FRAC SAND PRODUCTION

Wet Processing Solutions

McLanahan

Contact Your McLanahan Dealer:

FRAC SAND

If your sand has been tested by an accredited lab and it meets the American Petroleum Institute's frac sand requirements, McLanahan can immediately begin to design a plant specific to your needs. If your sand has not yet been tested, our accredited lab can perform the tests, which include:

- **Grain Size Or Sieve Analysis**
- **Sphericity And Roundness**
- **Crush Resistance**
- **Acid Solubility**
- **Turbidity**

Frac sand must be silica that is well rounded (weathered), structurally sound enough to withstand high pressure and be free of clay impurities. McLanahan's wet processing plant can be designed to remove the clay impurities and size and dewater the sand. Please contact McLanahan directly by phone or email to begin the evaluation and testing process.

Centrifugal Pump

McLanahan specializes in the design and manufacture of equipment and complete wet processing systems for producing frac sands used in the oil and gas well drilling industry. From conception to completion, McLanahan's production is executed with total emphasis on quality. McLanahan focuses on the customers' needs and offers full support throughout the design, build, startup and maintenance of your project. McLanahan's unique fully integrated engineering, manufacturing and customer support system provides customers exactly what they need to maximize their profits and production.

PROCESS DESIGN AND ENGINEERING

McLanahan's on-staff mineral processing engineers work with new and existing customers to determine the best process solution while taking the deposit specifications into account. Our professional mineral processing engineers are experienced in a wide variety of processing applications and projects around the world.

They will work with you to determine the following:

- Feed Or Product Production Rates
- Crushing Requirements, If Needed
- Total Flowsheet Development
- Attrition (Clay Removal) Requirements
- Desired Products And Stockpiles
- Plant Footprint
- Sand Dewatering
- Detailed Mass Balance Of Process
- Makeup Water Requirements
- Alternative Production Methods
- Utility Requirements
- Automation Requirements
- System Pricing Budget
- P&ID Development
- Complete Wet Processing Plant Design

FRAC SAND PROCESSING EQUIPMENT

Centrifugal Pumps

McLanahan's horizontal-spindle, centrifugal slurry pumps are ruggedly designed for the most arduous and abrasive silica sand pumping. All wetted parts are lined with field-replaceable, natural rubber which, when properly maintained, eliminates pump-casing wear. Other linings are also available. Pumps are available in three different gland configurations:

- Dry Gland – unique self-lubricating design that does not require an external water supply
- Hydrostatic Gland – low maintenance design that requires only minimal external flushing water
- Packed Gland – traditional configuration, requires external flushing water

Our pumps are matched to properly sloped and sized sumps with automated makeup water systems to ensure efficient operation and eliminate concerns of air entrainment, cavitation or the possibility that the pump may run dry.

Separators™ And Hydrocyclones

McLanahan designs and produces a wide range of Separators™ and Hydrocyclones commonly used in frac sand processing plants. Detailed mathematical modeling, developed by our process engineers, allows us to accurately predict field performance and capacities. We offer either the original patented "controlled under-flow" Separator™ cyclone or the traditional hydrocyclone. Sizes range from 6" to 36" diameter. For higher flow-rates, multiple units are mounted on a distribution manifold. All Hydrocyclones, Separators™ and manifolds are lined with natural rubber to resist abrasion.

Dewatering Screens

In 1980, McLanahan introduced the Dewatering Screen to the Aggregate and Industrial Minerals Processing industries. Through our ongoing design analysis, the McLanahan Dewatering Screen exemplifies unbeatable toughness and durability. McLanahan Dewatering Screens provide drip-free discharge for applications that range from coarse frac sand products to ultra-fines recovery.

Hydrosizers™

The core of McLanahan's frac sand processing plants is our Hydrosizer™ (Hydraulic Classifier) which makes the sharp size classifications required for frac sand. The Hydrosizer™ is based on the principle of "Hindered Settling" to achieve the extremely efficient size separation necessary to prep frac sand for the dry sizing that follows. Hydrosizers™ are as efficient as fine wet screening machines, but at a fraction of the footprint and cost. Benefits include:

- High efficiency size classification between 140 mesh (106µ) and 30 mesh (600µ)
- Low operating cost
- Unlike wet screens, the cut point can be changed on-the-fly offering a quick and efficient means to alter the amount of fines reporting to the coarse product

Attrition Scrubbers

If clays are present in a frac sand deposit, it is imperative that they be removed prior to sending product to the dry plant. Clays create problems in the dryer, in the dry screening units and more importantly, in the final use of the frac sand during the fracing process. To liberate these clays from the silica particles, McLanahan produces rubber lined attrition scrubbers which consist of a vertical cylinder with rotating paddles. When fed at high densities, these attrition scrubbers create an environment that scrubs silica on silica. This equipment liberates clays and provides end users with a clean silica end product. Features and benefits include:

- All field replaceable rubber-lined wetted parts
- Baffles within cylinder reduce short circuiting sands
- Right angle drive with no belts and sheaves prevents loss of power
- Provide accurate retention times designed specifically for your sand's characteristics

PLANT DESIGNS

McLanahan's design engineers will work directly with you in determining your layout and structure requirements. Plants are available in three different formats:

- Portable wheel-mounted plants designed for highway use
- Skid-mounted, self-supporting plants
- Bolted-together-steel structures for quick, on-site large plant construction

McLanahan Corporation also offers the option of complete MCC's (Motor Control Centers) in a container design format. These units are available with the HMI (Human Machine Interface) that provides a graphics-based visualization of an industrial control and monitoring system.


Separator™


Separator


Dewatering Screen


Hydrosizer™

Thickener

Recessed Plate Filter Press

MINIMIZE OR ELIMINATE SETTLING PONDS

Thickener (Clarifier)

The McLanahan High Rate Thickener makes it easier to manage waste fines (clays) removed from frac sands. The thickener utilizes flocculants to speed the settling of clays removed from the frac sands. This allows slurries reporting to settling ponds to be concentrated from as low as 1-2% solids to as high as 50% solids. Benefits include lowering costs by:

- Reducing settling pond requirements
- Making water available for immediate reuse in the process
- Reducing horsepower to pump fresh water

Design features of the McLanahan High Rate Thickeners include the following:

- Bolt-together construction for on-site assembly
- Ability to construct on compacted gravel bed or concrete pad
- Minimum-drag rake arm assembly with optional hydraulic lift capabilities
- Hydraulic drive with reverse capability
- Auto Floc system designed to meter flocculant addition rates to solids loading

Compact Deep Cone Thickeners are also available for smaller plant footprints and capabilities of higher underflow densities.

Recessed Plate & Membrane Filter Press

As environmental regulations become tighter, many areas no longer allow the use of settling ponds. McLanahan's Recessed Plate Filter Press (used with a Thickener) converts solids into stackable, conveyable solids. These units feature:

- Fully automated operation typically needs no operator
- Reduced chemical usage vs. other technologies
- Overhead beam design that allows complete access to plates for inspection and cleaning
- Ability to alter solids content of filter cake producing higher cake solids compared to other dewatering technologies
- Improved filter cake discharge with wide opening of plates
- Clean water discharge which can go directly back into process
- Units are built by McLanahan in the USA

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