

You can use Pump module to calculate Break Horsepower (BHP), Flow Rate, and Total Dynamic Head (TDH) for a centrifugal pumping system.

General Information	
CALCULATE:	[Dropdown]
Project:	BRAKE HP
Client Name:	PUMP FLOW TOT DYN HD

The Pump module provides fluid viscosity corrections that lets you enter the Viscosity Correction Factors for flow, head, and/or pump efficiency.

% Motor Loading :	64.98	%
Brake Horsepower :	454.89	BHP
Sug. Name Plate HP :	700	HP
Visc. Flow Corr. Fac. :	1	
Visc. Head Corr. Fac. :	1	
Visc. Eff. Corr. Fac. :	1	

C-MAX automatically adjusts the efficiencies of the Adjustable Speed Drive (ASD), part-load motors, and pump for your pump performance calculation. This allows error-free accurate pumping system performance calculation.

Performance Calculation		
Differential Pressure:	60.66	psi
Total Dynamic Head:	142.92	feet
Pump Efficiency:	89.45	%
Motor Efficiency:	96.2	%
ASD Efficiency:	88.61	%
Hydraulic Horsepower:	406.9	HP

Easy-To-Learn and Use Unique "All-In-One" System Input Forms

PUMP FLOW CALCULATION	
Type of Calculation	
<input type="radio"/>	Electrical Calculation
<input checked="" type="radio"/>	Hydraulic Calculation

When you use C-MAX, deriving the pump flow rate or total dynamic head from motor power draw data is just a simple mouse click away!

Adjustments to the pump efficiency and system pressure drops, including control valve DP, are made automatically when the pump is operated on its base characteristic curve.

The pump module is designed using Cameron Hydraulic Data Book and Goulds Pump Manual.

EQUIPMENT/CONTROL VALVE PRESSURE DROP		
Type of Equipment		
Primary Filters	[Dropdown]	5 psi
CHILLER	[Dropdown]	10 psi
HEAT EXCHANGER	[Dropdown]	8 psi
High Pressure Screens	[Dropdown]	15 psi
[Dropdown]	[Dropdown]	0 psi
Type of Control Valves		
HAND CONTROL VALVE	[Dropdown]	8 psi
Screen Flow Valve	[Dropdown]	11.7 psi
Total Equipment/CV Pressure Drop: 57.7 psi		
Calculate	OK	Cancel



The Systems Analysis Software for All Fluid Flow Applications

# Pump Module

You can create these industry-standard, ready-to-use reports from the C-MAX Pump module.

CENTRIFUGAL PUMP DATA SHEET	
CLIENT: Utility Company	JOB NO: 9518
LOCATION: Seattle, WA	PUMP NO: PMP-101
PLANT / UNIT: Paper Machine 2	CASE NO: DESIGN CASE
SERVICE: White Water	NO OF UNITS:
PUMP MFR: Warren Pump	SERIAL NO:
SIZE / TYPE: AW-12-22	
OPERATING CONDITIONS	
FLUID: WATER	NORMAL FLOW: 14000 gal/min
PUMP TEMP: 100 deg F	DESIGN FLOW: 14000 gal/min
	DESIGN PRESS: 94.39 psia
	DESIGN NPSH AVAIL: 40.21 feet
	DESIGN NPSH REQD: 35 feet
	SS: 18.02 psi
	179.95 feet

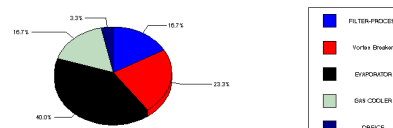
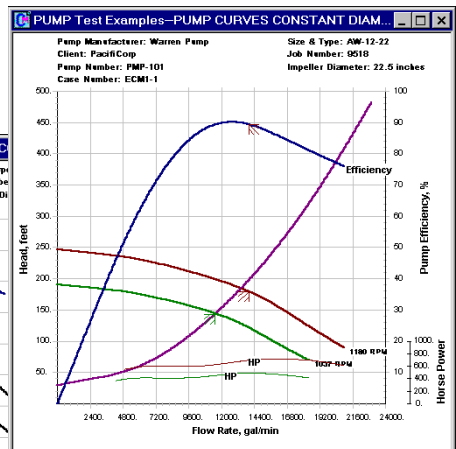
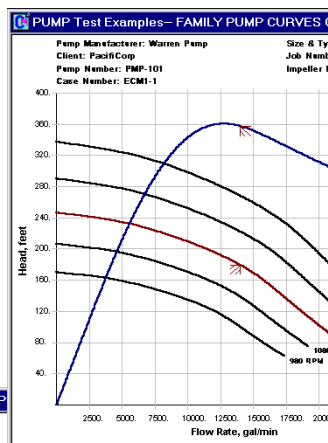
PUMP SYSTEM FORM			
GENERAL INFORMATION			
PUMP SYSTEM	Job No: 9518	Service: White Water	Site Pressure: 14.7 psia
Project: Paper Mill	Pump No: PMP-101	Size & Type: AW-12-22	
Client Name: Utility Company	Case No: DESIGN CASE	Pump Mfr: Warren Pump	
Location: Seattle, WA	Unit: Paper Machine 2	Prepared By: PSP	
FLUID INFORMATION		INLET SYSTEM INFORMATION	
Name of Fluid: WATER	Original Pressure: 14.7 psia	Delivery Pressure: 23 psia	
Temperature: 100 deg F	Inlet Line Fric. Loss: 2.057 feet	Outlet Line Fric. Loss: 9.7311 feet	
Vapor Pressure: 0.9501963 psia	Total Equipment DP: 1.2 psi	Total Equipment CP: 5.77 psi	
Kinematic Viscosity: 0.7134256 cP	Static Suction Head: 12.7 feet	Static Discharge Head: 22.52 feet	
Specific Gravity: 0.9803998	Suction Pressure: 18.02 psia	Discharge Pressure: 64.39 psia	
Flow Rate: 14000 gal/min	Available NPSH: 40.21 feet	Required NPSH: 35 feet	
PERFORMANCE CALCULATION		ENERGY CALCULATION	
Differential Pressure: 76.37 psi	% Motor Loading: 99.55 %	% Kwh/hrs: 565.07 kWh	
Total Dynamic Head: 179.95 feet	Brake Horsepower: 696.87 BHP	Operating Hrs: 8400 hrs/year	
Pump Efficiency: 89.5 %	Sup Name Plate HP: 700 HP	% Kwh/hrs: 474655.8 kWh/year	
Motor Efficiency: 92 %	Visc Flow Corr Fac: 1	Energy Charge: 0.03224 \$/kWh	
ASD Efficiency: 100 %	Visc Head Corr Fac: 1	Demand Charge: 2.48 \$/kWh	
	Visc Eff Corr Fac: 1	Energy Cost/yr: 169845.47 \$/year	
Remark: Design Case: Original installed specifications of the pumping system.			

PUMP CALCULATION SHEET			
PROJECT: Paper Mill		JOB NO: 9518	
CLIENT: Utility Company		PUMP NO: PMP-101	
LOCATION: Seattle, WA		CASE NO: DESIGN CASE	
SERVICE: White Water		PUMP MFR: Warren Pump	
LIQUID PUMPED: WATER		PREPARED BY: PSP	
LIQUID PROPERTIES		PUMP DIFFERENTIAL PRESSURE	
Pumping Temperature (PT)	deg F 100	Discharge Pressure	psia 94.39
Viscosity @ PT	cP 0.7134	Suction Pressure (+ for Lit)	psia 18.02
Vapor Pressure (VP) @ PT	psia 0.950196	TOTAL PUMP DIFF. PRESSURE	psi 76.37
Specific Gravity (SG) @ PT	0.9803998	TOTAL DYNAMIC HEAD	feet 179.95
Flow - Normal @ 60 F	gal/min 14000	BHP and kW CALCULATION	
Flow - Normal @ PT		Hydraulic Horsepower	hp 623.59
Flow - Design @ PT		Pump Efficiency @ C. O. P	% 89.5
PUMP HEAD CALCULATION		Brake Horsepower	bhp 696.87
Suction Pressure	psia 18.02	Electric Motor Efficiency @ C. O. P.	% 92
+Static Head	feet 12.7	ASD Efficiency @ C. O. P.	% 100
- Line Loss	feet 2.057	Electric Motor (Name Plate HP)	hp 700
+P Equipment	psi 1.2	% Motor Loading	% 99.55
PUMP SUCTION PRESSURE	psia 18.02	ELECTRIC POWER USE	kW 565.07
NET POSITIVE SUCTION HEAD		ENERGY & DEMAND CALCULATION	
Static Head	feet 12.7	Operating Hours	hr/yr 8400
- Line Loss	feet 2.057	Electricity Use	kWh/yr 474655.8
+ Equipment	psi 1.2	Demand Use	kWh/yr 565.07
+ (Original Pressure - VP)	psia 13.75	Energy Charge	\$/kWh 0.03224
AVAILABLE NPSH (LIQUID PUMPED)	feet 40.21	Demand Charges	\$/kWh 2.48
PUMP REQD NPSH (WATER)	feet 35	TOTAL ENERGY COST	\$/yr 169845.47
DISCHARGE PRESSURE	psia 64.39		
Delivery Pressure	feet 22.52		
Static Head	feet 12.7	FORMULA	

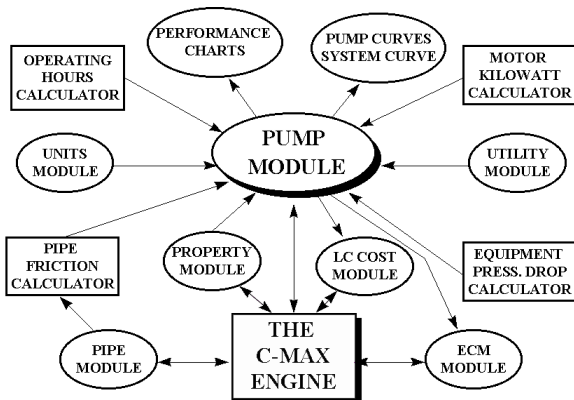
DESIGN	
TYPE: WEARING RING CLEARANCE	
STUFFING BOX ID DEPTH:	
ICATOR: CPLG GUARD	
SITON: SIZE RATING	
TESTS: SHOP INSPECTION	REQD WITH
HYDROSTATIC	
PERFORMANCE	
NPSH	
MATERIALS	
SHAFT - MAX DIAM @ CPLG	WEIGHTS
WEARING RING	PUMP @ CPLG
	BASE
	TOTAL
PRESSURE	
SHAF - MAX DIAM @ CPLG	INCHES
SPFACE REQUIREMENTS W/ DRIVER	
OVERALL LENGTH	INCHES
OUTLINE DWG NO	
CROSS SECTION NO	
PERFORMANCE CURVE NO	
G.F.P. NO	
DRIVER	
HP	RPM
PSIG	F SUPER HT
PSIG	WR/HP - HR
M	#HR WT #
REVISIONS	BY CHK APPD APPD

C-MAX graphs pump performance & characteristic curves, system curve, efficiency curve, horsepower curves, and adjustable speed drive curves. It will also plot a composite characteristic curve for two or three parallel pump operation.

SYSTEM PRESSURE DROP REPORT			
GENERAL INFORMATION			
Job No: 9518	Project: Paper Mill	Service: White Water	
Equipment No: PMP-101	Client: Utility Company	Site Pressure: 14.7 psia	
Case No: DESIGN CASE	Site: Seattle, WA	Prepared By: PSP	
SYSTEM PRESSURE DROP SUMMARY			
INLET SYSTEM			
Filter Process	0.50	psi	
Yorke Brake	0.70	psi	
EVAPORATOR	1.20	psi	
GAS COOLER	0.50	psi	
ORFICE	0.10	psi	
TOTAL PRESSURE DROP	3.00	psi	

The Pump module is fully integrated with the Pipe module, Energy Conservation Measure (ECM) module, Life Cycle Costing module, and other modules as shown below.



- C-MAX Modules**
- ⇒ Centrifugal Pump
  - ⇒ Fans & Blowers
  - ⇒ Compressors
  - ⇒ Centrifugal Recip. & Rotary Screw
  - ⇒ Flow of Fluids (Piping)
  - ⇒ ECM Compare
  - ⇒ Economic Evaluation
  - ⇒ Non-Energy Benefits
  - ⇒ Performance Charts
  - ⇒ Utility Rates
  - ⇒ Properties Database
  - ⇒ US/SI Units