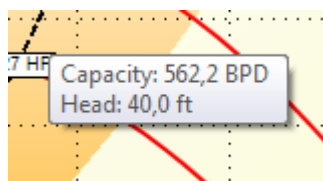


In 'Head curve of pump' field

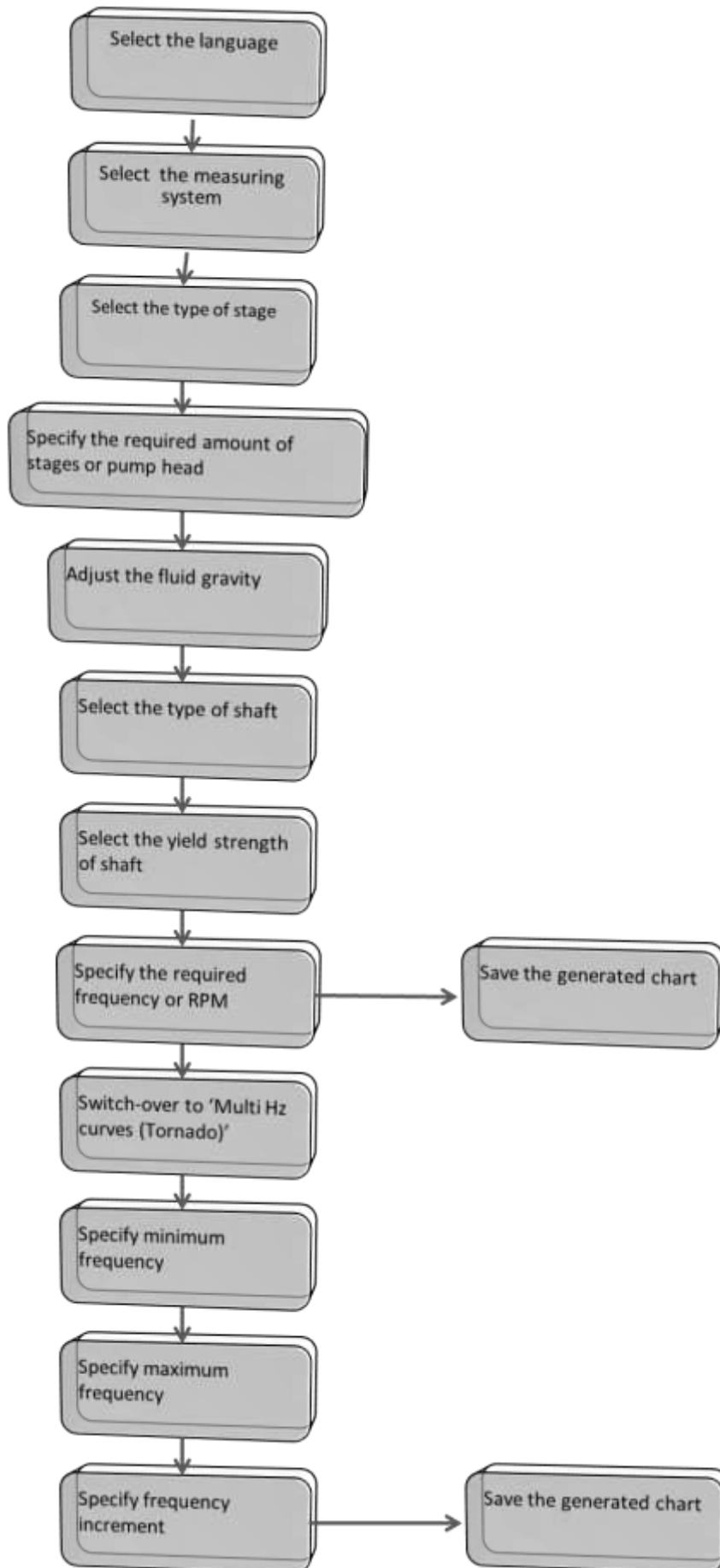


We can see conventional designation of the pump and all the changes implemented above will take place.

If we point the cursor to the curve at any place we will see the tooltip showing the capacity and head in the pointed out position.

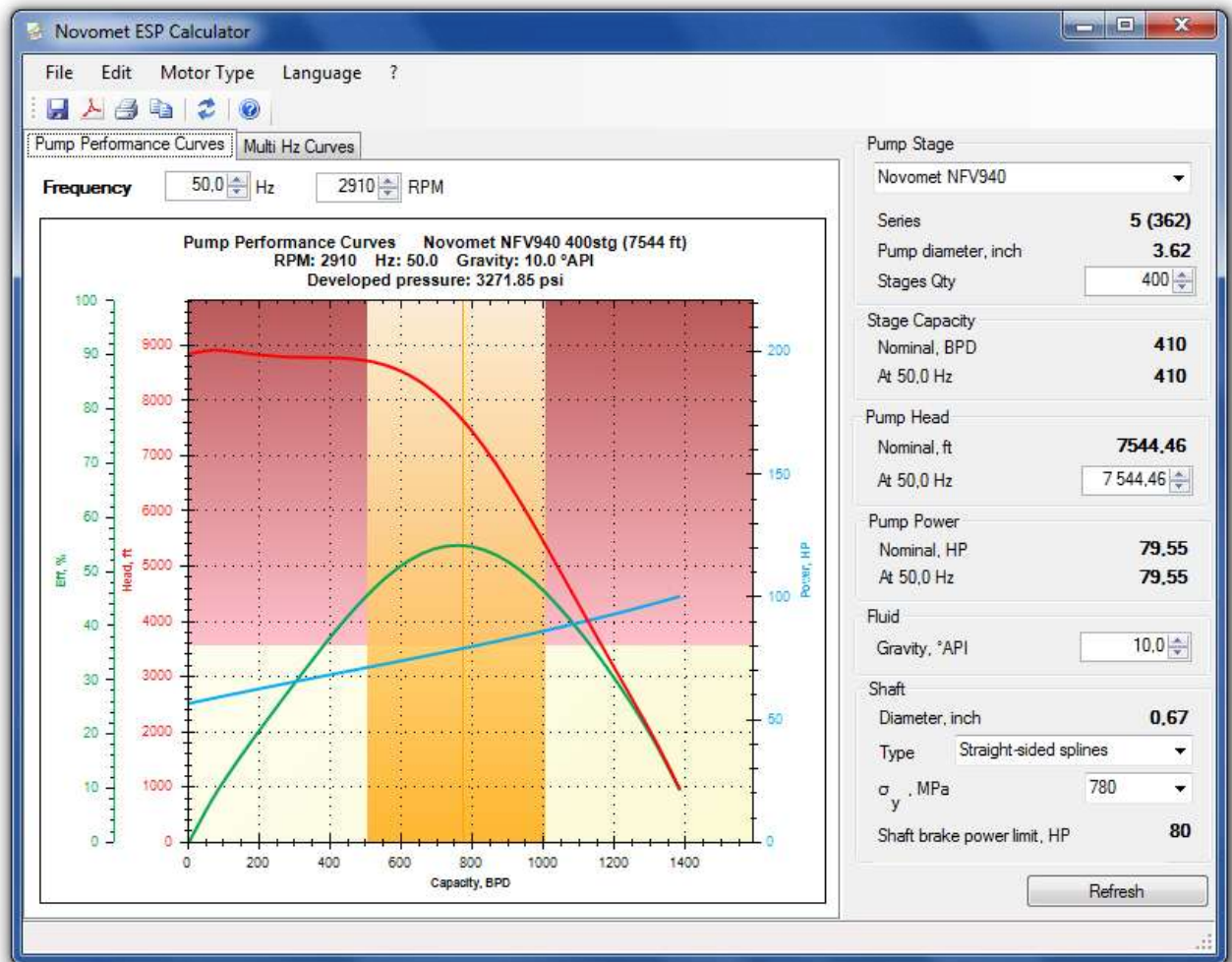


5.2. Operations sequence



5.3. Troubleshooting

In case the red colored area crosses the power curve of the pump in the upper part of the pump curve it means that in this area the pump uses a higher power



than the shaft can transfer, we should either change the shaft yield strength, or change the type of shaft, if this does not help, we should change the pump for a pump with a bigger shaft diameter. If this does not help either, then the pump that you selected can not be used, in this case there is only one solution - reduce pump head till power consumed by the pump is less than the shaft brake power limit (border line between two colored areas).

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