

UPHOLDING **EXCELLENCE** IN THE **PUMP** INDUSTRY



THE MOST ADVANCED
CENTRIFUGAL PUMPS FOR
PULP & PAPER MILLS





SAM TURBO INDUSTRY PRIVATE LIMITED



About Us

Greetings! We are delighted to introduce us as your dependable pumping partner.

SAM TURBO INDUSTRY PRIVATE LTD. has been an industry leader in the pump industry since 1971, providing premium design, manufacturing, supply, and servicing of pumps for the Pulp and Paper Industries worldwide. We've earned a well-deserved reputation for producing pumps that incorporate cutting-edge technology, advanced manufacturing techniques, and high-quality materials to ensure unparalleled reliability and dependability.

Our broad range of pumps caters to all the requirements of the pulp and paper industries and is tailored to meet a wide range of applications. We pride ourselves on being the preferred choice of several satisfied clients who continue to support us and recommend our pumps to other industries.

Our FAN pumps boast a split-casing design with a staggered vane design for low pulsation up to 4000 m³/hr, and we offer end-suction and back-pull-out design pumps for smaller capacities. Our pulp stock pumps can handle up to 7% consistency in many materials of construction up to 2000 m³/hr, medium consistency pumps up to 12% consistency, and chemical pumps with closed, open, and non-clog designs of the impeller to cater to various Pulp & Chemical applications.

Our range of pumps provides maximum efficiency, resulting in superior energy efficiency across pulp and paper industries. We take quality seriously, and we apply strict standards for castings from our foundry. Our in-house steel foundry is capable of producing 600 MT of castings every month, and our Investment casting and foam casting facilities enable us to manufacture castings with precision. Spectrovac, PMI and other mechanical testing equipments are available in order to ensure proper and precise chemical composition and mechanical properties

Our primary objective is to add your name to our esteemed list of regular customers by providing high-quality pumps. We are confident that once you use our pumps, you will keep coming to us for all your pumping requirements.

Yours faithfully,

For SAM TURBO INDUSTRY PVT LTD.,

S.K. SENTIL KUMAR
Managing Director



SAM TURBO

INDUSTRY PRIVATE LIMITED

UPHOLDING
EXCELLENCE IN THE
PUMP INDUSTRY



INFRASTRUCTURE



Head Office

3D Pattern

Lost Wax

Wax Pattern



Foam Casting

Foundry



Spectrometer

CNC Machining Center



Machining

Balancing

Testing

**Materials from
SAM's captive
Steel Foundry**

CAST IRON (FG260) / 2.5% NiCl / Alloy CI / CA-15 / CA-40 / WCB / CF 8 (SS-304) / CF3 (SS-304L) / CF8M (SS-316) / CF3M (SS-316L) / CG8M(SS-317) / CG3M(SS-317L) / SS-2324 / DIN-1.4460 / DIN-1.4517 / ASTM A 890 - CD4M CuN (1B) / CD6MN(3A) / CD3MN(4A) / CE3MN (5A) / CN7M (Alloy-20) / SAMRON 17L (450 BHN)



' ZM ' Series



DOUBLE SUCTION SPLIT CASE PUMP



Operating Range :

Pump Size	: DN 50 to 700mm
Capacity	: Up to 4000m ³ /hr
Head	: Up to 140 M
Temperature	: Up to 200°C
Pressure	: Up to 40 bar

Design Features

Split case, Single Stage |
 Double suction, radial staggered vane impeller |
 High reliability & vibration free performances |
 Gland packing/ Mechanical seal |
 Reverse rotation available

Applications

Fan Pump,
 Stock feed, Stock circulation,
 Centri-cleaner application in pulp & paper mills |
 Storm water |
 Industries transfer works | Water



' TPS ' Series



HEAVY DUTY PULP & PAPER STOCK PUMP



Operating Range :

Pump Size	: DN 32 to 350mm
Capacity	: Up to 2250m ³ /hr
Head	: Up to 80m
Temperature	: Up to 140° C
Pressure	: Up to 22 bar

Design Features

DIN 24256 Standard | Open impellers with renewable front wear plate and closed impeller with wear ring | Simple external adjustment to maintain constant clearance between impeller and wear plate| Gland packed/mechanical seal | Dynamic Seal, Tapper roller bearings to take care of both radial & Thrust loads

Applications

Handling pulp & paper stocks up to 7% consistency |
 All liquor applications |
 Suitable for high capacity requirement of acids, alkaline, corrosive slurries, etc., heavily contaminated liquids, raw sewage & Sludge

'TPS + H' Series



MEDIUM CONSISTENCY PUMP



Operating Range :

Pump Size	: DN 80 to 200mm
Capacity	: Up to 500m ³ /hr
Head	: Up to 140m
Temperature	: Up to 150° C
Pressure	: Up to 22 bar

Design Features

Centrifugal & Single Stage |
Open Impeller With Fluidizer | End Suction &
Top/horizontal Discharge |
Sturdy & Vibration Free Casing Mounting To The Base
Frame

Applications

Handling pulp & paper stocks up to
8% - 12% consistency |
Available with in built (or)
External Vacuum Pump

'SPS + T' Series



HEAVY DUTY PULP & PAPER STOCK PUMP



Operating Range :

Pump Size	: DN 32 to 400 mm
Capacity	: Up to 2000m ³ /hr
Head	: Up to 80m
Temperature	: Up to 140° C
Pressure	: Up to 22 bar

Design Features

Wide passages in impeller suction zone, minimal vanes, non-clogging
design | Open impellers with renewable front wear plate & closed impeller
with wear ring | Simple external adjustment to maintain constant clearance
between impeller & wear plate | Gland packed / Mechanical seal /
Dynamic Seal Tapper roller bearings to take care of radial thrust loads

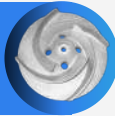
Applications

Handling pulp & paper stocks up to 7% consistency |
All liquor applications |
Suitable for high capacity requirement of acids, alkaline,
corrosive slurries, heavily contaminated liquids, raw sewage
& Sludge

' SPS ' Series



HEAVY DUTY PULP & PAPER STOCK PUMP



Operating Range :

Pump Size	: DN 32 to 400 mm
Capacity	: Up to 2000m ³ /hr
Head	: Up to 80m
Temperature	: Up to 140° C
Pressure	: Up to 22 bar

Design Features

Open impellers with renewable front wear plate & closed impeller with wear - ring | External adjustment for wear from suction side| Gland packed / Mechanical seal / Dynamic Seal / Cylindrical roller bearing for radial & Double row angular contact ball bearing for thrust

Applications

Handling pulp & paper stocks up to 7% consistency | All liquor applications | Suitable for high capacity requirement of acids, alkaline, corrosive slurries, heavily contaminated liquids, raw sewage & Sludge

' TPS + N ' Series



PULP STOCK PUMP



Operating Range :

Pump Size	: DN 150 to 200 mm
Capacity	: Up to 850m ³ /hr
Head	: Up to 65m
Temperature	: Up to 140° C
Pressure	: Up to 22 bar

Design Features

Heavy Duty Design | Fully Open Impeller With Renewable Front & Back Wear Plates | Gland Packed/ Mechanical seal / Dynamic Seal / Cylindrical roller bearing for radial & Double row angular contact ball bearing for thrust

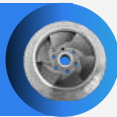
Applications

Handling Pulp & Paper Stocks Up To 7% Consistency | All Liquor Applications In Pulp & Paper Industries | Suitable For Acids, Alkaline, Corrosive Slurries Etc., |

'TCC' Series



HEAVY DUTY PROCESS PUMP



Operating Range :

Pump Size	: DN 50 to 150 mm
Capacity	: Up to 450m ³ /hr
Head	: Up to 45 m
Temperature	: Up to 140° C
Pressure	: Up to 22 bar

Design Features

Heavy Duty, Horizontal, Single Stage, End Suction, Radially Split, Volute Casing pump with back pull out design, conforming to DIN 24256. | Closed impeller with wear ring | Gland packed/mechanical seal/dynamic seal.

Applications

Pulp up to 1.5% consistency | Suitable for Fan pump, Clarified Water, Back Water, White Water, De - inking Water, Soft Water, Centri Cleaner Application, Corrosive Acids, Alkalies | Hydrocarbons Oils |

'TCH + N' Series



CHEMICAL PROCESS PUMPS



Operating Range :

Pump Size	: DN 25 to 200 mm
Capacity	: Up to 700m ³ /hr
Head	: Up to 180m
Temperature	: Up to 200° C
Pressure	: Up to 26 bar

Design Features

Conforming to ANSI B73.1. | Semi open impellers with balancing holes. | End suction / Top Centre line discharge | Only 3 bearing beds to cover 32 models | Gland packing / Mechanical Seal / Dynamic Seal. | Simple external adjustment for impeller wear

Applications

For low consistency Pulp & Stock, Green liquor, black liquor, Caustic and corrosive Slurry, lime-mud slurry, extraction, Alkalies, Acids, NaOH, China clay, Fitrates, Hypo, Spent wash, starch etc.



**CHEMICAL
PROCESS PUMP**



Operating Range :

- Pump Size : DN 32 to 200mm
- Capacity : Up to 750m³/hr
- Head : Up to 150m
- Temperature : Up to 200° C
- Pressure : Up to 22 bar

Design Features

Confirming to DIN 24256. | Closed impellers with balancing holes. | Wear rings to maintain the clearance. | Back pull out design | Gland packing/Mechanical Seal | Only 4 bearing frames to cover 32 models

Applications

For pulp with less than 1.5% consistency, Fan Pump De-inking process liquors, clarified water, back water, white water, Dewatering, etc., | Chemicals, Acids, Alkalis, Dyes, hydrocarbons etc., | DM Water, Hot water, condensates



**CHEMICAL
PROCESS PUMP**



Operating Range :

- Pump Size : DN 40 to 200 mm
- Capacity : Up to 650m³/hr
- Head : Up to 80m
- Temperature : Up to 120° C
- Pressure : Up to 22 bar

Design Features

Conforming to ANSI B73.1 | Open impeller construction | End suction / Top center line discharge | Gland packed / mechanical seal | Simple external adjustment for impeller wear

Applications

For low consistency Pulp & Stock, Green liquor, black liquor, Caustic and corrosive Slurry, lime-mud slurry, extraction, Alkalies, Acids, NaOH, China clay, Fitrates, Hypo, Spent wash, starch etc.

' WP '

Series



WATER PUMPS



Operating Range :

Pump Size	: DN 32 to 150mm
Capacity	: Up to 550m ³ /hr
Head	: Up to 100m
Temperature	: Up to 120° C
Pressure	: Up to 16 bar

Design Features

Confirming To Din 24255 |
Back Pull Out Design |
Gland Packed/
Mechanical Sealed |
Closed Impeller Design with wear ring, for close clearance

Applications

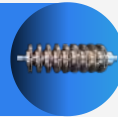
De-inking Water, Soft Water,
Centri Cleaner Etc., |
Clarified Water, Back Water,
White Water
Booster Service

' MD '

Series



MULTI - STAGE PUMPS



Operating Range :

Pump Size	: DN 40 to 150mm
Capacity	: Up to 350m ³ /hr
Head	: Up to 600m
Temperature	: Up to 120° C
Pressure	: Up to 90 bar

Design Features

Multi Stage with Single suction closed Impeller |
Axial thrust compensated by balancing drum/disc

Applications

High Pressure application in Pulp & Paper Mills
Main and Auxiliary condensate extraction |
General water &
Dewatering &
Descaling

' FF '
Series



VORTEX
NON CLOG PUMPS



Operating Range :

Pump Size	: DN 40 to 125mm
Capacity	: Up to 350m ³ /hr
Head	: Up to 45m
Temperature	: Up to 120° C
Pressure	: Up to 12 bar

Design Features

Non-clogging Operation, Fully Free Vortex Design |
Any Solid That Enters Pumps Will Pass Through Discharge |
Minimum Particle Degradation |
Fluid Does Not Pass Through Impeller, Solids Leave In
Single Rotation

Applications

For any liquid having Big particles (Up to 75mm) |
For Sludge,
Pulp,
Ossein,
Slurry Applications

' MF '
Series



MIXED
FLOW PUMPS



Operating Range :

Pump Size	: DN 200 to 450mm
Capacity	: Up to 3000m ³ /hr
Head	: Up to 40m
Temperature	: Up to 110° C
Pressure	: Up to 7.5 bar

Design Features

Horizontal, Single Stage
End suction & discharge branch arranged tangentially
upwards / Horizontal
Open impeller construction

Applications

Stock Feed |
Stock Circulation | Pulp transfer / Centric cleaner
Clear Liquid |
Turbid or slightly contaminated liquid

' AR '

Series



SLURRY PUMPS SINGLE CASING



Operating Range :

Pump Size	: DN 50mm to 350mm
Capacity	: Up to 2800m ³ /hr
Head	: Up to 70m
Temperature	: Up to 110 ° C
Pressure	: Up to 40 bar

Design Features

Twin casing/Single casing design | Heavy duty & Single stage | Outer casing in Cl/ Carbon Steel
Inner casing in Ni-hard / Hi chrome to take entire wear
The Armored Centrifugal Pump is designed to suit various slurry pumping applications.

Applications

Liquids of abrasive and Coarse grained solids |
Lime mud slurry, milk of lime, liquor up to 50% solids |
Sand water mixtures |

' THM '

Series



NON CLOG PUMPS



Operating Range :

Pump Size	: DN 65 to 100mm
Capacity	: Up to 300m ³ /hr
Head	: Up to 30m
Temperature	: Up to 120° C
Pressure	: Up to 12 bar

Design Features

Horizontal, Non-clog,
Single Stage,
Back pull out,
High efficiency volute
Providing smooth unobstructed flow.

Applications

For handling solids in suspension,
Sludges,
Pulpy materials,
Sewage or waste with soft Solids in suspension,
Viscous liquids or liquids carrying fibrous materials

'VG' Series



VERTICAL CANTILEVER PUMPS

Operating Range :

Pump Size	: DN 25 to 200mm
Capacity	: Up to 400m ³ /hr
Head	: Up to 50m
Temperature	: Up to 120° C
Pressure	: Up to 22 bar

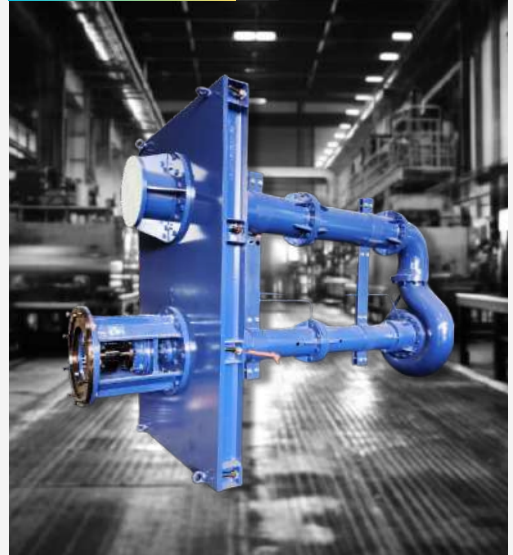
Design Features

Vertical Suspended | Single Shaft Design |
No Intermediate Bush Bearing Support |
Simple Mounting & Self Priming |
Up To 2mts Submersion Depth |
Can Be Extended Further With Suction Spool.

Applications

Suitable Where Space Economy Matters |
Suitable For Acids, Alkalies &
Slurries |
Waste Water. |
Sludge Handling

'VO' Series



VERTICAL SUMP PUMPS

Operating Range :

Pump Size	: DN 25 to 300mm
Capacity	: Up to 900m ³ /hr
Head	: Up to 120m
Temperature	: Up to 120° C
Pressure	: Up to 22 bar

Design Features

Vertical Suspended With Open/closed Impellers |
With Intermediate Bush Bearing Support |
Simple Mounting & Self Priming |
Up To 10m Submersion Depth |
Simple, Fast, External Impeller Adjustment

Applications

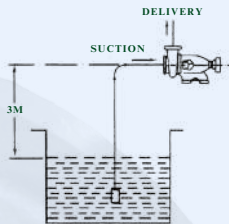
Suitable Where Space Economy Matters |
Suitable For Acids, Alkalies &
Slurries |
Waste Water. |
Sludge Handling



NET POSITIVE SUCTION HEAD - NPSH (A) CALCULATION

NPSH (A) = (Pressure on the liquid surface) (ha) + (suction head/lift) - (friction loss) - (vapour pressure) (hvp)

EXAMPLE-I OPEN TANK - SUCTION LIFT CONDITION

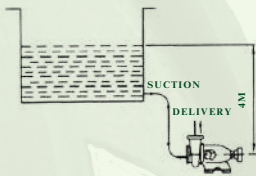


DATA: Source Pressure = 1 Kg/cm²
Suction Lift - 3 m
Friction loss in pipeline
Foot Valve, Strainer, Bend, Valve
1m, temperature of water: 21°C

METHOD

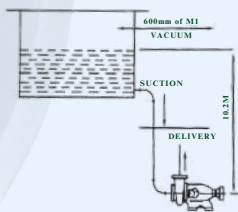
$h_a = 10 \times Pa / Sg = 10 \times 1 / 0.998 = 10.02$ Mts
Vapour pressure of water at 21°C = 0.0253 Kg/cm²
 $h_{vp} = 10 \times 0.0253 / 0.998 = 0.25$ m
NPSH (A) = 10.02 - 3 - 1 - 0.25 = 5.77 mts

EXAMPLE-II OPEN TANK - SUCTION HEAD CONDITION



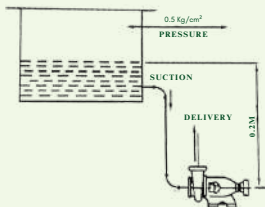
DATA: Suction head: 4 m,
Friction loss: 1.2 m
Temperature: 21°C Attitude: 1500m
Pressure at 1500m Attitude is 0.9 Kg/cm²
So, $h_a = 10 \times 0.9 / 0.998 = 9.02$ m
NPSH (A) = 9.02 + 4 - 1.2 - 0.25 = 11.57 Mts.

EXAMPLE - III CLOSED TANK UNDER VACCUUM CONDITION



DATA: Vaccum in Vessel: 600 mm of HG
Temperature: 40°C, Friction Loss : 1m
Vapour pressure and specific gravity are 0.49 Kg/cm² and 0.72 respectively at 40°C. Sg of mercury : 13.6
 $h_a = (10 \times 1 / 0.72 - 600 \times 13.6 / 1000 \times 0.72)$
 $= 13.88 - 11.33 = 2.55$
 $h_{vp} = 10 \times 0.49 / 0.72 = 6.81$ mts
NPSH (A) = 2.55 + 10.2 - 1 - 6.81 = 4.94 mts

EXAMPLE-III CLOSED TANK UNDER PRESSURE

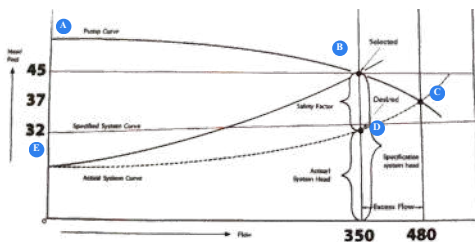
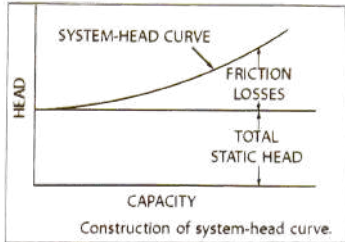


DATA: Pressure in closed vessel : 0.5 Kg/cm²
Atmospheric Pressure at the installation : 0.9 Kg/cm²
Friction loss: 1.5 m, vapour pressure: 0.45 Kg/cm²
Specific gravity: 0.8
METHOD
 $h_a = (10 \times 0.9 / 0.8 + 10 \times 0.5 / 0.8) = 11.25 + 6.25 = 17.5$
 $h_{vp} = (10 \times 0.45 / 0.8) = 5.625$
NPSH (A) = 17.25 + 0.2 - 5.625 - 1.5 = 10.325 mts

EFFECT OF OVER SIZING PUMP



At first sight, a centrifugal pump seems to be one of the simplest machine. In practice however, it is capable of posing an enormous spectrum of different problems. Occasionally one comes across problems that seems to defy everything, we know about centrifugal pumps.

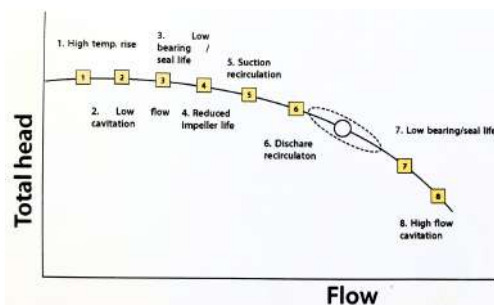


The system head curve is developed by plotting total system head (static and friction loss) as the flow varies from zero to maximum. System head curve analysis helps define the operating relationship between the pump head and the system head. Efficient and trouble free operation depends on a close match of pump curve and system curve. Otherwise pumps may be picked that are improperly sized and do not run at the conditions for which they are selected/purchased.

At design flow 350cum/hr, the Engineer calculates the head as 32m,. Erroneously believing that using a safety factor will ensure his reaching D, he adds 12 m, to obtain total head of 45 m. Assuming the user needs a pump to operate 350cum/hr, and 45m, pump manufacturer selects a pump with curve A,B,C. The pump curve intersects the system head curve at BEP- Best Efficient Point.

However, the actual system curve is E,D,C and the pump will run at C rather than B. Because with discharge valve fully open, pump seeks equilibrium with the system and operate at the intersection of pump curve and system head curve. At point C the pump will produce a flow 445 of 480cum/hr. Not only the Auser is getting different conditions than he wants, he is also operating at a less efficient Point on the pump curve and spending more on energy.

Centrifugal pumps seldom run at their best efficiency point (BEP). Let's look at what happens when we go off the BEP:



To get 350 cum/hr, the valve is gradually closed, steepening the system head curve. The pump produces 350 cum/hr and 45 m. But head at 350 cum/hr is 32 m. The pump thus produces 45m and 350 cum/hr but delivers only 32 m and 350 cum/hr to the system. The additional head 12 m, is thus wasted across the valve as heat and noise.

The effects of over sizing the pumps are

1. operation at excess capacity requires greater NPSH®
2. High pressure drop through foot valve,
3. cavitation leading to efficiency drop and premature failure of rotor.
4. Greater power consumption
5. High initial purchase cost
6. Internal loading and hydraulic radial thrust and
7. vibration and dehydration.



The solutions are 1. Reduce impeller dia 2.Reduce speed and 3.Go for new correct sized pump.

Excessive throttling pulp stock pumps leads to dehydration due to high velocity, vibrations, greater internal radial load reducing life of rotating element. Hence, the pumps are not to be operated for extended periods, less than 1/4th of BEP capacity.

It is needless to mention that for any machine preventive and routine maintenance is mandatory for its successful operations.

PIPING DESIGN FOR PULP PUMPS



A RIGHTLY SELECTED VALVE FOR THE INLET PIPE (=WHEN OPEN, NO HEAD LOSS) CAN ALSO LOCATE IN A SMALLER PIPE (a)

Connections to the inlet pipe - evenly and as far away as possible from the inlet opening

Best for stock below 4% bent pipe prevents air from coming into the pump when the surface is low
The design of the inlet opening of the suction pipe

The Positioning of the refilling pipes in the reservoirs so that the incoming liquid does not transport air into the reservoir and the pump

Air Pockets must be avoided when planing the piping

Pipe reductions after pipe directed upwards

SMOOTHLY FORMED CONNECTIONS TO THE MANIFOLD

Pipe reductions in horizontal pipe

THE EXPANSION JOINT SHOULD BE SUPPORTED THE FIXED POINT, NOT BY THE PUMP

HIGH WEAR RESISTANT MATERIAL FOR PULP & PAPER MILLS

SAMRON-17L (450 BHN)

Samron 17L is a high wear resistant alloy developed by R & D section of SAM TURBO having a hardness of 450 BHN. This is a complex alloy of carbon, chromium, molybdenum, nickel, copper and micro elements which can be pre-machined to required dimensions and upgraded to the desired hardness by resorting to differential heat treatment, coupled with high hardness

Normally, pulp stock pumps are available with max. hardness of 260 BHN in CD6MN, CE3MN, CE8MN & CD4MCu or SS-2324. Now, SAM TURBO can offer these pumps for abrasive applications of pulp containing relatively larger suspension of hard abrasive solids such as silica, sand and silt etc. SAM has supplied this material to various mills, increasing the productivity of plants by reducing the down time due to prolonged life. Apart from supplying end suction pumps in this material, SAM has successfully manufactured and supplied even bigger horizontal split case pumps using SAMRON-17L.





SAM TURBO

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