

# Duperon Corporation FlexRake™



**Technical Package**



# Technical Package



## About Duperon Corporation and the FlexRake™...

Duperon Corporation was established in 1985 as a manufacturer of both pumps and trashracks. The Self-Cleaning Trashrack was invented and first installed in 1979 in response to a local drain commissioner's request for a solution to his debris problems at flood control pump stations. During peak conditions, when the flood control pumps were most needed, the intakes were blocked by debris. The patented Self-Cleaning Trashrack continues to effectively handle the needs of customers with severe or harsh debris removal problems such as fast-moving, highly concentrated trash.

In 1995, the FlexRake™ was designed for those customers who were looking for an automatic, continuous-cleaning device that was cost effective, flexible, simple and required little or no maintenance or operators.

Duperon products have two major design criteria: **simplicity and value.**

We are unparalleled in our commitment for customer satisfaction and hold to a simple standard:

***"you'll like working with us!"***

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## Why the FlexRake™?

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The FlexRake™ offers distinct advantages:

- It can be installed by your own crew.
- It can be retrofitted to existing screens.
- The rake can be purchased fully assembled on a barscreen.
- The FlexRake™ has minimal maintenance with annual lubrication requirements and no underwater maintenance required.
- No underwater sprockets.
- All non-corrosive components under water.
- Easily adapted to the site. Scrapers can be designed to handle specific types of debris and screens.
- The unit is easily modified to handle changing debris conditions.
- The rake can rake fine to coarse screen openings.
- There are multiple rakes on the screen.
- Energy efficient—1/8 hp motor draws 4.2 full load amps.

## FlexRake™ Models

- **Standard:** Used for stormwater, hydro, or other intakes with 1 in. or larger screen openings and debris of general refuse, aquatic vegetation, sticks, limbs, tires, drums... Scrapers are configured (usually serrated) to barscreen. Maximum width of unit is 12 ft.
- **Heavy Duty:** Used for open channel systems, such as stormwater, where debris may be unpredictable in size, volume or velocity. Wider and heavier scraper assemblies are utilized. Maximum width of the unit is 12 ft.
- **Full-Penetration:** Typically used in screening applications for head works in wastewater, pulp and paper or similar effluent where debris has a tendency to wrap around the bars. Typically has 1 in. or smaller openings. Scrapers clean all three sides of the bar.
- **Fine Screen:** Wedgewire screen openings often used for industrial effluent, fish screening, and similar applications. Scrapers are straight edged and cut at a 45° angle. May use brushes or squeegees according to debris type.
- **Single Strand:** 24 in. maximum width of the unit, available in fine screen models.

## Applications...

***Pump Stations***

***Hydroelectric Plants***

***Irrigation***

***Fish Barriers***

***Combined-Sewer Overflow***

***Pulp & Paper Mills***

***Food Processing Plants***

***Wineries***

***Sanitary Sewers***

***Prisons***

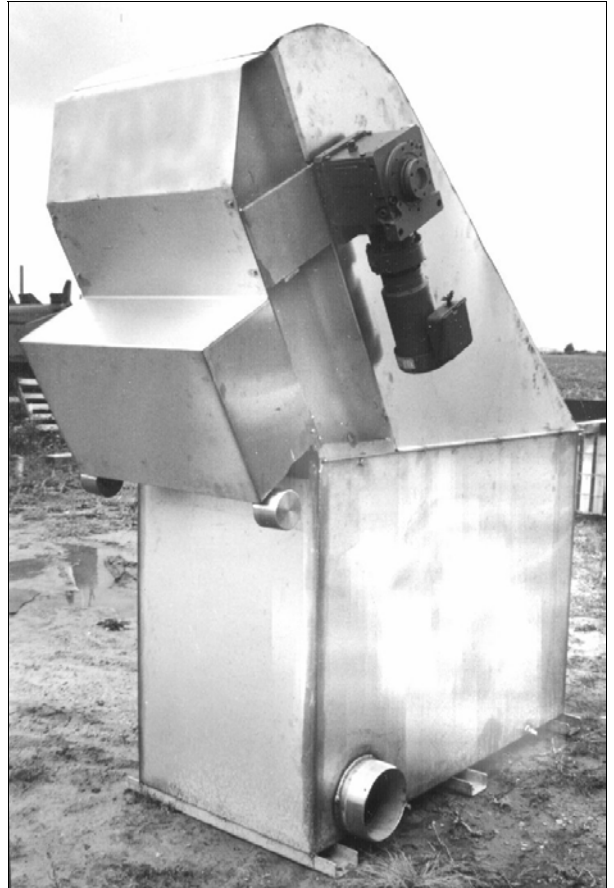
***Any Industrial Intakes or  
Outlet Filtering Canals***

- **Others:** Custom application? Call us!

# FlexRake™ Models



◀ **Single Strand Model**



**Fine Screen, Enclosed Model** ▶

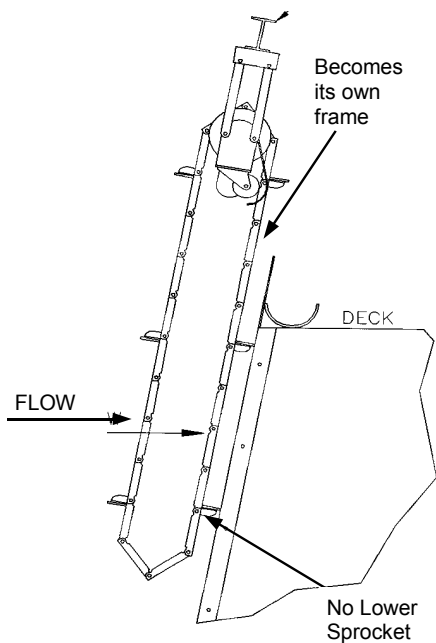


▲ **Standard FlexRake™ Model, Multiple Units**

## How it works...

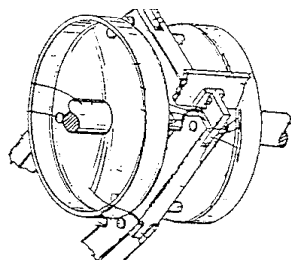
**Figure 1: The Frame**

The unique FlexLink™ technology consists of 316 SSTL investment castings where it becomes both its own frame and lower sprocket. This is possible because the links bend in only one direction, providing both flexibility and rigidity as the current forces it against the intake screen.



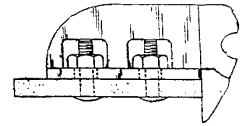
**Figure 2: The Drive Sprocket**

The FlexLink™ is designed to clamp to the drive pin as it travels around the sprocket which stabilizes the movement of the raking mechanism.



**Figure 3: Scrapers Locking Mechanism**

Scrapers (or rakes) are UHMW and vary in width to 12 ft., in depth to 9 in. and in thickness to 1-1/4 in. The configuration depends upon debris and screen requirements.



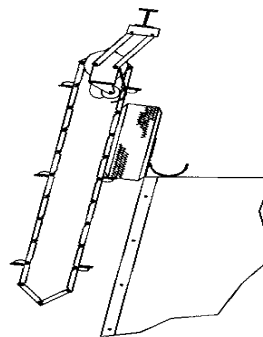
Scrapers are fastened to the FlexLink™ by stainless bolts that lock in the mounting hole rather than on the scraper to allow for flexibility of the scraper and to prevent bolts from loosening during operation.

**Figure 4: Interaction with Large Debris**

One of the great features of the FlexRake™ is its ability to handle larger debris without shutdown.

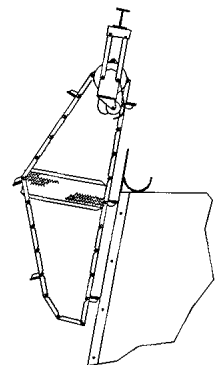
### **Pivoting Mounting:**

Standard to the FlexRake™, if a tire or other large object comes between the rake and intake screen, the mounting assembly pivots forward as illustrated, allowing the object to travel the face of the screen.



### **Flexibility:**

As you can see, when the FlexRake™ encounters large objects such as tires, logs, drums... it simply "flexes" around them.

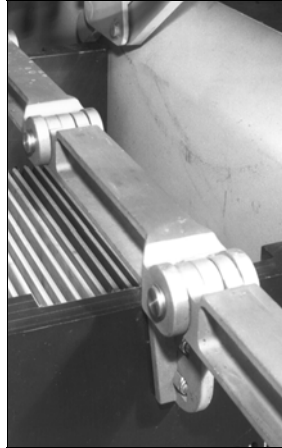


## How it works...

### The FlexRake™ Technology

Consists of 316 Stainless Steel investment castings called FlexLinks™.

These 4-5 lb. castings form a bar that bends in only one direction; becoming it's own frame and lower sprocket.



Notice how the unit becomes its own lower sprocket in the Single Strand, Fine Screen FlexRake™ below.



### Scrapers

The scrapers are constructed of UHMW and will have a fiberglass support for units over a certain width.

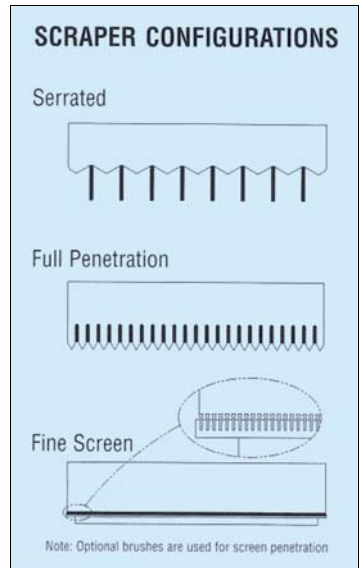
Scrapers are designed to offer flexibility to spring around larger debris.



Scrapers can be easily adapted to changing debris conditions (from the deck). Each scraper can be modified for a specific debris, so that debris is raked effectively every revolution.

A fundamental advantage of the FlexRake™ is its multiple rakes across the raked area. This means that every few feet the entire screen has been raked.

Each model has a specific scraper configuration as shown in the illustration below.



As the illustration shows, Scrapers are shaped for debris conditions and FlexRake™ Models.

## (FAQs) Frequently Asked Questions

- ***How does the FlexRake™ remain against the barscreen?***

The FlexRake™ is forced against the surface of the barscreen by the current and its own weight, which is approximately 1000 lbs. (Note: The weight will vary depending upon the angle, width, height, and the type and size of scrapers used.)

- ***Is the FlexRake™ automatic and continuous-cleaning?***

Yes. The FlexRake™ does not require an operator and as a standard unit, it is simply wired to run continuously, often to run simultaneously with pumps, turbines or during water flow. The scrapers will travel slowly (at a rate of 28 in./minute) from the bottom of the barscreen to the top, dumping the debris before it makes its return down the upstream side of the sprocket. (Note: Vertical barscreens may require a deflector to assist in removing debris.)

- ***Why isn't there a frame or lower sprocket?***

Design goals for the FlexRake™ included eliminating the need for extensive site engineering and the use of massive frames. It is designed to have the ability to adapt to many styles of barscreens. It needed to be easily removable to allow for maintenance of screens, gates, and other equipment or structures.

This criteria resulted in the unique development of the FlexLink™ technology. Constructed of 316 stainless steel investment castings, the link was engineered to create a bar that would bend in only one direction. This created rigidity for the links to become its own frame. The assembled links ability to bend allows it to become its own lower sprocket as well (as demonstrated in Figure 1, page 6).

- ***What keeps the FlexRake™ from stalling when a large object comes between the scraper traveling up the face of the barscreen and the scraper returning in the opposite direction?***

- ***What if a large object comes between the rake and rack?***

The FlexLink™ permits the rake to go around large debris such as drums or logs with its unique ability to "flex" or for the mounting assembly to pivot from the screen (as seen in Figure 4, page 6).

### ***How much weight can the FlexRake™ lift?***

The FlexRake™ has a lifting capacity of approximately 1000 lbs.



## (FAQs) Frequently Asked Questions continued...

- ***What maintenance is required?***

Virtually none! There are all corrosion resistant materials underwater. The scrapers are manufactured of UHMW; the FlexLink™ castings and fasteners are stainless steel. The gearbox is greased and sealed, requiring no lubrication schedules. The bearings are lubricated and sealed as well.

- ***What drive systems and control packages are offered?***

The FlexRake™ as a standard has an electric drive, though hydraulic or solar are also options. A list of possible options follows in the Specifications Section.

Savings are available when ordering Duperon standard controls packages. Please request details for what might be suitable for your application.

- ***What spare parts should I stock?***

Each site receives a minimum of (1) standard spare parts package with (10) snap rings and (4) link pins for the FlexLinks™, (1) drive sprocket pin, (4) stainless bolts and nuts for the scrapers, (1) 3 oz. tube of Never Seez and (1) snap ring tool.

Beyond this, Duperon Corporation does not make recommendations for additional spare parts. However, some customers, particularly in remote locations, may choose to stock (1) spare motor per site, (1) set scrapers and additional link pins and snap rings.

- ***What type of warranty is offered?***

The FlexRake™ has a Standard One Year Warranty for defective parts and workmanship.

Warranty extensions are available at additional cost.

- ***What purchase options are offered?***

Standard terms are 1/3 down with purchase order or contract and balance due net 30 days from date of shipment based upon credit application. Also, available; a 10% performance retainer due net 60 days from successful start up and/or testing or from date of invoice, whichever is less. Terms are negotiable upon request.

Trouble getting funding with your capital budget? Leasing options are available for qualified buyers.

- ***How do I know whether the FlexRake™ is right for our site?***

We encourage you to contact us at

***(800) 383-8479***

if you have questions  
as to whether the FlexRake™  
is a good fit for your site.

# Specifications

<b>Motors</b>	<b>Standard: 1/8hp, 3/60/230/460volt weatherproof, or 1/60/115/230 volt with a weather shield</b>
	1/6 hp: washdown duty 1/3 hp: explosionproof Solar Power or Hydraulic Drives.
<b>Speed Reducer</b>	<b>Standard: .5 output rpm, 4650 in.lb. output torque, 3511:1 ratio</b>
	Options: variable speed available for 1/60/220 volt or 3/60/230/460 volt
<b>Discharge Rate</b>	<b>Standard Model: Scrapers are 63 in. or every 6th Link at an approx. 2 minute discharge rate. Scrapers move at approx. 28 in./minute.</b>
	Wastewater Models typically have Scraper spacing of 21 in or every 2nd Link. Fine Screen: 42 in or every 4th Link. Other options apply.
<b>Drive Assembly</b>	<b>Standard: Drive Sprockets &amp; End Castings: CL40 Iron Drive Shaft: A36 Steel</b>
	304 Stainless Steel guard (center tube) available.
<b>FlexLinks™</b>	<b>FlexLink™: 316 Stainless Steel Investment Castings Link Pins: 304 Stainless Steel</b>
	No options available.
<b>Scrapers</b>	Standard Model Configuration: Serrated Material: Black, UHMW with UV Protection. Thickness: .75 in to 1.5 in Depth: 4 in to 9 in Length: 1.5 ft to 12 ft
	Material thickness: to 2 in.  Configuration Options: (see page 7) <b>Full Penetration:</b> Screen openings minimum of .25 in. - scrapers clean 3 sides of bar screen  <b>Fine Screen:</b> Screen openings .020 to less than .5 in. - scrapers have straight edge cut at 45° angle.  <b>Accessories:</b> such as brushes, squeegees and other devices may be used for fine screening or specific debris.

<b>Standard Duperon Coating</b>	<b>All steel components are painted with a moisture cured urethane 2-3 coat paint system applied to manufacturers specifications. Acceptable manufacturers are Wasser or Xymax coating systems. Standard Colors: FlexRake™: Safety Blue Barscreens: Black</b>
	FlexRake™: Safety Yellow Options (at additional cost): customer specified paints or hot dipped galvanizing for screens.
<b>Stripper</b>	<b>Standard Model: Typically does not include a stripper.</b>
	Full Penetration and Fine Screen Models come with a stripper as a standard.
<b>Chain Slides</b>	<b>Material: A36 Steel and UHMW. Used for certain site conditions to support the upstream chain. Typically every 15 ft.</b>
	Several styles available depending upon model.
<b>Lower Return Guides</b>	<b>Standard: A36 Steel HDG used for tracking the FlexRake™ when purchasing the rake only for existing screens. Customer may choose to provide.</b>
	When purchased assembled on bar screen, return guides are integral to the frame.
<b>I-Beam Mounting</b>	<b>Standard: Duperon can provide (A36 Steel with standard Duperon coating) or customer frequently has this manufactured locally or by your maintenance crew with Duperon's design assistance. Other options are available.</b>
	Side Fab Mounting System: duplicates the FlexRake frame system which includes the return guides and chain slides. Attaches to customers existing screens when bar openings are 2.5 in or greater (or a bar can be removed).  This is not necessary when the FlexRake™ is purchased fully assembled on the bar screen. Mounting is part of frame.
<b>Pivoting Mounting Assembly</b>	<b>Standard: Material: A36 Steel. May either be bolted or welded to I-beam mounting. If purchased assembled on barscreen, rake mounting will be part of screen frame. Standard mounting brackets are designed to pivot.</b>
	Options: With space constraints a custom non-pivoting mounting can be designed. Not recommended due to decreased flexibility for debris.
<b>Lifting</b>	<b>1000 lbs.</b>

## Specifications continued...

<p><b>Torque Limiting</b></p>	<p>Due to the shaft mounted drive, Duperon does not design limit switches or shear pins for torque limiting. However, there are several sacrificial members. The best way to protect the FlexRake™ unit from torque overload is by the use of either a power monitor such as an Emotron or a Variable Speed Drive. A typical starter used for thermal overloads WOULD NOT be sufficient protection. Due to the high gear ratio (either 3511:1 or 954:1), a standard heater does not react quickly enough to prevent potential damages to the unit.</p>														
<p><b>Controls</b></p>	<p>Controls can vary from the most basic (many customers hard wire the unit on a fused breaker) to the more sophisticated with interaction to your site PLC or SCADA system to run the FlexRake™ <b>simultaneously</b> with other primary equipment. Duperon Corporation currently provides standard controls packages to provide the best value for customers. Here are a few considerations for selecting controls:</p> <ol style="list-style-type: none"> <li>1 You may operate the FlexRake™ by head differential. However, the unit easily works if it is allowed to run continuously whenever there is flow through the bar screens. It allows the unit to maintain clean screens through varied debris flows. The FlexRake™ moves slowly at .5 rpm to prolong the product life and uses little energy. Timed sequences can also be used if desired. Regardless of operating method, it is recommended to avoid high load start ups.</li> <li>2 Analyze your debris conditions for level of risk for jamming or heavy loads for which you may want protective shutoffs.</li> <li>3 Evaluate cost/benefit of having motor, gearbox and FlexRake™ protected. Some customers determine that the "insurance" of more sophisticated controls is too costly for their potential losses. Ask about our standard control packages.</li> <li>4 Determine the risk, hazard, damage or other negative results that could occur if the unit is not operating and maintaining clear waterways.</li> <li>5 Evaluate your overall control system at the site and determine if you want equipment running simultaneously, receive fault warnings, e-stops, hour meters, sound alarms, etc.</li> <li>6 Make certain that controls are located such that they are protected from direct sun or freezing conditions to get optimal performance and life from your controls. Also, make sure that any "Jog Reverse" and "E-Stop" buttons (whether in a local or main panel) are within sight of the trashrake.</li> <li>7 If you will be operating controls automatically, you will want to address possible litigation issues and insure that you have adequate warning, limited unauthorized access, etc. to minimize exposure to litigation.</li> </ol> <p style="text-align: center;">ASK ABOUT OUR STANDARD CONTROLS PACKAGES.</p>														
<p><b>Technical Assistance</b></p>	<p><b>On-site technical assistance during installation or start up is available at additional cost. Often we have agreements with our local reps to provide start up assistance for their customers. You may also call (800) 383-8479 for telephone support.</b></p>														
<p><b>Recommended Spare Parts</b></p>	<p>The FlexRake™ automatically comes with a Standard Spare Parts Package which includes additional bolts/nuts/washers, snap rings, drive and link clevis pins. Each site also receives a snap ring tool. Additional spare parts are not typically recommended, however, some customers feel more secure with items such as:</p> <p style="text-align: center;">Spare motor          (1) set of scraper assemblies per site (or 1 additional scraper)          (1) each of FlexLink™ castings (with mounting and without)          Additional link pins and snap rings</p> <p>Most of these items are kept in stock other than the motor and the scrapers which have been machined specifically to your site configuration (which is why it is less expensive to order spares with the original order).</p>														
<p><b>Design Parameters</b></p> <p>*Maximum width for Full Penetration Model is 10 feet</p>	<table style="width: 100%; border: none;"> <tr> <td style="width: 60%;"><b>Minimum - Maximum Width per (1) FlexRake™ Unit:</b></td> <td>1 - 12 feet*</td> </tr> <tr> <td><b>Maximum Height of FlexRake™ w/o re-design:</b></td> <td>40 - 50 feet</td> </tr> <tr> <td><b>Height typically requiring Chain Slides:</b></td> <td>Over 12 feet</td> </tr> <tr> <td><b>Height Over Deck (depends on debris/discharge pt):</b></td> <td>3 - 7 feet</td> </tr> <tr> <td><b>Minimum - Maximum Bar Screen Openings:</b></td> <td>.020 Wedgewire - Any</td> </tr> <tr> <td><b>Screen Angle from Vertical:</b></td> <td>Ideal: 20 - 30° vertical to horizontal</td> </tr> <tr> <td><b>Debris:</b></td> <td>vegetation, limbs, general refuse, tires, drums...(not for large trees)</td> </tr> </table>	<b>Minimum - Maximum Width per (1) FlexRake™ Unit:</b>	1 - 12 feet*	<b>Maximum Height of FlexRake™ w/o re-design:</b>	40 - 50 feet	<b>Height typically requiring Chain Slides:</b>	Over 12 feet	<b>Height Over Deck (depends on debris/discharge pt):</b>	3 - 7 feet	<b>Minimum - Maximum Bar Screen Openings:</b>	.020 Wedgewire - Any	<b>Screen Angle from Vertical:</b>	Ideal: 20 - 30° vertical to horizontal	<b>Debris:</b>	vegetation, limbs, general refuse, tires, drums...(not for large trees)
<b>Minimum - Maximum Width per (1) FlexRake™ Unit:</b>	1 - 12 feet*														
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## More about FlexRake™ Models...

### Standard Model FlexRake™

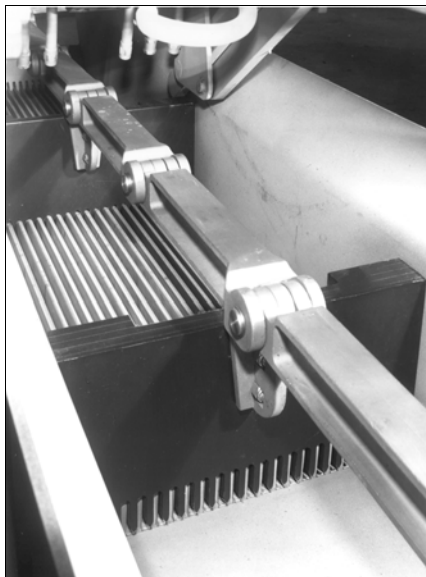
The Standard Model is typically used for stormwater, pumpstation, hydroelectric, irrigation or other applications where the debris is varied and the screen openings are coarse; 1 – 12 inches.

If the site allows, the Standard Model is delivered completely assembled. Installation is simply pick, place, anchor and wire.

Standard Model	
Width	> 2 to 12 feet*
Length	To 50 ft (w/o modifications)
Standard Bar Openings	1 to 12 inches
Standard Scraper Spacing	Every 6th Link
Purchase Options	Fully Assembled or for RETROFIT: Rake Only



### Full Penetration Model



The Full Penetration Model FlexRake™ is typically used in wastewater or other applications where debris can accumulate or wrap around the bars. The scraper is designed to clean 3 sides of a bar. It is available in bar openings of .25 – 2 inches. If the site allows, this ships fully assembled.

Full Penetration	
Width	1.5 to 10 feet*
Length	To 50 ft (w/o modifications)
Standard Bar Openings	.25 to 2 inches
Standard Scraper Spacing	Every 2nd Link
Purchase Options	Fully Assembled

## Fine Screen Model Flex-Rake

The Fine Screen Model FlexRake™ is most often used in food processing, fish screening or other applications where a wedgewire screen may have openings of .020 - .25 inches. The combined ability to handle both large and small debris provides an advantage compared to most maintenance intensive traveling water screens and may result in eliminating several graduated screens.



Shown here as a Single Strand Model.

### Why choose the Fine Screen FlexRake™?

- The FlexRake™ is a simple mechanical device.
- No lower sprockets, rails, gears subject to fouling.
- Easy to install—comes fully assembled. Pick, place, anchor, wire.
- Eliminates plumbing required for sprayers.
- Eliminates pumping.
- The FlexRake™ can rake fine to coarse screens.
- Superior to traveling water screens in both installation and maintenance.
- The ability to remove the raking mechanism without removing the screen or the entire unit.

#### Fine Screen

Width	> 2 to 12 feet*
Length	To 50 ft (w/o modifications)
Standard Bar Openings	.020 to .25 inches
Standard Scraper Spacing	Every 4th Link
Purchase Options	Fully Assembled

## Single Strand Model

The Single Strand Model FlexRake™ is used in applications where the channel opening is 1-2 ft wide.

It is offered in Fine Screen Models.

#### Single Strand

Width	1 to 2 feet
Length	To 50 ft (w/o modifications)
Standard Bar Openings	.020 to 2 inches
Standard Scraper Spacing	Every 2nd Link or Every 4th Link
Purchase Options	Fully Assembled Fine Screen



## Heavy Duty Model

The Heavy Duty Standard Model FlexRake™ is used in open channel applications such as stormwater, where debris size, volume and velocity may be unpredictable and where there is no upstream constraints such as in-fluent pipes or pre-screening.



Sample of heavy duty scrapers.

Heavy Duty Model	
Width	2 to 12 feet
Length	To 50 ft (w/o modifications)
Standard Bar Openings	2 to 6 inches
Standard Scraper Spacing	Every 6th Link
Purchase Options	Fully Assembled or Partially Assembled (Rake Only)

## Available Accessories

### Accessories for Specific FlexRake™ Models:

Stripper

Chain Slide

Scraper Brushes/Blades

Sprayer

Silt Scraper

Stone Comb

### Accessories For Retrofit:

Mounting System

Chain Slide

Return Guide

### Other Items Available:

Drag Chain Conveyor

Std Controls Packages

### Stripper

The Stripper is a simple device used to remove debris from the scraper. There are a two models available.



## Applications

**The FlexRake™ ... retrofitting to existing screens.**



**St. Mary's Falls—USACE Hydroelectric Plant**

**SCOPE:**

Purchased partially assembled, Standard Model, Rake Only.

Included Duperon designed mounting & link support system.



**SFWMD: Pumpstation**

Aquatic Debris Application

***The FlexRake™ ...***

***Flexibility to  
handle wide ranges of  
sizes, types & volumes  
of debris.***



## More FlexRake™ Applications

**Standard Model.... *fully assembled.***



**Neat.... Clean.... Quiet.**

**Nevada Irrigation - Residential Area**

SCOPE: Purchased the unit fully assembled with anchoring plates.



- **Unload**
- **Place**
- **Anchor**
- **Wire**





## More FlexRake™ Applications

**Full Penetration Model FlexRake™ ... *cleaning three sides of the bar.***

### Mechanically Cleaned Barscreens

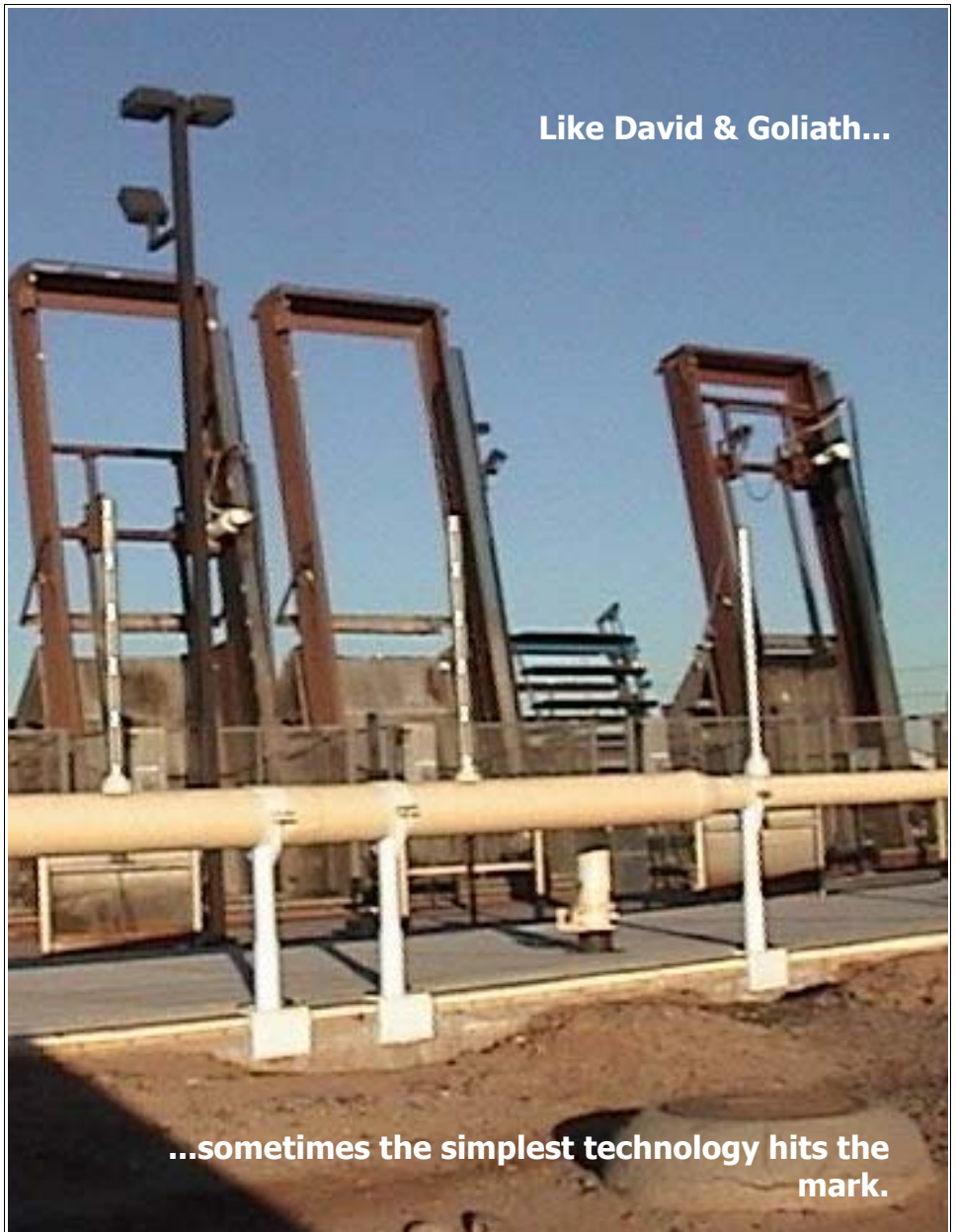
Simple  
Quiet  
Low profile



#### City of Frankenmuth WWTP

Wouldn't you like to say this about your mechanically cleaned screen? When asked how the FlexRake™ was working, this customer replied...

“...boring!”



City of Phoenix, 91st Avenue WWTP



## More FlexRake™ Applications

**Fine Screen Model....** *from .020 inch openings.*



**Joseph Phelps Winery**



**Dry Creek Winery**

*The Flex-Rake™...*

- Eliminates pumping, plumbing, etc which breaks down effluent
- Replaces expensive, high-maintenance traveling water screens.
- Does not have the sunlight/algae-growth of revolving screens.
- Reduces BOD's & secondary treatment costs.

## Additional Services...

Product Development	An unusual challenge? Let's see if we can use our ability to develop simple mechanical devices to solve your water flow problems.
Concept Drawings	E-mail us your drawings and we'll draw the FlexRake™ on your site.
Leasing Options	Capital expenditures budgeting a problem? Ask about our leasing options.

*Call (800) 383-8479*



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