50 HP Tesla Disc Pump vs Discflo Interpolation Performance Envelopes

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Below are modeled expected field curves for a 50 HP-class module for (1) a Tesla-style disc pump (wide-gap, mining-water tolerant) and (2) a Discflo-type Discpac pump (engineered disc spacing/count; optional ribbed High Head discs). Discflo documents that Discpac diameters (8–20 inch), disc count (2–20), and spacing are configurable, and mentions smooth vs ribbed High Head discs to tune head/flow/efficiency. ([Discflo][1])
These curves are not manufacturer pump curves; they are quantitative, internally consistent performance envelopes constrained by 50 HP power limits and typical disc-pump soft curve behavior (head decays with flow). Use them for first-order system sizing and to compare curve shape between architectures.

Modeling basis
Fluids
Fluid A: Wash-plant water
• Viscosity: 1.2 cP
• Specific gravity (SG): 1.03
Fluid B: Dirty water slurry
• Viscosity: 5 cP
• SG: 1.15
50 HP module assumptions
• Driver: 50 HP with VFD
• Intended duty: high flow, low-to-moderate head (typical mining wash plant supply)
• Overall efficiency used for feasibility checks:
  • Tesla-style (wide gap): ~35 to 45 percent (typical mining-tolerant build)
  • Discflo-type (engineered Discpac): ~40 to 55 percent depending on configuration and fluid (consistent with Discflo's positioning around optimized Discpac geometry and High Head disc options). ([Discflo][1])
Curve form
• Head modeled as a smooth, disc-pump-like decline with flow:
  • Head = H0 × (1 − (Q/Qmax)^2)

A) Tesla-style 50 HP module curves
A1) Wash-plant water (SG 1.03, 1.2 cP)
Assumed: Qmax ~ 3,800 gpm, shutoff head ~ 53 ft
Flow (gpm) | Flow (m3/h) | Head (ft) | Head (m) | ΔP (psi) | ΔP (bar)
• 0 | 0.0 | 53.0 | 16.2 | 23.6 | 1.63
• 950 | 215.8 | 49.7 | 15.1 | 22.2 | 1.53
• 1,900 | 431.5 | 39.8 | 12.1 | 17.7 | 1.22
• 2,850 | 647.3 | 23.2 | 7.1 | 10.3 | 0.71
• 3,420 | 776.8 | 10.1 | 3.1 | 4.5 | 0.31
• 3,800 | 863.1 | 0.0 | 0.0 | 0.0 | 0.00
Interpretation (wash water): Expect best operating usefulness around 2,000 to 3,200 gpm at roughly 10 to 35 ft of head (about 4 to 16 psi at SG 1.03), depending on how restrictive the plant plumbing is.
A2) Dirty water slurry (SG 1.15, 5 cP)
Assumed: Qmax ~ 3,600 gpm, shutoff head ~ 50 ft (slightly reduced flow/head due to slip and solids losses)
Flow (gpm) | Flow (m3/h) | Head (ft) | Head (m) | ΔP (psi) | ΔP (bar)