Technical Specifications

F-Class
Four Bearing Vibrating Screen
Why an F-Class over Concentric Shaft Machines?

- Capable of processing periodic surge load conditions effectively
- Ideal for large scale production plants requiring multiple machines
- Lower Capex required to structurally support the F-Class
- Machine power is expended to most effective separation of materials
- Very dependable with low maintenance costs

F-Class by Definition

W.S. Tyler offers the F-Class as the number one vibrating screen for applications requiring a maximum degree of continuity, load independency and minimal force transmission. It is designed and constructed to be a rugged, dependable vibrating screen with many built-in features that are considered extras by other manufacturers. The circle-throw motion of the vibrating machine is developed by a double eccentric, counterbalanced shaft that is supported by four high performance, double spherical roller bearings. The motion of the F-Class machine is such that it is dynamically balanced at all operating speeds.

F-Class Parameters Range*

- Application: Wet or Dry
- Avg. Top Size: Less than 10 percent up to 16”
- Drop to Feed Box up to 24”
- Maximum material temperature: 140F / 60C
- Drive: Double Eccentric Shaft
- Lubrication: Grease
- Inclination Range: 15 to 25 degrees
- Cut Sizes: 6” to 20 mesh (.0328”)
- Decks: 1, 2 or 3

* Application dependent
1100 F-Class Design Platform

<table>
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<tr>
<th>Width</th>
<th>Length</th>
<th>1D</th>
<th>2D</th>
<th>3D</th>
<th>5 Rail for +1” .opg</th>
<th>7 Rail for -1” + Ty-Deck</th>
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<td>16</td>
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Optional Rail Systems: Grooved, Snap, Bolt Down, Maxi

Design Tools

The F-Class is modeled in a 3D environment prior to production. Using a 3D CAD system, the engineer produces a geometrically accurate, unambiguous, digital product model that is utilized throughout product development, manufacturing and assembly. Interacting with 3D model speeds up design encourages innovation and identifies errors. It enables engineers to visually evaluate interference between parts, complicated geometric features, required tolerances, mechanism motion and assembly structure as the product evolves. Further, the virtual prototype enables concurrent collaboration between engineering, manufacturing and customers.
Figure 1: 3D CAD model showing F-Class features (Application Dependent)
F-Class Non-welded Fortified Body Design
F-Class Body Components

90° bend at top of side plate

45° bend at bottom of side plate

flanged shaft

reinforcing plate
Side Plate Features and Benefits

- Formed 90° bend at top and 45° bend at bottom of side plate adds rigidity.
- Entire assembly is integrated by the use of highly durable HUCK™ bolt construction to ensure they do not come loose, provide consistent torque pressure, and a solid connection between bolting surfaces.
- Reinforcing plate solidifies the side plate, screen panel and shaft assembly providing superior reinforcing where it is needed most at the shaft assembly.
- No welding on the side plate reduces stress and crystallization of the steel.

Figure 2: Side Plate and Reinforcing Members
Screen Panel

- one piece panel design
- HUCK™-bolted screen body fastening for extra strength and rigidity
- formed side rail (90° top and 45° bottom bends)
- rail options available to accommodate suitable media
  - flat deck e.g. perforated plate or rubber deck
  - rails for any urethane style panels (pin and sleeve arrangement or to accept grooved media)
  - side tensioned media

Cross Member Design

- FEA optimized and Strain Gauge tested cross member design minimizing stress levels
- Hybrid design with individual cross members assembled into one-piece-panel structures allowing cross member replacement
- ¾” face plates with inside and outside weld to rectangular tube
- 4 mounting holes per face plate with additional locating welds for optimum rigidity
Feed Box and Back Plate

- reinforced with gussets
- interchangeable feed box and back plate (in most cases)
- replaceable feed box liners available in QT400, urethane, rubber or high chromium alloy
- back plate increases the rigidity of the feed end of the machine

Figure 5: Feed Box

Figure 6: Back Plate
Base Frame

- heavy tubular members welded together to resist racking
- designed to have adequate strength and stiffness to support the screen body thereby eliminating the need for a continuous structural beam under the base frame
- motor support bolted to side of main beam of base frame can be mounted for either right or left side drive
- sliding motor support base to facilitate proper tensioning of the V-belts

Figure 7: F-Class Base Frame
The Tyler Tubular Pedestal Base Frame

- The Tyler base frame and integral motor support reduces structural costs.
- Serves as a support system for hoppers, chutes, spray systems and air seals.
- Convenient lifting lugs provided a safe and feasible way to lift the screen and prevent damage during installation.

Figure 8: Pedestal

Figure 9: Tubular Base Frame
Shaft Assembly

The double eccentric shaft of an F-Class screen is supported by four bearings. The housings for the inside bearings are mounted to the side plates of the screen body and the housings for the outside bearings are supported by the side arms. The bearings are mounted on the eccentric positions of the shaft. The two pairs of eccentric positions are opposed in their location with respect to the center of rotation of the shaft. With this arrangement both the screen body and the side arms will be driven in a circle throw path of motion by the rotation of the shaft. Since the screen body and the side arms are opposed at all times in respect to the center of rotation for the entire mass the centrifugal force of the screen body will be counterbalanced by the centrifugal force of the side arms. However since the side arms are not as heavy as the screen body, they are augmented by counterweights mounted on the shaft. This ensures that the system is dynamically balanced meaning that there is little or no force transmission to the supporting structure.

Figure 10: F-Class Shaft Assembly
Shaft Assembly Features

- Positive circular motion developed by double eccentricity machined into shaft.
- Shaft assembly counterbalanced by balance weights calculated to offset the screen body weight.
- Supported by four high-performance, double spherical roller screen bearings.
- Coated bearing bore helps minimize fretting corrosion between the bore of the bearing and the shaft caused by the necessary loose fit design.
- Labyrinth seals prevent grit or foreign matter from reaching the bearings while preventing leakage of grease.
- Seamless steel tube housing with cast iron tube heads supplies reinforcement surrounding shaft area and provides lateral stability as well as shaft protection.
- Permanently installed tube housing allows for easy bearing exchange without seal breakage.
Four Bearings

2 160mm Main Bearings
Centered on the Side Plates
High precision and center greased
Benefit: For even grease and weight distribution and increased bearing life

2 100 MM Bearings mounted on the side arm
High precision center greased
Benefit: Allows the shaft to free float to find its natural center of gravity without strain or thrust on the bearing, increasing bearing life

Figure 11: Bearings
Double Eccentric Shaft Assembly

- Eccentricity is machined into the shaft to create a permanent built in circle as opposed to the “created” circle of concentric shafts.
- The “free floating” action allows the shaft to find its natural center of rotation without strain or thrust on the bearings.
- Ability to handle remarkably high tonnages often created by surges within the operating process.
- Powerful motion stratifies heavy bed depths quickly to allow more space for screening near size material.

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<th>Eccentricity</th>
<th>Body RPM</th>
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<td>1/8 in.</td>
<td>1050</td>
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<tr>
<td>3/16 in.</td>
<td>860</td>
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<td>1/4 in.</td>
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Figure 12: Double Eccentric Shaft Assembly
Figure 13: F-Class Shaft Assembly (Exploded)
Resiliently Mounted: Shear Rubber Mounts

- The mounts are installed in a near vertical angle (shear) and when compressed they cushion the downward forces never bottoming out which allows the side arm to “free float” and maintain the “positive circle throw action”.
- System is very forgiving in overload situations.
- Following periodic maintenance inspections operators have ample time to change mounts during scheduled maintenance periods.
- No catastrophic failures which can happen with springs or other type mounts.
- Robust “buckets” house the mounts and reduce product build up and provide safety from moving parts.
- No other Vibrating Screen Company has this system.

Figure 14: Shear Rubber Mounting Unit
Figure 15: Floor Mounted Tailor Made F-Class
Vibration Analysis Inspection

Every F-Class vibrating machine is backed by years of engineering experience. Prior to shipment each machine is carefully examined and operated over a prolonged period assuring correct balance, satisfactory bearing operating temperatures, smooth operation, acceptable noise levels, and quality workmanship.

Each machine is evaluated using a computer vibration analysis tool to find any dynamic irregularities in a vibrating screen. This information makes it possible to view in the monitor the orbit points, peak to peak, median acceleration, displacements, frequency (RPM) and FFT analysis. The combination of speed and stroke on a vibrating screen results in acceleration forces. Operating a screen outside of its proper accelerations reduces screening performance and poses risks to the mechanical integrity of the machine. Measuring the mechanical performance of a vibrating screen builds the basis, minimizing these risks, ensuring proper operation. The “healthy” screen will display a stable waveform and close to zero acceleration in the side axis.

![Vibration Analysis Data Acquisition](image)

Figure 16: Vibration Analysis Data Acquisition

Horizontal and vertical vibrations analyzed together allow orbit plots to represent the 2D shape of the screen motion (Figure 19). This shape also holds valuable information about the condition of the screen. The integrated FFT-analysis separates and analyzes frequency patterns that indicate mechanical problems.
Figure 17: Vibration Analysis Orbit Plots

A software suite processes the information resulting in a report featuring detail information for each measuring point and an evaluation for the entire machine. The summary brief points to modifications that are necessary to achieve optimum performance.
Summary

These features of the F-Class vibrating screen make it useful for the screening of virtually any material. The F-Class generates a circular motion of constant amplitude with constant, load-independent operating conditions. The double eccentric shaft provides a dynamically balanced system and does not transmit vibrations to the structure. Large bearings and rugged construction assure efficient operation, low production cost and low maintenance. The F-Class represents field-proven features from a long and successful Tyler history and the latest technologies.
Warranty

W.S. TYLER CANADA LTD., hereinafter designated the Company, warrants to the Purchaser / End-user that the equipment will be free from defects in material, design, and workmanship, provided that the equipment is commissioned by a certified TYLER technician, for a period of 18 months from the date of shipment or 12 months from installation, or 6000 operation hours from installation whichever is first provided the Purchaser or user operates the equipment according to and in accordance with the conditions of operation specified herein and in accordance with operating manuals furnished. Claims for wear and tear are excluded from the company's warranty.

If during the warranty period, any part of the equipment is found to be defective in material or workmanship, the Company will furnish a replacement part FCA ST. CATHARINES. Such parts claimed to be defective shall be returned to the Company's manufacturing plant, transportation prepaid, for inspection by the company to determine to its satisfaction that said Part or Parts are defective, or, at its option, repair such defective part in place, provided the Purchaser or user operates the equipment according to generally approved industry practices and in accordance with the conditions of operation specified herein and in accordance with operating manuals furnished if any, and further provided that the Purchaser notifies the Company in writing as soon as any defects occur. The performance of a screening machine is subject to so many variables in the user's plant and is beyond the control of the seller, that there can be no warranty of any particular performance.

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