Paste Thickeners

Advanced Thickening Technology

ISO 9001 WesTech Certified Quality System

WesTech®

Swire Water

Paste Thickening

What is Paste?

Paste thickening technology is a long-term solution for many challenges facing the minerals industry. Thickening a stream to produce paste (also called "thickened tailings") offers unique advantages:

- **Increased water recovery**
- **Smaller tailings disposal volumes**
- **Maximum product recovery from a thickener**

Paste/thickened tailings is a term for a non-Newtonian suspension of solids which are relatively non-settling and non-segregating. It has a self-supporting structure and, when deposited on the ground, will form an 'angle of repose'.

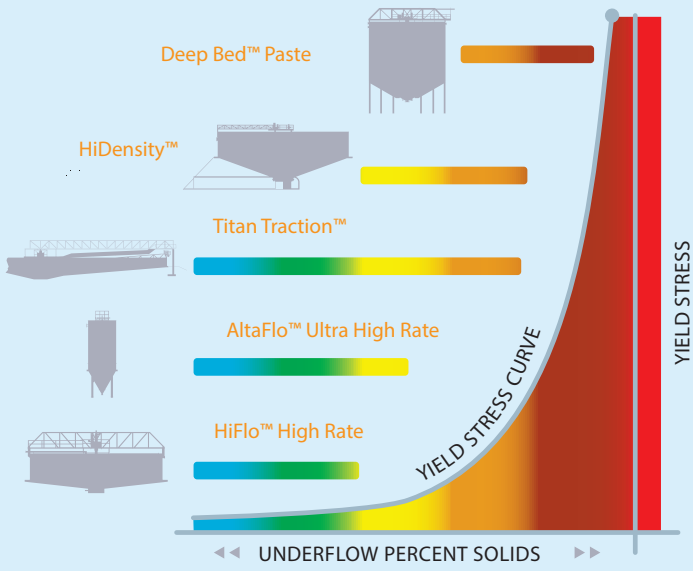
A network of bonded fine particles accounts for the non-Newtonian properties. The coarser particles are inhibited from segregating by the fine particles' network which acts like a net to hold particles in suspension.

Paste/thickened tailings is characterized by the presence of a yield stress, which is the force required to initiate flow.

The underflow of high-rate thickeners is "slurry," which has relatively no or only minor yield stress. Conversely, WesTech paste thickeners operate in higher solids concentrations within a yield stress range. This yield stress range produces the benefits of non-Newtonian suspensions for surface stacking, CCD, and backfill systems. Suspensions in the lower portion of this yield stress range are often referred to as "thickened tailings" and the higher yield stress suspensions are referred to as "paste."

Which Thickener is Right for Your Application?

Each site has unique objectives and obstacles. WesTech has a wide range of experience that can be utilized to help identify your plant objectives and obstacles, then to recommend the best solution for your site requirements. WesTech offers a full range of thickeners and filters to meet the dewatering needs of minerals and industrial applications. There are more dewatering options than ever before - your water balance can be optimized like never before.



Applications and Advantages

Why Choose a Paste Thickener?

WesTech paste thickener design allows for increased performance compared to conventional or high-rate thickeners. A smaller footprint, increased water recovery, and paste/thickened tailing underflow translate into great advantages. WesTech's paste thickeners produce non-Newtonian underflow, which provides dramatic process advantages for surface stacking, CCD circuits, and mine backfill.

Surface Stacking of Process Tailings:

- **Increased water recovery**
- **Rapid drying allows for tailings layering disposal**
- **Increased disposal site capacity**
- **Reduction in containment dyke size**
- **Stable and self-supporting tailings**
- **Elimination of conventional slurry dams and their risks**

CCD Washing Circuits:

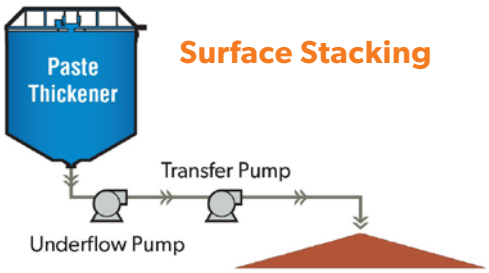
- **Increased stage efficiency**
- **Fewer stages for same recovery**
- **Reduced wash water**
- **Higher concentration in recovered liquor**

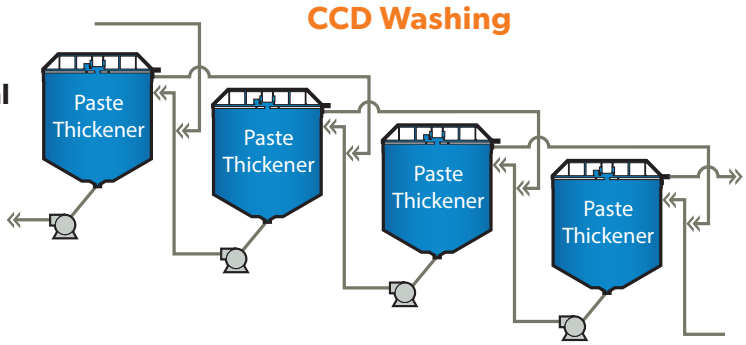
Mine Backfill:

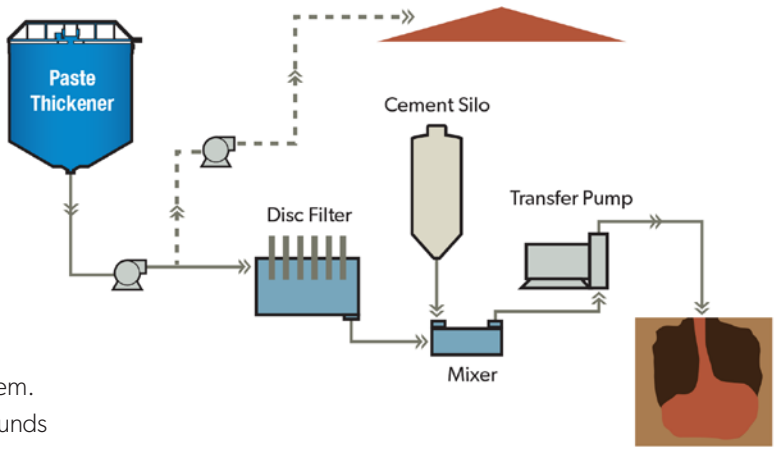
- **Reduce filtration CAPEX**
- **Surface stack advantage when not feeding underground**
- **Full tailings usage**
- **Potential elimination of filters**

Use of paste/thickened tailings must be considered as a full system. These remarkable benefits can be realized when the end-user surrounds themselves with experienced providers. This holistic approach, insuring that the paste/thickened tailings production, transportation, and downstream requirements are properly integrated is critical to success. Non-Newtonian suspensions are fundamentally different than slurry (Newtonian). After a 10-year partnership, WesTech has recently acquired PasteThick™ Associates; a team of engineers with experience in paste thickener design and operation extending back to the 1990's (to learn more, visit www.pastethickassoc.com). The WesTech/PasteThick™ team can consult through all phases of a project; from feasibility, equipment design, supply, startup, to optimization and system audits. Bring WesTech's minerals process and paste system experience into your project team.

Note: *Selection of the best "thickener" might not be a thickener, but a filter or a thickener/filter combination.*







Additional Services

Whether it is lab testing to determine the right process or having its field service personnel install new parts, WesTech commits to keep your plant running.

- Lab Testing
- Piloting
- Turnkey Solutions
- Field Support
- Retrofits

Deep Bed™ Paste Thickener

The original concept of the "deep cone" type thickener was developed in the 1960's using a steep floor slope and increased bed volume to produce high underflow densities. Over the years, this thickening technology has evolved and refined to consistently produce non-settling, non-segregating underflow. The improved underflow density can be in the range of 10 – 15 percentage points higher than underflow from a high-rate thickener. The WesTech Deep Bed™ paste thickener is the latest advancement in the evolution of this style of thickener.

To be able to consistently dewater the tailings slurry to a non-settling and non-segregating suspension, WesTech Deep Bed™ paste thickener design includes:

- **Diameters from 3 – 24m**
- **Elevated tank design**
- **Height-to-diameter ratio near 1:1**
- **Steep floor slopes from 30 – 45°**
- **Low-profile raking mechanism**
- **Full-length dewatering pickets**
- **Heavy-duty rake drives to over 2 million ft-lbs**
- **Latest feedwell designs for optimum flocculant use and solids distribution**

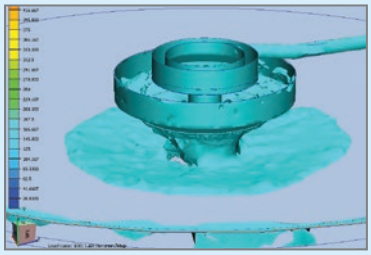
The WesTech Deep Bed™ is designed to produce maximum water recovery, maximum underflow density (approaching a filter cake), and highest yields possible in a thickener. Accomplishing this requires an extra heavy-duty drive that powers through the bed, raking to the discharge without the use of a rake lift.

WesTech process controls allow this consistent production of the target underflow properties (density and yield stress) and overflow clarity with the minimum polymer consumption.

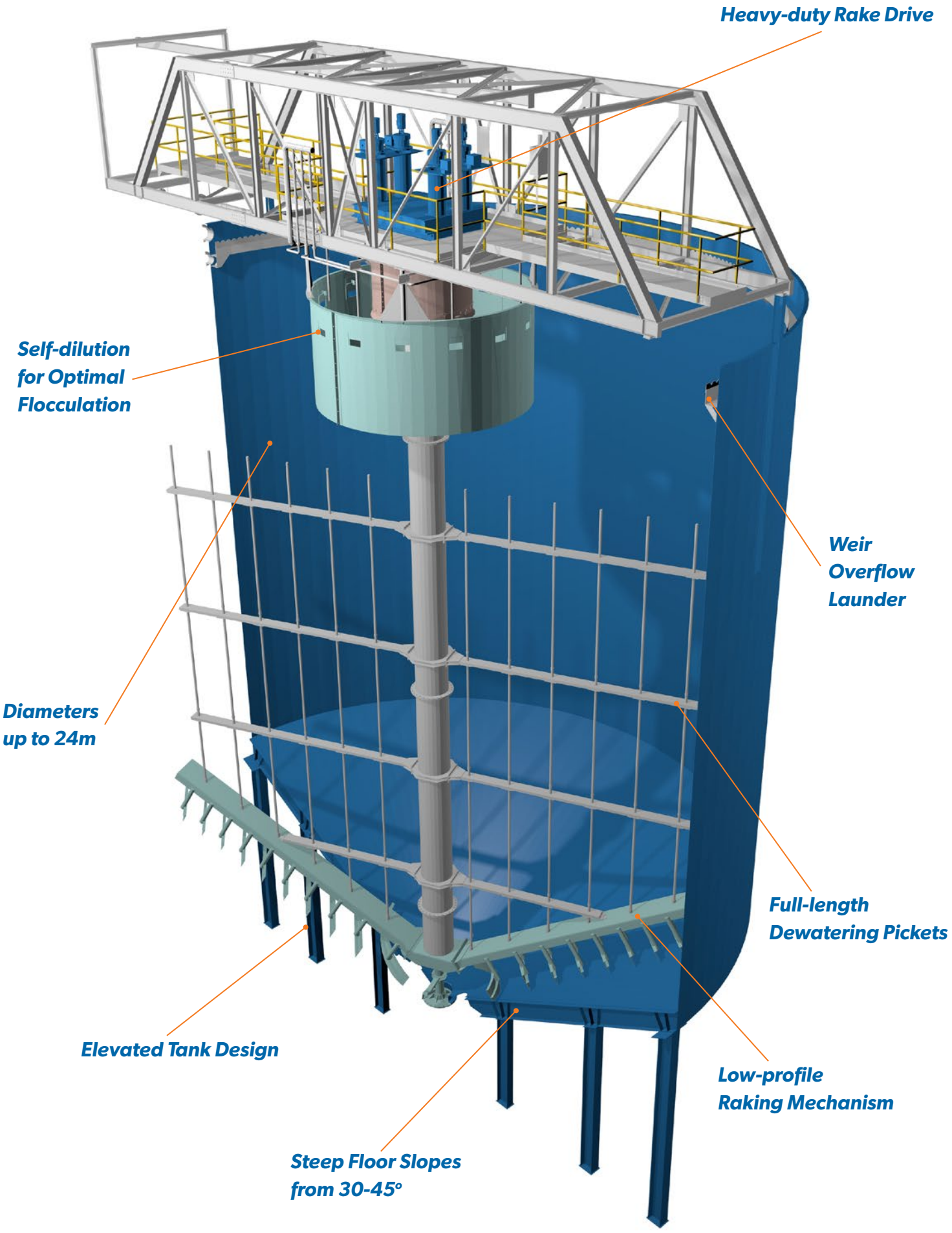
EvenFlo™ Feedwell

Optional Feedwell to Maximize Performance

A properly designed feedwell should provide energy dissipation as well as even distribution of the feed into the thickener. WesTech's EvenFlo™ design consists of a two-part feedwell system. An inner chamber converts the feed energy into a concentric radial flow for optimal mixing of flocculent and solids in all areas of the main chamber. The main feedwell chamber then evenly distributes the feed into the sedimentation zone of the thickener.



WesTech's EvenFlo™ Feedwell provides optimal flocculation conditions and even distribution of solids in the thickener.


Heavy-duty Rake Drive
Self-dilution for Optimal Flocculation
Weir Overflow Launder
Diameters up to 24m
Full-length Dewatering Pickets
Elevated Tank Design
Low-profile Raking Mechanism
Steep Floor Slopes from 30-45°

HiDensity™ Paste Thickener

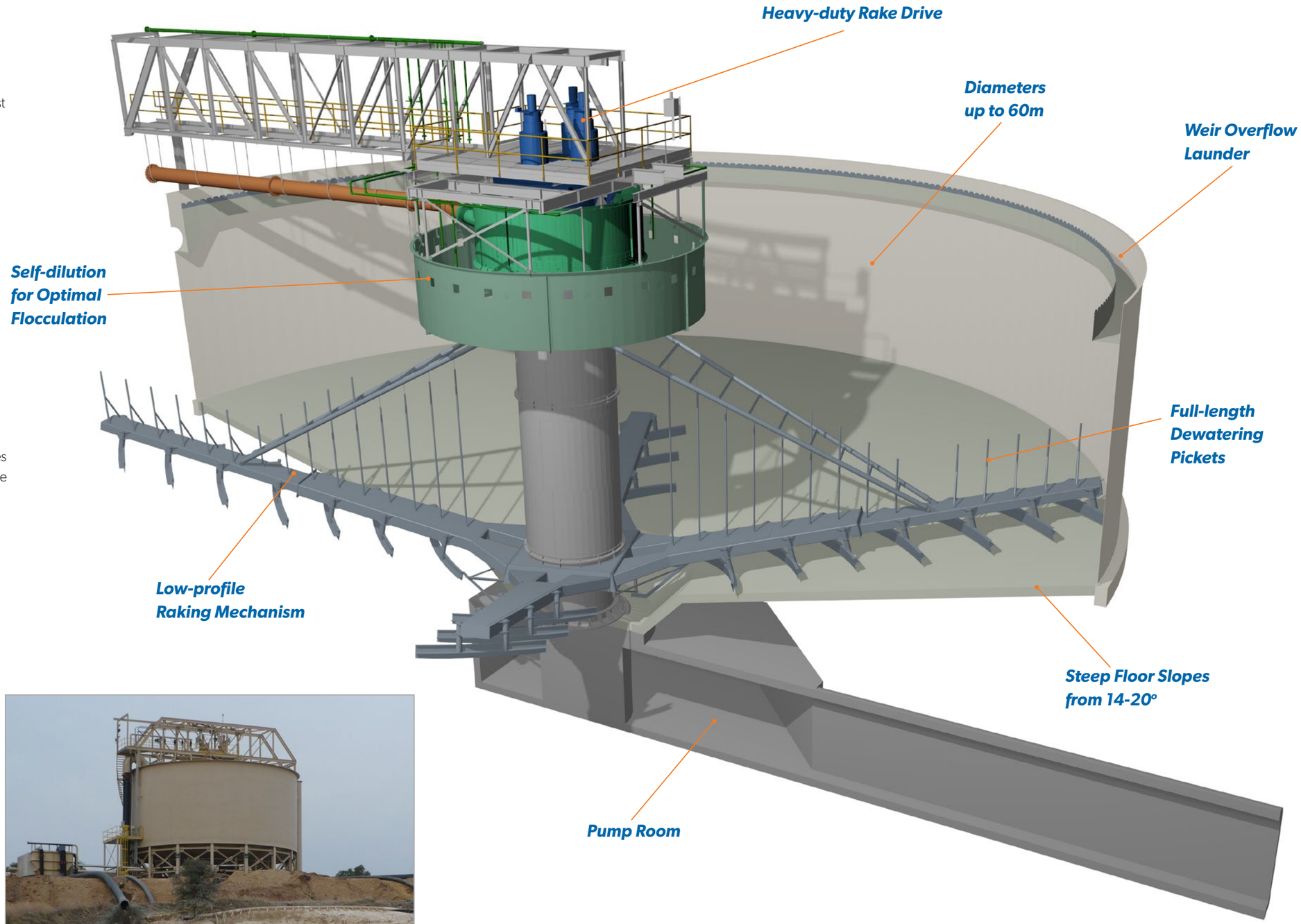
There is a range of underflow densities that are non-Newtonian suspensions. The WesTech HiDensity™ paste thickener produces similar non-settling and non-segregating underflow to the Deep Bed™ Paste Thickener, but with lower yield stress.

There are many installations where site-specific objectives are best served with a lower yield stress underflow. The HiDensity™ paste thickener is designed for these applications. Many of the same design features of the Deep Bed™ are used with the HiDensity™ thickener:

- **Diameters from 3 – 60m**
- **Both elevated and on-ground tank designs**
- **Thickener sidewall heights as tall as 8m**
- **Steep floor slopes from 14 – 20°**
- **Low-profile raking mechanism**
- **Full-length dewatering pickets**
- **Heavy-duty drives to over 5 million ft-lbs**
- **Latest feedwell designs for optimum flocculant use and solids distribution**

Producing lower yield stress underflow has many advantages while still providing the non-settling, non-segregating, and rapid drying characteristics of paste/thickened tailings. These advantages can translate into significant reductions in both capital expenditure and operational cost for a tailings disposal system:

- **Very large tonnage may be processed in a single thickener**
- **Reduced underflow pumping cost**
- **Improved surface stack management**



WesTech®

SWIRE WATER

Tel: 801.265.1000
westech-inc.com
info@westech-inc.com
Salt Lake City, Utah, USA