Hammerhead
On-site Screen Sizing

Innovative Technology for
Intelligent Resource Management

HYDRO DYNE® ENGINEERING

Hammerhead On-site Screen Sizing

The Time is Now for a Better, Smarter Design

Industry leaders, engineers, operators and maintenance personnel have long realized the benefits of removing inorganic solids as early in the treatment process as possible, but preliminary treatment equipment has conventionally been selected more on the requirements of downstream processes than influent characteristics. As these processes increase in sophistication and sensitivity, plant design is driven towards finer upstream screening protection, without further investigation into the type of solids presented to the plant.

The methods and formulas for headworks design and equipment sizing have remained constant for decades while the industry continues to evolve. As a result, treatment plants and collection systems around the world continue to deal with ongoing and unnecessary maintenance issues, equipment failure, and a significant reduction in overall system efficiency and performance due to the inadequacies of a plant's first line of defense. Combined with the realities of increasingly strained natural resources, growing population centers, aging infrastructure and shifting weather patterns, it is easy to see that this path cannot be sustained by an industry that is required to do more with less.

It doesn't have to be this way.

So Much Can Affect a Treatment Plant's Flow

Each plant has its own unique influent flow, as well as different processes that dictate the amount of required protection.

There are many things that have a direct impact on the operational efficiency of the plant; the design of a collection system, constituents feeding the plant, stormwater infiltration, variations in flow and more.

Factors Affecting Wastewater Influent
Collection system
• Inflow and infiltration
• Area of collection system and length of sewer lines
• Number and size of pump stations
• Type of pumps and presence of coarse screening or grinding at stations
• Equalization or storage basins
• Septage and grease hauler dumping
Population
• Density
• Hotels/resorts/laundry facilities/hospitals/ sports stadiums
• Correctional/Institutional facilities
• Local industry
Headworks design
• Pumped to or gravity fed
• Length and slope of influent channel
• Number of channels and flow distribution
• Pretreatment such as coarse screening or grit removal
Flow variations
• Infiltration and Intrusion
• Weather conditions like drought or heavy precipitation
• Water use restriction

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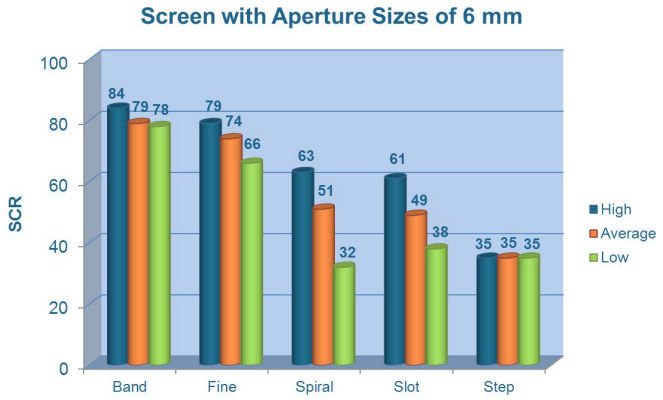
Because "Business as Usual" is not the Business You're In

For years, engineers have sized screening equipment using industry standard blinding factors based on peak flow and screenings capture ratio (SCR) the measurement of the percentage of solids a screen captures equal to or greater than its opening size. Those two variables should not be the only factors considered when determining the proper headworks equipment for an application.

Studies have shown that the wet screenings quantities encountered at different plants can vary by as much as 240%, and the SCR between different screen styles can vary by as much as 50%. Even screens with the same opening size can have dramatically different SCRs. For example, the 6mm opening size recorded an SCR as low as 32% for a spiral-style screen and as high as 84% for a center fed band-style screen.



WEF, in co-operation with ASCE, conducted a study[1] of the screenings volume relative to flow collected at 39 US wastewater treatment plants. Results proved that plant screenings are so unique, they differ by a factor of 70. Even conservative sizing methods used by most engineers cannot properly account for fluctuations in screenings of this magnitude when calculations are based on peak flow and opening size alone.

Common Issues Associated with Under Performing Headworks Systems

- Reduced protection and lifespan of downstream processes
- Increased capital costs from oversized or prematurely replaced equipment
- Decreased equipment lifespan
- Equipment failure due to structural deficiencies under hydraulic forces
- Increased maintenance costs
- Increased blow through of screenings
- Reduced screenings capture
- Increased electrical and wash water requirements
- Flooded headworks structures
- Solids deposition upstream

[1] WEF Manual of Practice No. 8

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We have the technology to make the process better, smarter, more efficient

Welcome to a new era of headworks design!

For the first time, treatment plants and collections systems can now easily understand their unique influent characteristics to make truly informed decisions on how their influent can impact their processes system-wide.

Hydro-Dyne's Hammerhead On-site Screen Sizing tests and characterizes the properties of wastewater influent and effluent. Solids loading characteristics can now be expanded from generalized total suspended solids or biochemical oxygen demand ranges to include stratification of solid sizes present in the waste stream.

This intelligence allows treatment plants and collections systems to design the most efficient and effective headworks package for their unique environment. On-site Screen Sizing takes headworks design from the analog to the digital age, improving resource recovery, energy management and overall plant efficiency.

How the Hammerhead Hunts

1 Adjustable level intake piping

2 Custom configured solids handling pump

Delivers steady pressure across the system to generate polynomial curves and pressure trends without macerating captured solids.

3 Specialized non-contact flow meter

Ensures consistency across tests for precise data analysis.

4 Custom programmed PLC

Test conditions such as elevation, precipitation, humidity, temperature, flow rate, pump-fed vs gravity system, and other scenarios can be programmed into the system.

5 Modular screening assemblies

Capable of simulating single or dual-stage screening of dozens of screening types, sizes and combinations.

6 Discharge piping

7 Sensor array

Precise detection of flow, which ensures concise and consistent data capture.

Wireless interface

System controlled via tablet which wirelessly communicates with the PLC to more quickly order, tag and execute tests.

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The Value of Good Intel

Just as the Hammerhead Shark uses its highly specialized sensory receptors to analyze and dominate its environment, Hydro-Dyne's Hammerhead On-site Screen Sizing equipment utilizes an array of technologies to test and analyze a treatment plant's unique wastewater environment. Through the unique insights that On-site Screen Sizing provides, treatment plants can significantly improve the efficiency of their headworks and overall performance of their processes.

The capability of a treatment plant's flow to blind a screening element is of great importance to equipment design, yet it is not contained in the most popular metric for solids content, TSS (total suspended solids). Quantifying the blinding capacity of a flow is imperative in not only equipment design, but for predicting the rate at which it will capture solids. This metric is essential to optimizing equipment, motor and compactor design. By sampling the water upstream and downstream of a solids-handling device, not only can SCR be approximated, but the degree of loading can be evaluated as well.

This nuance is beyond the scope of traditional headworks design. Intelligent selection of opening size can mitigate the difference in optimum screen speeds during loading situations of different character; however, without explicit knowledge of particle blinding characteristics, any effective synthesis of control and sizing remains the purview of convention, not engineering.

As a global leader in water and wastewater, Hydro-Dyne Engineering innovates to solve some of the most difficult challenges in our industry. The value of understanding the unique characteristics of a plant's environment cannot be understated.

Benefits of On-site Screen Sizing

1. Improved protection and extended life of downstream plant technologies
2. Elimination of unknown variables currently utilized in equipment design
3. Decreased capital costs attributed to oversized equipment and channels
4. Reduced maintenance of equipment throughout the plant
5. More accurate hydraulic predictions
6. Increased headworks equipment life
7. Defined dual stage screening
8. Proper design and sizing of screenings handling units
9. Significantly reduced chance of equipment failure or headworks flooding

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ENGINEERING

Designed to Protect. Built to Perform.™

FINE SCREENS | COARSE SCREENS
SCREENINGS HANDLING | GRIT REMOVAL EQUIPMENT

Designed & Manufactured in the USA

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