AutographPC™

Release Notes Version 12.2

September 2024

Baker Hughes

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Introduction

The latest release of AutographPC™ version 12.2 is now available for update or download by internal and external users. The main new feature is the update of the HPumps module, along with other additions required to reflect the new products developments.

HPumps module updates

The update of the module for Horizontal Pumps in AutographPC™ has begun, adding features that allow to proceed with the sizing process for these systems, making it competitive with other third-party software used by BH employees and customers of this product segment.

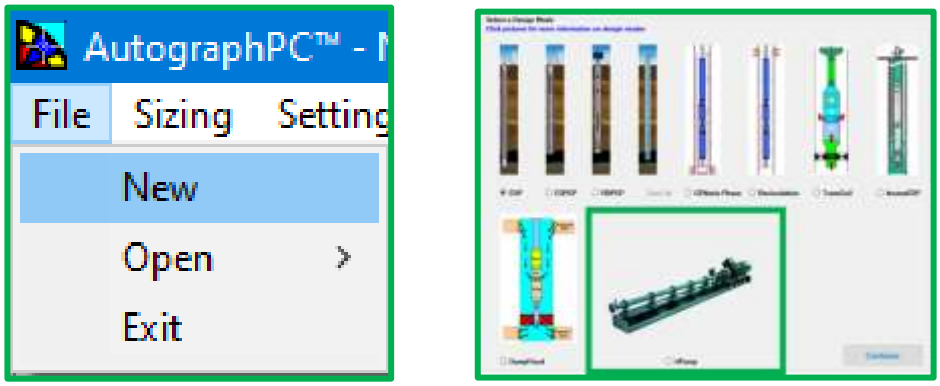


Figure 1: HPump Design Mode Screen

This is the first stage of a series of updates to the module in accordance with the needs from users in different regions and skills levels, along with the collaboration of the HPumps Engineering team and Product Line Management.

Gas modeling

Traditionally AutographPC treats fluid as Incompressible fluid in its calculation. Nowadays we are seeing more HPump applications that need to be able to take GVF into account.

The addition of the option for Fluids Properties allows the input of Gas Oil ratio, GOR, or Gas Liquid Ratio, GLR, in order to perform calculations to consider Gas Volumetric Fraction, GVF, when selecting the pump stage for the specific application. The data input in the Fluids tab, for gas modeling, activates the PVT calculations embedded in the program, in the same way these are done in the ESP modules, displaying calculations for parameters at intake and discharge conditions, based on the different correlations available.

To activate this feature, in the Pump tab, the Gas Modeling box, under Design Options, must be selected.

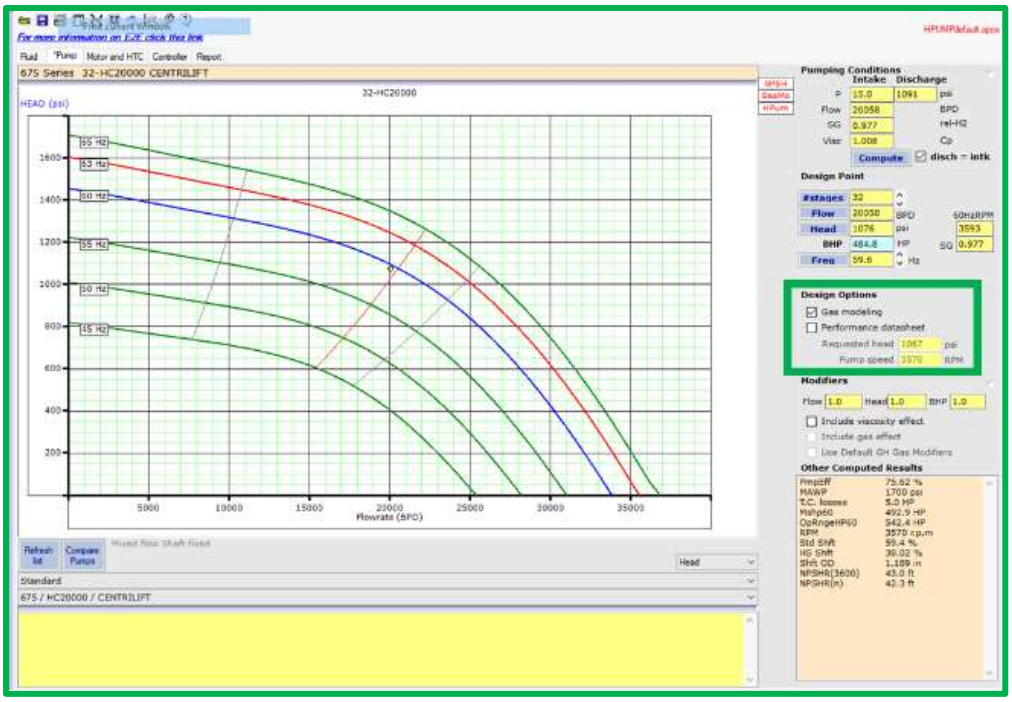


Figure 2: Gas Modeling option.

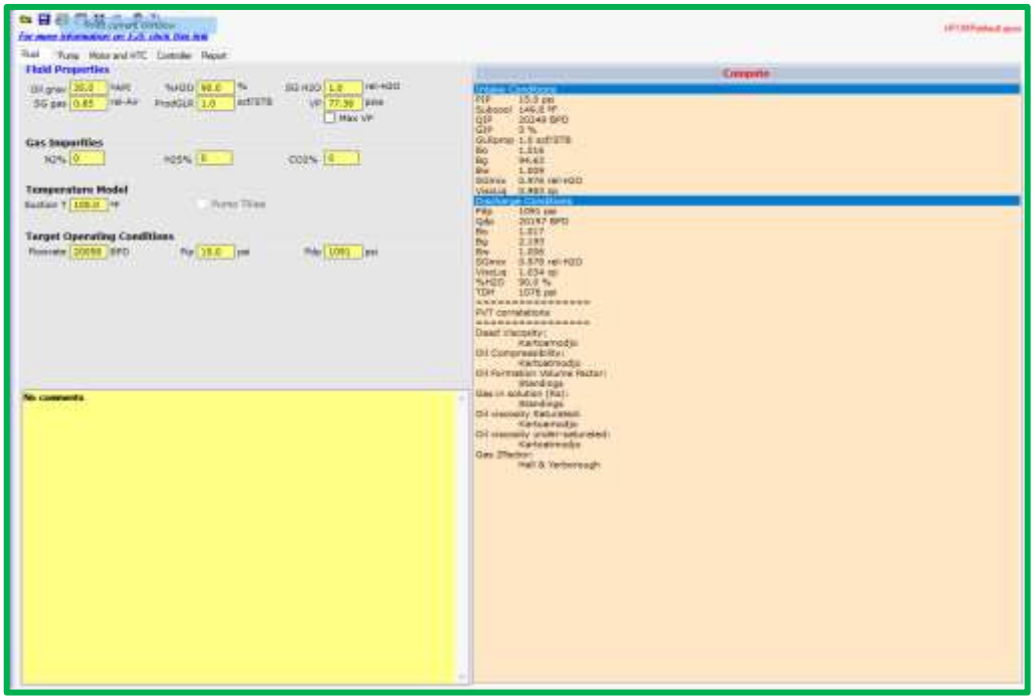


Figure 3: Gas data input screen.

Upon selecting this option, the Pump and the Fluid tabs can be Tied/Untied. The user can execute calculations based on the input data and other iterations isolating the pump. To see the effect of the input gas conditions in the pump, the Pump tab must be tied.

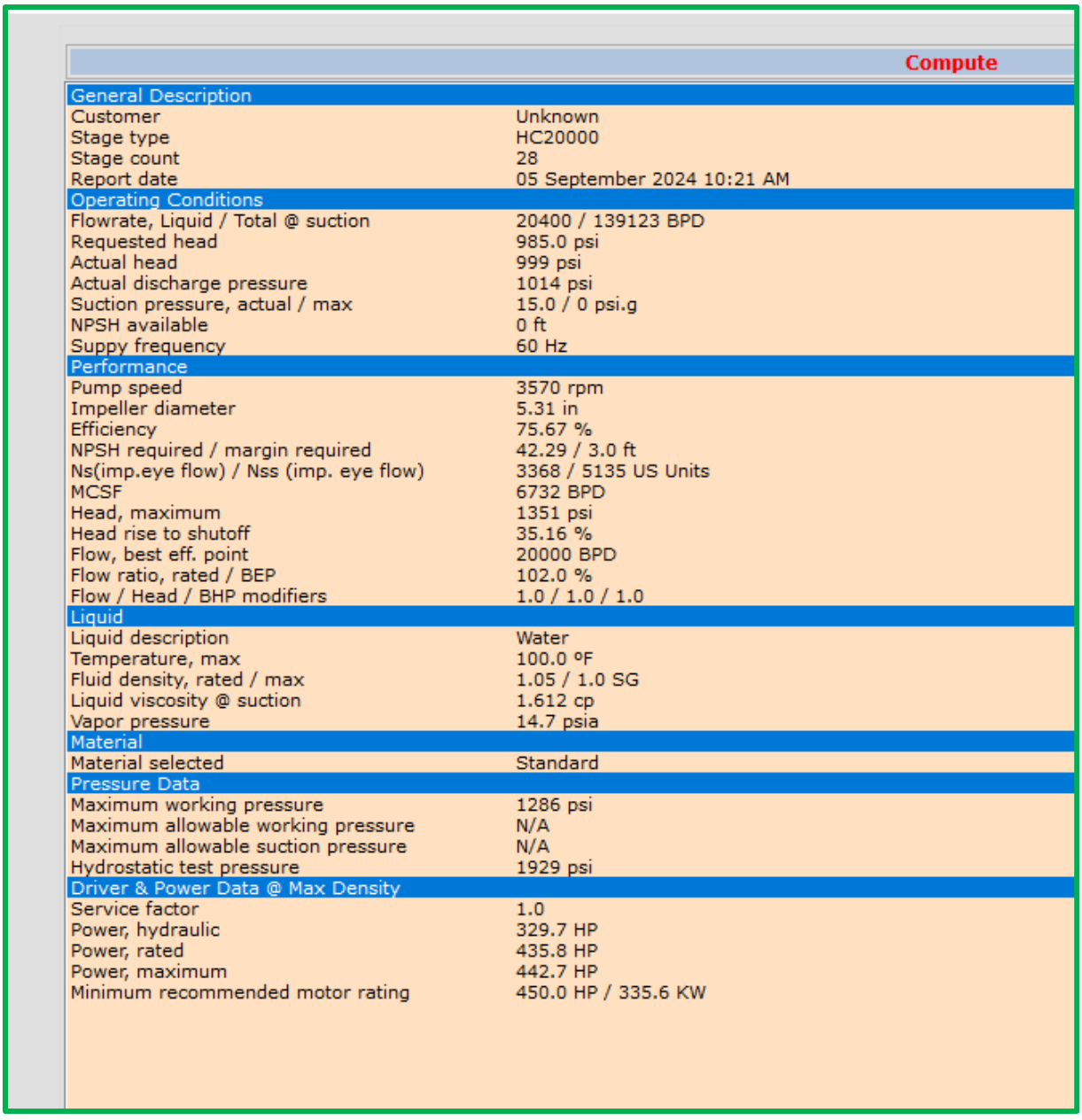
The Turpins plot to determine conditions for gas locking, is available as well to be used as criterion for pump selection.

Performance datasheet

A new feature included in this version, is a summary of the calculated parameters based on the input data, showing the main parameters reflecting the operational conditions.

For now, the option is available for non-tapered systems.

More parameters, that are critical for HPump design and operations, were added in this release as shown in the following screen capture.



Compute

General Description	
Customer	Unknown
Stage type	HC20000
Stage count	28
Report date	05 September 2024 10:21 AM
Operating Conditions	
Flowrate, Liquid / Total @ suction	20400 / 139123 BPD
Requested head	985.0 psi
Actual head	999 psi
Actual discharge pressure	1014 psi
Suction pressure, actual / max	15.0 / 0 psi.g
NPSH available	0 ft
Suppy frequency	60 Hz
Performance	
Pump speed	3570 rpm
Impeller diameter	5.31 in
Efficiency	75.67 %
NPSH required / margin required	42.29 / 3.0 ft
Ns(imp.eye flow) / Nss (imp. eye flow)	3368 / 5135 US Units
MCSF	6732 BPD
Head, maximum	1351 psi
Head rise to shutoff	35.16 %
Flow, best eff. point	20000 BPD
Flow ratio, rated / BEP	102.0 %
Flow / Head / BHP modifiers	1.0 / 1.0 / 1.0
Liquid	
Liquid description	Water
Temperature, max	100.0 ºF
Fluid density, rated / max	1.05 / 1.0 SG
Liquid viscosity @ suction	1.612 cp
Vapor pressure	14.7 psia
Material	
Material selected	Standard
Pressure Data	
Maximum working pressure	1286 psi
Maximum allowable working pressure	N/A
Maximum allowable suction pressure	N/A
Hydrostatic test pressure	1929 psi
Driver & Power Data @ Max Density	
Service factor	1.0
Power, hydraulic	329.7 HP
Power, rated	435.8 HP
Power, maximum	442.7 HP
Minimum recommended motor rating	450.0 HP / 335.6 KW

Figure 4: HPump performance data sheet

The performance datasheet has a box to activate it in the Pump tab. The HPump datasheet is displayed, allowing to input data for the Operating Conditions and Liquid characteristics. Upon updating these parameters, the program calculates parameters that can be seen in the tab and can

be populated as a report, printable or as PDF file, to be handed to the persons with interest. This report tabulates all the input and calculated data, as well as two plots for reference, NPSHr vs Flow and Head/Power/Efficiency vs Flow.

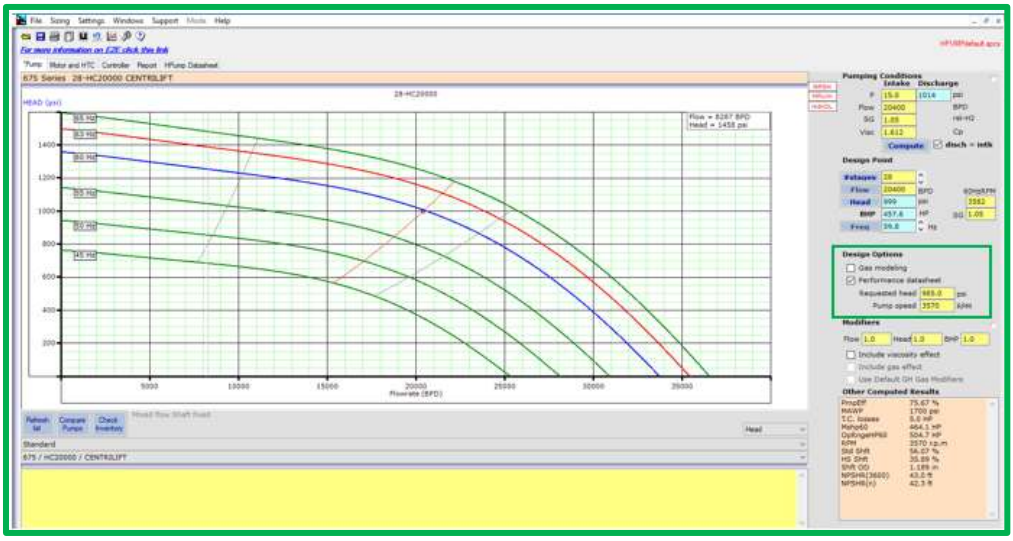


Figure 5:Performance datasheet option

This icon allows to see the same of the report.

HPumps Datasheet sample.pdf

Filtered pumps database

As a way to tailor the module for HPumps, the list of pumps available has been revised and only those pump stages for HPumps applications are displayed in the drop list.

Pump screen

A cross on pump curve plot has been added displaying the Flow and Head values as the user moves the cursor over the tornado curve. The fixed frequency curve shows Power and Efficiency in addition to Flow and Head. This option is as well available for all other Design Modes in the program.

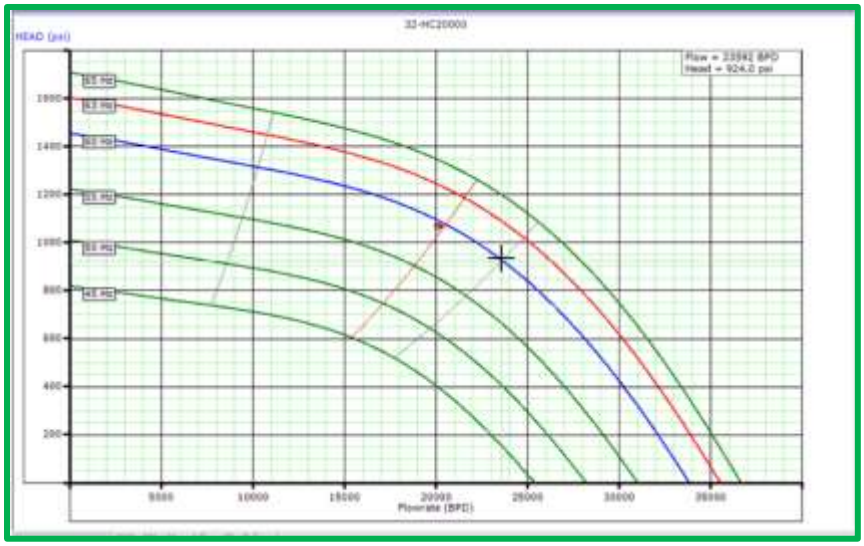


Figure 6: Cross on tornado curve plot

Figure 7: Cross on fix frequency curve

JSON format option

AutographPC™ file is XML based. We are in the process to integrate APC with Leucipa. Leucipa prefers APC model in JSON format, which can help to reduce the size of the APC file. Users now can export APC model into JSON format.

User can access this feature from File menu:

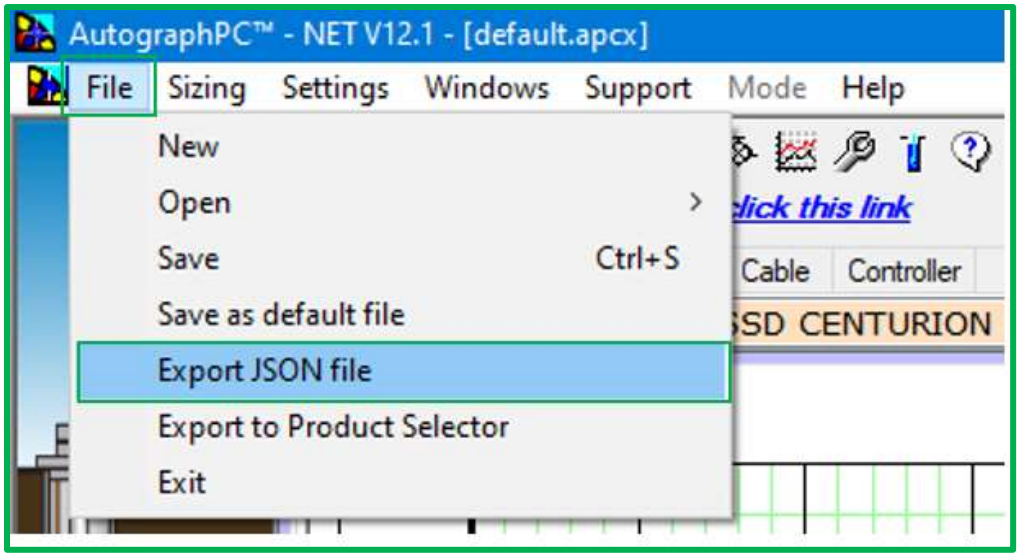


Figure 8: JSON format option for APC files

Pump Discharge Pressure design mode

Traditionally, APC uses Tubing Pressure (Ptbg) as input or boundary condition. Nowadays we have to deal with situations in which Ptbg might not be available because the gauge is not working or is not monitored from Scada system. For ESP performance matching purpose, we can now enable AutographPC™ to use Pump Discharge Pressure (Pdp) as input/boundary condition, a parameter that can be read from the sensor measuring discharge parameters.

From Well screen, user can enable Pdp as input by clicking on Pdp checkbox

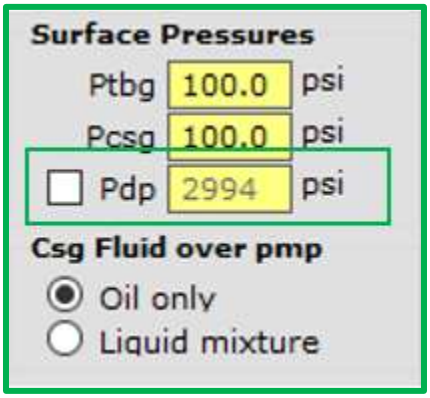


Figure 9: Discharge pressure activation box

After Pdp is enabled, one can see Ptbg text box is disabled.

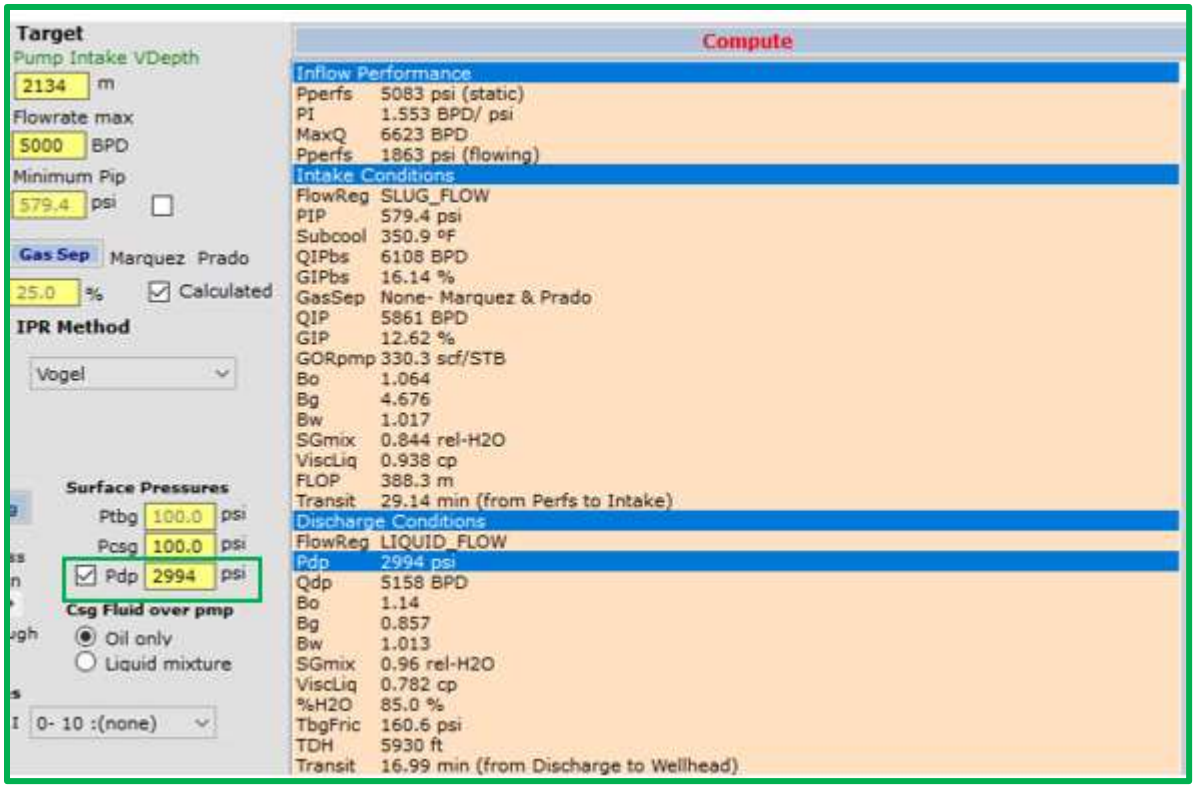


Figure 10: Discharge pressure input

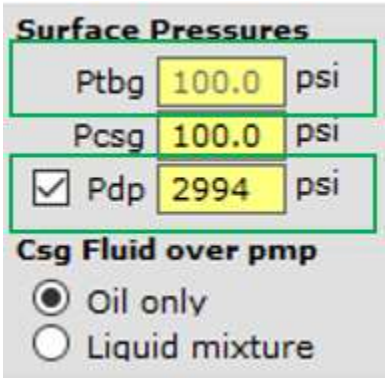


Figure 11: Pdp from calculated parameters

User can click on Compute button to use Pdp as input for design and performance matching.

Notice when Pdp is enabled APC will calculate corresponding Ptbg.

If the Pdp is inactive, it will be displaying the calculated discharge pressure based on the Ptbg input.

Other updates

Motor Pressure Loss calculations are displayed in the Motor Tab.

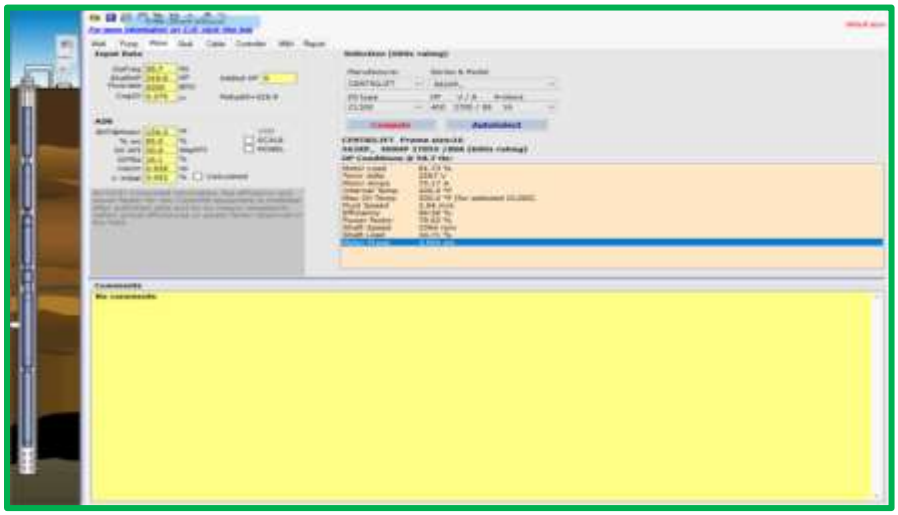


Figure 12: Ploss value in motor tab

Correction to bug in the calculation of oil viscosity curves.

Correction to pump list display when tapered pumps are selected.

Database updates

Motors

The Magnefficient motors in 375 and 440 series, have been updated as E2E.

Pumps

900 series Flex1500 stage has been updated in its minimum flow rate to 500 GPM (17,140BPD)

Updated curves for E40000

1000-Flex1500_HSG is the nomenclature for the Hpumps applications

FLEX31_A, FLEXER_A, updated minimum flowrate and coefficients

E2000, updated coefficients

HC27000CG and E8000LS CSHD: Included as stages for high temperature applications

Resources

- Technical Support Portal.
- Teams OFS AutographPC channel
- Release notes library