Discflo vs Tesla Disc Pump

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Here's an engineering-oriented analysis of the Discflo hybrid disc pump concept based on the publicly available information about Discflo's patented Discpac technology, and a comparison with the pure Tesla-style disc pump you've been considering previously.

Technical Overview — Discflo Hybrid Disc Pump Technology
Discflo Disc Pumps operate using a series of rotating discs (called a Discpac) that exploit boundary layer and viscous drag to move fluid. They are •not• centrifugal pumps, positive displacement pumps, gear pumps, or lobe pumps. Instead, they form a boundary layer of fluid adhering to the disc surfaces, and momentum transfer through viscous drag draws successive layers of fluid into a smooth, laminar flow stream. ([Discflo][1])
Key performance properties highlighted by Discflo include:
• Laminar, non-pulsating flow with very low radial loads on shafts and bearings. ([Discflo][1])
• Virtually clog-free operation with no close tolerances, enabling large solids handling and abrasive service. ([Discflo][1])
• Capability to handle high solids content, high viscosity, and entrained air/gas better than many conventional pumps. ([Discflo][2])
• Long seal life and low maintenance due to non-impingement of fluid on tight tolerances. ([Discflo][1])
• Disc spacing and disc count engineered to match application demands. From specifications, some Discflo models handle up to 80% solids and solids sizes up to 10 in (250 mm), to 10,000 gpm flows and >1,000 ft head at pressures up to 2,500 psi in heavy configurations. ([Discflo][2])
Though the site does not explicitly describe a hybrid disc pump in the sense of one disc plus another disc with vanes, it does describe configurations in which the disc elements (Discpacs) are assembled in series or multiple stages—for example in multistage or multielement pumps. ([Discflo][3])

How Discflo Technology Compares to a Tesla-Style Disc Pump
Below is a side-by-side comparison along key engineering attributes:

1. Pumping Mechanism
Tesla-Style Disc Pump (as previously discussed):
• Uses a rotating disc pack spaced closely to create viscous drag and boundary layer momentum transfer.
• Primarily suitable for fluids of moderate viscosity; performance declines as clearances widen (centrifugal slip increases).
• Efficiency and head are tied strongly to disc diameter, spacing, rpm, and fluid viscosity.
Discflo Disc Pump:
• Also uses a disc-based boundary layer mechanism (Discpac), but with distinctive engineering:
  • designed for continuously laminar, non-impinging flow rather than deliberately creating shear gradients as in Tesla pumps;
  • built to handle extreme solids, gas entrainment, extremely viscous fluids, and abrasive slurries. ([Discflo][4])
Comparative Note
Both pumps rely on viscous drag and boundary layer momentum transfer rather than direct centrifugal acceleration, but Discflo systems are engineered for far more severe duty (e.g., coarse solids, high viscosity, air entrainment) than typical Tesla disc pumps. Tesla pumps may excel at lower viscosity clean liquid duties but can struggle as clearances open up or as fluid properties deviate from Newtonian or low-solids conditions.

2. Tolerance to Solids, Abrasion, and Entrained Gas
Tesla-Style Disc Pump:
• Good for clean to moderately dirty fluids if disc gap and clearances are chosen appropriately.
• High solid concentrations severely erode efficiency; disc spacing is a tradeoff between solids tolerance and slip.
• Velocity shear limitations restrict performance in highly abrasive or multiphase flows.
Discflo Disc Pump: