PUMP CHALISA

II BY ER. B.M. CHATWANI, EX. CE (MECH.), GWSSB, GANDHINAGAR II

MAJOR 40 MISTAKES WHICH WE MAKE IN SELECTION/SIZING/OPERATION

These are 40 main defects in selection, sizing and operation of pumping system due to which 20-30% overall system efficiency is lost, which means waste of 20 to 30% energy. Following are details of 40 main defects.

II MECHANICAL II

Sr. No.	Defects	Effects
II 1 II	Faulty intake/sump design (less submergence)	Vortex, swirl, cavitation (Pump life & performance affected)
II 2 II	Faulty suction filter (Opening in suction filter not min. required more than 4 times of bell mouth dia.)	Intake speed increases, cavitation etc., pump life & performance affected
II 3 II	Faulty suction pipe arrangement (Dia. Not as per velocity of 1.5 m/s, unnecessary bends, more length, air entrance)	Hf more, more vibration , air interring so cavitation, pump life & performance badly affected,
II 4 II	Suction specific speed more than 420 rpm (S = (3.65*N*√Q)/(N)^0.75)))	Pump reliability less wear & tear, more pump life reduced
II 5 II	Faulty sizing of pump set	Less efficient, less reliable, costly in O&M

	(oversized/undersized, Non-optimized initially or now)	
II 6 II	Faulty selection of pump set (Polder pump/mono sub. Pumps etc.)	Costly in long run, less efficient, less reliable so opt for sub cf. pump sets
II 7 II	Faulty installation pf pump sets	Frequent failure, heavy repair expensive, less reliability
II 8 II	Faulty operation (solo operation for long time, poor priming, 10-15 seconds)	Damage to pump set due to run-out
II 9 II	Faulty maintenance	Less reliability, more O&M expenditure, life reduces
II 10 II	Faulty operating point (w.r.to BEP)	Less efficiency, more O&M expenditure
II 11 II	Faulty S.H. Curve (pump curve & SH curve not intersecting at BEP)	Less efficiency, more O&M expenditure
II 12 II	Unnecessary throttling of delivery valve	Less efficiency, Costly O&M
II 13 II	Faulty pressure gauges (tell-tally equipment)	Can't monitor proper pressure on delivery line & know about leakage if any
II 14 II	Under sized delivery lines & accessories, valves, expansion bellows, flow meter etc. delivery velocity more than 2.5 m/s	Excessive energy consumption, Hf more than required

II 15 II	Faulty valves: SV/BFV/NRV (K-factor more –weight less, MoC poor, Non-operative so not closing or opening during stoppage/starting)	Less life, frequent leakages, Hf more Pump starting with open valve so loading of motor
II 16 II	Specific speed not in the range of 140-200, best at 170 rpm for max efficiency	Loss of efficiency Loss of reliability Loss of power Loss of working life
II 17 II	Non-repairing timely (Re-pair)	Loss of reliability Loss of power Loss of working life
II 18 II	NPSHR more than NPSHRA	Cavitation
II 19 II	Non-performing energy audit annually	Loss of reliability Loss of power Loss of working life
II 20 II	Non- replacement in efficient P/M timely	Loss of reliability Loss of power Loss of working life
II 21 II	Residual head too high	Water coming as jet & damaging the ESR & lines
II 22 II	Residual head very less	Water not reaching the destination
II 23 II	Heavy leakage in pipe lines due to rusting, cracking or non-proper gasketing	Loss of water
II 24 II	No-soft start/stop due to non-matching of torque of the motor	Reduced life of pump sets bearing, shaft etc.

II ELECTRICAL II

II 25 II	Non-maintaining of PF @ 0.98	Excessive power bills
II 26 II	Non-stabilization of voltage	Excessive power consumption, more heat generation, damage to the cables & instruments
II 27 II	Faulty sizing of motor over/under loaded	Less efficient, more costly, un reliable
II 28 II	Non-Installation of energy efficient electric-motors	Excessive power bills,
II 29 II	Non-installation of energy efficient transformer	Costly O&M
II 30 II	Faulty operation of transformer in parallel operation	Costly O&M
II 31 II	Use of rewinded motor	Costly O&M
II 32 II	Faulty cable type selection instead of XLPE to PVC insulated	Costly O&M
II 33 II	Non-maintaining of temperature in pump room (10 degree Celsius higher than designed temp. can reduce life of cable by 50%)	Life of cable reduces, resistance increase with temperature

II 34 II	Non-use of VFD where dynamic head is more than 60% of the total head	Excessive power consumption
II 35 II	Non-replacement of transformer even where payback period is less than 8 years (1/3 life of TR)	Costly O&M Less reliability
II 36 II	Non-replacement of capacitor bank where Payback period is less than 8 years	Costly O&M Less reliability
II 37 II	Developed torque less than required by pump	More wear & tear of motor, pump etc., reduce life of O&M
II 38 II	Poor Ventilation in pump room (Air change 10-20 times required)	Creates higher temperature so reduces life of insulation of motor, cable etc. so costly O&M
II 39 II	Non-evaluation of capital rates of motors on efficiency basis	Getting poor quality of motors at lowest rates approval system
II 40 II	Non-evaluation of capital cost of transformers on load/no load losses basis	Getting poor quality of transformers at lowest rates approval system

Let us open our eyes & rectify these 40 defects or do not hesitate/ delay disposal of inefficient machinery if energy saving by energy efficient machinery pays back its capital cost within ¼ (25 %) of its prescribed life. Doing details energy audit (post mortem) or various tests are not necessary when we can compare the ideal power required for the present discharge and head versus present power consumed. If difference is more than 20% we should decide direct disposal to save time and money.