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The multistage baffle design of Columbus Industries' collectors allows each layer to uniformly collect overspray particulates, or depth load.

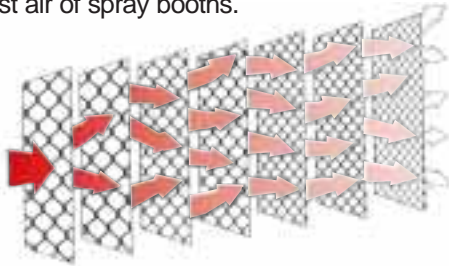


Meeting Your Needs with a Highly Versatile, Cost-Effective Line of Dry Overspray Collectors.

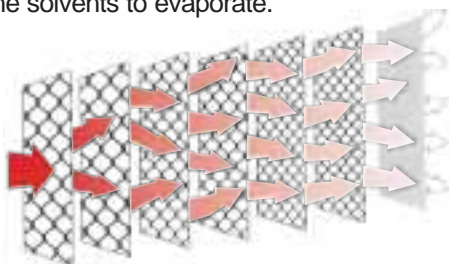
Overspray collectors are not commodity items and all do not perform equally well on every coating. Specific types of coatings require certain collector designs and performance levels. A continuing dedication by Columbus Industries to research and develop better overspray collection systems has brought about a complete, highly versatile line of cost-effective dry overspray collectors. Some Columbus Industries' collectors provide optimum performance under general conditions while others are designed to provide maximum performance under specific spray booth applications. One of Columbus Industries' overspray collectors is the perfect match for your overspray collection needs.

Columbus Industries' Dry Overspray Collection Principles.

Columbus Industries' collection medias are designed for optimum performance and extended service life. As a result, they are extremely economical collectors of particulates from the exhaust air of spray booths.



Columbus Industries' overspray collectors are fabricated from slit and expanded kraft media, and utilize the baffle principle of collection to its highest level. These layers are arranged to redirect and cause the particulate-laden airflow to become turbulent, resulting in maximum contact between the solid overspray-particulates and the baffles within the collectors. These baffled layers are also positioned in a graduated density pattern to assure full usage of the collectors' media, or depth loading – the uniform depositing of particulates throughout each layer of the media. Additionally, the kraft material actually absorbs particulates while continually allowing the solvents to evaporate.



Columbus Industries' Supra™ overspray collectors incorporate both the strainer principle of collection and the baffle principle. In these collectors, a final synthetic layer acts

as an additional filtering stage by “straining” practically all of the remaining particulates from the air. Since the particulates generated from various types of sprayed coatings differ so much in physical and chemical characteristics, Columbus Industries has developed different collector designs to yield the performance levels required with various types of coatings.

This flexibility in design optimizes the collection efficiency, holding capacity and service life of Columbus Industries' overspray collectors. The design's goal is that efficiency of operation is maintained and resistance to airflow is minimal. This helps slow resistance buildup and minimizes airflow changes, providing more uniform air distribution through the booth and throughout the service life of each collector.

Performance Characteristics of Overspray Collectors.

The four primary categories used to assess the overall effectiveness of a particular overspray collection system are as follows:

- **EFFICIENCY** (formally known as “arrestance efficiency” or “weight arrestance” is now referred to as “efficiency” throughout this brochure) – The average percentage of particulate extracted or collected from the exhaust air. The higher the collector efficiency, the cleaner the exhausted air and spray booth ducts, fan, neighboring properties, plant roof, etc. Higher efficiency lowers booth maintenance costs and, with minimal maintenance, greatly reduces the chance of a duct fire.
- **AIRFLOW RESISTANCE** – The measure of resistance encountered by the particulate-laden air as it passes through the collector. (Generally it is stated in inches of water column, the static pressure required to draw air through the filter.) As the collector begins to load, the resistance increases. The velocity of the air through the booth also influences the initial resistance figures and, therefore, the holding capacity and service life. The importance of proper airflow in overspray collection cannot be overemphasized. **The uniformity of airflow and increased efficiency minimizes the amount of overspray deposited where it is not wanted – in difficult to clean areas within the booth, inside of the exhaust duct, on fan blades, plant roof, neighboring properties, parked cars, etc.**
- **HOLDING CAPACITY** – The amount (weight) of overspray a collector will hold before its resistance to airflow becomes prohibitive. A collector should be able to hold overspray throughout its entire depth, which is referred to as depth loading.
- **SERVICE LIFE** – The length of time a collector performs effectively in terms of hours or shift periods before the resistance to airflow becomes prohibitive.

Mini-Mesh design reduces storage space & disposal costs.

Columbus Industries' Mini-Mesh Overspray Collector Product Line.

Columbus Industries' collectors incorporate a unique **Mini-Mesh** final filtering layer with baffle openings smaller than those found in conventional collectors. This configuration enhances efficiencies and allows the collectors to be packed in higher quantities per container, **requires less storage area, reduces freight costs and reduces disposal costs.** The Mini-Mesh design is a result of equipment companies' success in increasing transfer efficiencies, or the percentage of particles that make contact with the part, thus reducing the amount of overspray actually reaching the collector bank. These Mini-Mesh products are further evidence of Columbus Industries' continuing effort to design overspray collection products best suited to your particular needs. Overspray collectors of standard diamond construction are also available from Columbus Industries as they have been in the past, which may have a slightly higher holding capacity.

STANDARD/ STANDARD MINI-MESH



Columbus Industries' baffle-type **Standard Mini-Mesh Collector** is comprised of six layers of kraft media, each slit and expanded into a mesh with baffle-like surfaces. These six baffled layers form a multistage collection design which creates the action necessary for superior depth-loading characteristics. The layers with the larger baffled openings are positioned at the front of the collector. As the exhaust air passes through the collector, these larger front baffles cause the initial turbulence and surface contact removing the larger overspray particulates. The final layers incorporate smaller baffled openings which efficiently trap the vast percentage of the remaining particulates. With this configuration, the Standard Mini-Mesh Collector provides high efficiency as well as good holding capacity. The Standard Mini-Mesh Collector is designed for general application with a wide variety of coatings ranging from lacquers to bake-dry enamels and is particularly suitable for use wherever conventional coatings are being sprayed.

HIGH-CAPACITY/ HIGH-CAPACITY MINI-MESH



Columbus Industries' baffle-type **High-Capacity Mini-Mesh Collector** also provides excellent efficiency and very high holding capacity. The High-Capacity Mini-Mesh Collector utilizes eight layers of slit and expanded kraft, again creating a multistage collection design. The first three layers of this collector employ extremely large baffle openings for **maximum particulate holding capacity.**

The High-Capacity Mini-Mesh Collector is excellent for use with a wide range of coatings and especially with heavier, tacky-type coatings, conventional coatings and in **situations requiring extended service life.**

SUPRA I & II/ SUPRA I & II MINI-MESH



The combination baffle/strainer-type **Supra I Mini-Mesh Collector** boasts extremely high efficiency as well as excellent holding capacity. Five layers of slit and expanded kraft with multistage designed baffle openings are combined with one layer of a duo-density singed synthetic backing, which employs two material densities to maximize efficiency and strength. This media was developed to meet the high-efficiency requirements of installations using many of today's compliance coatings including high solids, waterbornes, catalyzed and bake-dry coatings. Supra I Mini-Mesh Collectors are also recommended for use on coatings with overspray which is tacky to semi-tacky as it encounters the overspray collector. Columbus Industries is the originator of this type media.

The **Supra II Mini-Mesh Collector** also employs both baffle and strainer principles and performs with high efficiency and excellent holding capacity. The Supra II Mini-Mesh Collector also has five layers of slit and expanded kraft media with multistage designed baffle openings and one synthetic layer. The Supra II's final synthetic layer is less dense than the Supra I's but still provides high efficiency collection for a wider range of coatings. The Supra II Mini-Mesh Collector is recommended for the same type of situations as Supra I. This media will, however, have a longer service life when used with coatings that have slightly drier overspray.

Different coatings react differently to any filter media from a standpoint – Columbus Industries' collectors fully address those differences.

HIGH-CAPACITY SUPRA I & II/ HIGH-CAPACITY SUPRA I & II MINI-MESH



The **High-Capacity Supra I & II Mini-Mesh Collectors** combine the advantages of the High-Capacity Mini-Mesh and Supra Mini-Mesh Collectors. This provides high efficiency and very high holding capacities. The High-Capacity Supra Mini-Mesh Collectors incorporate seven layers of slit and expanded kraft with multistage designed baffle openings and one final layer of synthetic media. High-Capacity Supra Mini-Mesh collectors are specifically designed for high overspray efficiency and extremely high holding capacities with coatings that remain tacky to semi-tacky. These collectors can be effectively implemented on a wide range of coatings.

SupraLoft™ PAINTSTOP (PSG) SERIES



Columbus Industries' **SupraLoft™ Paintstop (PSG) Series** offers end users a highly economical overspray collector solution. These collectors are available in pads and rolls and are best suited for use as secondary or tertiary overspray collectors in general applications incorporating a wide variety of coatings where low static pressure and good holding capacity are required.

The **SupraLoft™ Multiple-Pocket Polyester Bags** from Columbus Industries are designed to provide a highly efficient secondary or tertiary filtering media while maintaining a low resistance to airflow. The pocket construction, or extended surface area, makes these benefits possible.

These collectors, which are available in a wide array of pocket counts, frame configurations and material specifications, yield exceptional efficiencies and long service life.

SupraLoft™ MULTIPLE-POCKET POLYESTER BAGS



A full galvanized metal frame or wire support grid gives each bag collector product dimension, stability and provides a positive seal within the same frame that our overspray collection pads utilize. Rolls or pads can be used as the primary media in front of the pocket filters.

When used on today's COMPLIANCE coatings such as waterborne and high solids, the **SupraLoft™ Multiple-Pocket Polyester Bags**, with their excellent efficiencies and versatility, are the perfect overspray collector. These filter systems are especially important when an end-user has a VOC-abatement system that must be kept cleaner than traditional systems.

The service life or a filter's change-out period is solely determined by the airflow within the system.

COLUMBUS INDUSTRIES' OVERSPRAY COLLECTOR PRODUCT LINE APPLICATIONS

- 1 - Excellent Performance
- 2 - Good Performance
- 3 - Moderate Performance
- 4 - Not Usually Recommended

Performance is based on an overall rating considering all categories of performance. When evaluating an application, the *priorities of the customer* should determine which media to use while using this chart as a typical guideline.

THE MINI-MESH ADVANTAGE

Columbus Industries' collectors incorporate a unique Mini-Mesh final filtering layer with baffle openings smaller than those found in conventional collectors. This configuration enhances efficiencies without reducing holding capacities, allows the collectors to be packed in higher quantities per container, requires less storage area, reduces freight costs and reduces disposal costs. These Mini-Mesh products are further evidence of Columbus Industries' continuing effort to design overspray collection products best suited to your particular needs. Overspray collectors of standard diamond construction are also available from Columbus Industries as they have been in the past.

	Standard & Standard Mini-Mesh	High-Capacity Mini-Mesh	Supra I Mini-Mesh	Supra II Mini-Mesh	High-Capacity Supra I & II Mini-Mesh	SL-100 PSG*	Supra DP Series Secondary Collectors**
Adhesives	2	1	3	3	1	3	DP Series:
Air-dry Enamels	1	1	2	1	1	2	Use in 2nd & 3rd stage
Asphalts	2	1	3	2	1	3	
Bake-dry Enamels	2	2	1	1	1	1	filtration where high efficiency is required.
Clear Coats	2	2	1	1	1	1	
Epoxies	2	1	1	1	1	1	Especially important in applications using VOC Abatement Systems.
Fiberglass	2	1	3	2	1	4	
Frit	2	1	2	2	1	2	
Gel Coats	2	1	2	2	1	2	
High Solids - Enamels	3	3	1	2	2	2	
Lacquers - Nitrocellulose	1	2	4	2	3	2	
Primers - Air Dry	1	1	2	1	1	2	
Tar-like Coatings	2	1	2	2	1	3	
Teflon	2	1	2	2	1	2	
Urethanes	2	1	1	1	1	1	
Vinyls	2	1	2	2	1	2	
Waterbornes	2	2	1	1	1	1	
Stains	1	1	2	1	2	1	
Sealers	1	2	2	1	2	1	
Glazes - Fillers	1	1	2	1	1	1	

COLUMBUS INDUSTRIES' CLEAN COLLECTOR RESISTANCE TO AIRFLOW IN INCHES WATER COLUMN

Airflow (Velocity) FPM	Standard & Standard Mini-Mesh (Tested with two pads in tandem.)	High-Capacity Mini-Mesh (Tested with two pads in tandem.)	Supra I & II Mini-Mesh (Range) (Tested with one pad only.)	SL-100 PSG (Range)* (Tested with one pad only.)	Supra DP Series Secondary Collectors (Range)**
100	.015	.015	.040-.050	.025	.020-.050
150	.025	.025	.065-.095	.045	.040-.080
200	.045	.040	.105-.135	.070	.060-.120
250	.065	.060	.150-.180	.095	.090-.170
300	.100	.095	.200-.250	.120	.120-.220
350	.135	.125	.230-.310	.160	.150-.290

OSHA 1910.107 Standard requires that spraying operations be so designed, installed and maintained that the average air velocity over the open face of the booth shall not be less than the lower explosive limit of the solvents being sprayed which is usually above 100 linear feet per minute. Electrostatic spraying operations may be conducted with an air velocity over the open face of the booth of not less than 60 linear feet per minute or more, depending on certain variables (see OSHA 1910.107 Standard for the full scope of spray booth operating requirements). This was initiated primarily from a health standpoint; however, it also provides for proper collection of airborne solids. A higher initial start-up velocity should be used in order to maintain airflow above the minimum required. This is caused by the gradual increase in resistance as the overspray collectors become loaded. Columbus Industries' overspray collectors will function well at excessive velocities; however, primarily because of energy considerations, it is not recommended.

* Usually recommend for the following reasons:

- Size (available in roll widths to 100")
- Filter change-out governed by shift change or schedule over pressure drops
- Ease of installation

** The Supra DP Series Pocket Collectors are meant to be used as secondary collectors. Refer to the following page for further details.

All overspray is not created equal! Each coating reacts differently to any filter - therefore, every end user should expect tests based on the same or similar coating as the actual coating being used.

COLUMBUS INDUSTRIES' OVERSPRAY COLLECTOR PRODUCT LINE

EFFICIENCY/HOLDING CAPACITY PERFORMANCE FOR TYPICAL COATINGS

COATING TYPE	EXPECTED EFFICIENCY RANGE (%)	EXPECTED HOLDING CAPACITY (LBS.) @.5" W.C.
STANDARD & STANDARD MINI-MESH OVERSPRAY COLLECTORS*		
Air-dry Enamel	96.0-98.0%	2.30-2.70
Bake-dry Enamel	96.5-98.5%	4.10-4.40
Lacquer	87.0-90.0%	1.20-1.50
Primer	93.0-95.0%	7.00-7.50
Waterborne Enamel	96.0-98.0%	3.50-3.80
HIGH-CAPACITY MINI-MESH OVERSPRAY COLLECTORS*		
Air-dry Enamel	96.0-98.0%	4.80-5.20
Bake-dry Enamel	97.0-99.0%	7.80-8.40
Lacquer	87.0-90.0%	1.50-1.80
Primer	93.0-95.0%	10.00-12.00
Waterborne Enamel	96.0-98.0%	6.80-7.20
SUPRA I MINI-MESH HIGH EFFICIENCY OVERSPRAY COLLECTORS		
High-Solids Bake Enamel	99.7-99.9% +	5.30@.35"W.C.
Waterborne Bake Enamel	98.5-99.5%	4.20@.50"W.C.
(Tests conducted using one layer of filter media only)		
SUPRA II MINI-MESH HIGH EFFICIENCY OVERSPRAY COLLECTORS		
High-Solids Bake Enamel	98.5-99.5%	5.80@.20"W.C.
Waterborne Bake Enamel	97.5-99.0%	4.50@.50"W.C.
(Tests conducted using one layer of filter media only)		
HIGH-CAPACITY SUPRA I & II MINI-MESH HIGH EFFICIENCY OVERSPRAY COLLECTORS		
High-Solids Bake Enamel	98.5-99.9% +	9.40@.20"W.C.
Waterborne Bake Enamel	97.5-99.9%	7.80@.50"W.C.
(Tests conducted using one layer of filter media only)		
SL-100 PSG OVERSPRAY COLLECTORS		
High-Solids Bake Enamel	98.5-99.9%	2.80@.50"W.C.
Air-dry Enamel	98.9-99.8%	1.50@.50"W.C.
(Tests conducted using one layer of filter media only)		
SUPRA DP-I SECONDARY COLLECTORS		
High-Solids Bake Enamel	99.7-99.9%+	7.00-11.00
Waterborne Bake Enamel	99.0-99.7%	3.00-5.00
Powder Coating	99.0-99.9%	3.00-6.00
Clearcoat	98.5-99.5%	8.00-12.00
Urethane (Polane)	97.5-99.5%	5.00-8.00
SUPRA DP-II SECONDARY COLLECTORS		
High-Solids Bake Enamel	99.0-99.7%	8.00-12.00
Air-dry Enamel	98.5-99.5%	9.00-13.00
Lacquer	95.0-99.0%	1.00-4.00

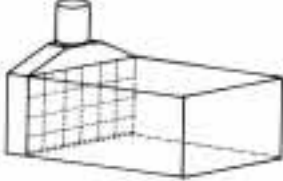
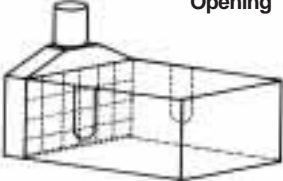
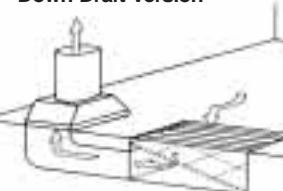
NOTE: Tests were conducted using a modified ASHRAE STANDARD 52-76 test apparatus and procedures. Test media size consisted of 20" x 20" pads held in a frame/grid module just as it would be used in the field. Overspray was 100% from an air atomizing gun with the air velocity of 150 fpm.

* These results were gained using Standard or High-Capacity Mini-Mesh collectors in tandem. Only the front pad is loaded and requires changing each time. Bear in mind that as coatings, viscosities and mix ratios will vary, so will the test results. These ranges should be used as a guideline to verify actual performances. A test on the specific coating should be conducted by the manufacturer using the ASHRAE test apparatus and procedures.

Judge
a filter by its
efficiency and cost
per pound of overspray
collected during its service life,
not by its cost per pad or roll.

Meeting Your Needs with a Highly Adaptable, Economical Modular Collection Bank Design.

Columbus Industries' modular overspray collection bank system is easily adapted to practically any style or size of new and existing spray booth. Booth styles which can be adapted include the upright totally enclosed, enclosed with conveyor opening and the totally open booth. Additionally, down-draft versions of each of these booth configurations can also be easily converted. Sizes of installations currently operating range from only one module to several hundred. The fact that a booth equipped with Columbus Industries' frames, grids and media (rolls or pads) is very lightweight, allows the booth to be located in desired areas where the weight of other style booths make it prohibitive.

<p>Upright Totally Enclosed</p> 	<p>Enclosed with Conveyor Opening</p> 
<p>Totally Open – Down-Draft Version</p> 	<p>Since OSHA requires a minimum of 100 linear fpm over the open face of a manned booth, the following final velocities at the filter bank should be used as a rule of thumb:</p> <ul style="list-style-type: none"> • Totally enclosed spray booth...100 fpm • Enclosed spray booth with conveyor opening...150 fpm • Open spray booth...300 fpm • Down-draft booth – similar to upright booths depending upon the booth wall configuration • In an electrostatic operation requiring 60 linear fpm, the numbers should be adjusted accordingly

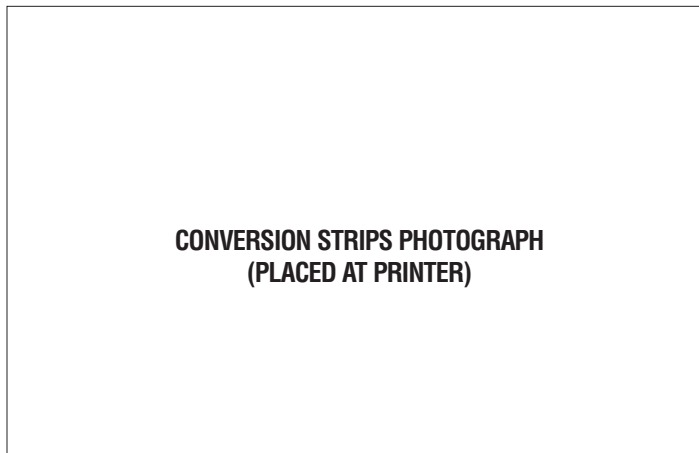
Simple, Inexpensive Modular Collection Bank Construction.

Columbus Industries offers a convenient, economical overspray collector module package and roll conversion strips which take the time, manpower and cost out of spray booth conversions or the development and assembly of a new booth. These simple, efficient systems, when combined with the properly specified Columbus Industries' collectors, will keep ducts, exhaust fans and stacks clean, minimizing maintenance and fire hazards. Good spray booth overspray collection reduces the chance of coating the plant roof, parked cars and neighboring properties. In addition, these systems used in combination with Columbus Industries' overspray collectors provide, on a per pound of overspray collection basis, the most economical means of overspray collection available today and can offer substantial savings in spray booth operating costs.



Columbus Industries' modular bank section (shown with roll conversion strips) makes conversions and new installations easy and economical.

With the addition of a roll conversion package, those operations utilizing modular dry collector components can convert to roll media for a more cost-effective, high-production design. For the system that best suits your needs, consult your local supplier of Columbus Industries' products.



Conversion strips are designed to fit most popular modular systems.

New booths utilizing these overspray collector systems are currently available through major original equipment manufacturers.

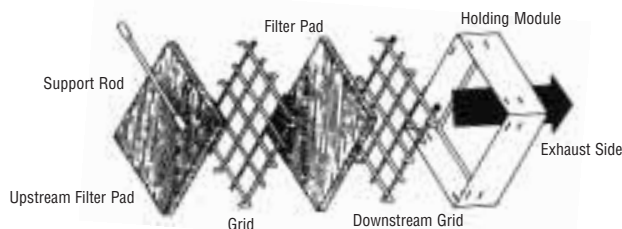
In high-production applications, filter rolls require much less time to change out than pads. The more heavily laden rolls can be changed while leaving any rolls not utilized in place, thus reducing operating costs.

Columbus Industries' Modular Collection Bank Assembly Instructions.

- 1) Utilizing the 20" x 20" or the 20" x 25" modules, a multitude of collection wall sizes can be achieved. First, determine the size of the modular collection wall desired in inches (W x L).
- 2) Calculate the number and size of modules to best suit your spray booth size specifications. This is easily done by first determining the number of 20" increments along the base and the number of 20" or 25" increments along one vertical side of the collection wall. Then multiply these figures together to determine the exact number and size of modules you will need to fit your collection wall most efficiently. (Note: When utilizing the 20" x 25" modules, the 25" edges should be vertical and the 20" edges horizontal.) In retrofitting an existing booth, any remaining open edges should be closed off with the appropriate sheet metal pieces (usually center the filter bank).
- 3) The spray gun is normally located some five to six feet from the filter bank while the plenum depth should be at least the diameter of the properly sized exhaust fan.
- 4) Determine the type of collection system best suited to your needs. For engineering assistance, contact your local representative or Columbus Industries.

Assembly and Replacement Instructions for Dual Collector Pad Systems.

Modular systems utilizing the dual collector pad system require two pads (one upstream pad and one downstream pad), two grids (one for each collector) and one support rod, for each individual module. First, place the downstream grid in the exhaust end of the module frame. Then, place the downstream pad into the grid with the larger grid openings facing the spray gun side of the system. Next, place the remaining grid into the module frame, followed by the upstream pad. Lastly, position the support bar to secure the assembly as needed. This support bar prevents sagging which may occur due to the high holding capacity and service life of Columbus Industries' overspray collection pads.



The modular construction of the overspray collector bank facilitates the changing of only the loaded (used) upstream collector pads as needed. Different medias may be used to gain higher efficiency and/or higher holding capacity.

Assembly and Replacement Instructions for Collector Roll Systems.

Columbus Industries' roll media, especially designed for use in high-production situations, is available in various lengths to fit your booth's specifications. The width of these rolls is designed so that the weight of the loaded rolls is not too heavy to physically remove from the booth. After the roll length is selected, the installation should begin at the top of the modular roll conversion assembly allowing the remaining media to unroll down the face of the rack. The largest openings in the overspray collection media should always be in the upstream position.



Columbus Industries' roll media system is perfect for high production operations (two-stage design shown here), where labor costs are reduced by quicker change outs.

When using the Columbus Industries' modular roll conversion assembly rack, **the flexible design accommodates the use of a single layer of media or two layers of rolls or a roll and pad combination.**

This flexibility allows for the specific requirements of an end user to be designed into the system. The roll concept saves time which is particularly important in high-production situations. Less frequent replacement of the secondary (downstream)

media should always occur. These readily replaceable rolls allow for easy maintenance and reduce downtime of production equipment.

Two-Stage Collection Advantages.

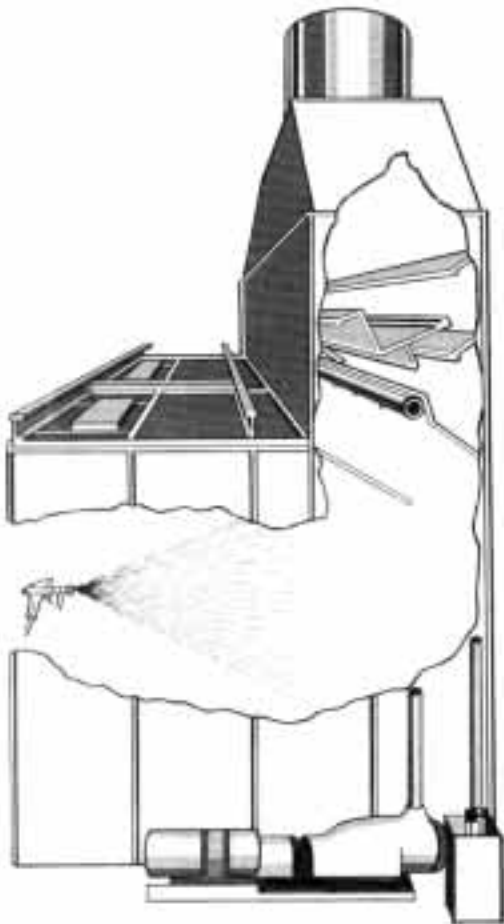
The high efficiency Supra medias can be used in a single layer design; however, several advantages exist for using the two-stage approach which is typically recommended for the Standard and High-Capacity Collectors.

- 1) The second layer helps **compensate** for any installation error on the first stage.
- 2) It gives added **efficiency** to the system, reducing booth maintenance requirements even further.
- 3) Two stages allow the use of different Columbus Industries' medias so a system can actually be designed for individual applications and extended service life.
- 4) The second layer requires change-outs at a greatly reduced interval and is therefore very **cost-effective**.

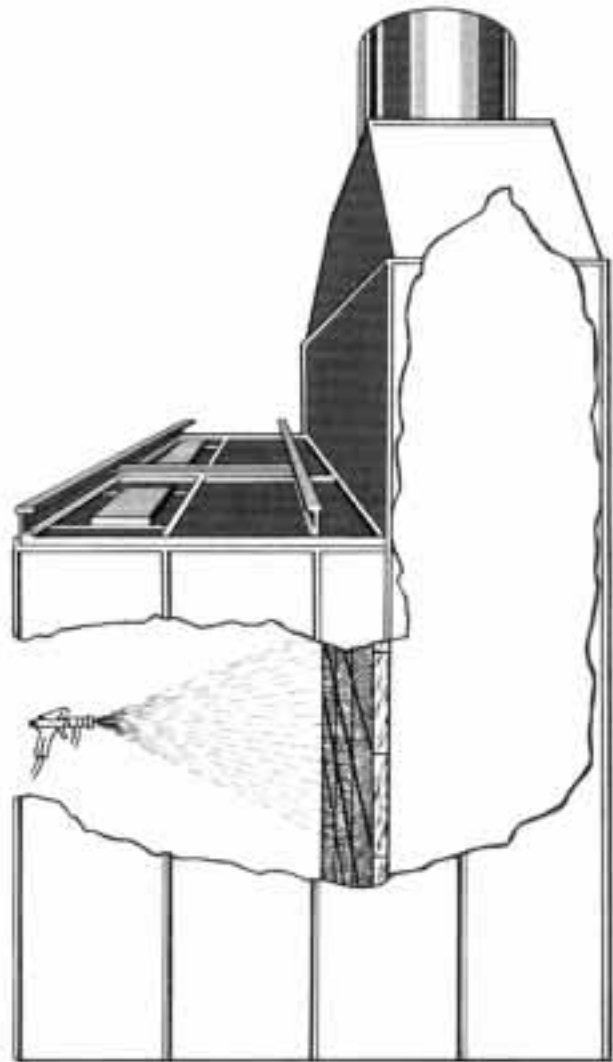
For detailed assembly instructions, refer to Columbus Industries' "COLLECTOR MODULE SYSTEM AND ROLL CONVERSION STRIP ASSEMBLY INSTRUCTIONS" sheet.

Easy Conversions of Water-Wash Spray Booths.

As water-wash booths become inefficient or inoperable, they can easily be converted to a highly efficient and economical Columbus Industries' overspray collection system. All that is usually necessary to complete the conversion is to remove the pump, plumbing and sheet metal baffles. Next, install the Columbus Industries' modular collection bank upstream from the exhaust fan to form a plenum. The distance between the bank and the back wall which forms the plenum should be, at least, equal to the diameter of the properly sized exhaust fan. Additionally, water-wash booths operate against much higher static pressure than the typical Columbus Industries' overspray collection system. Therefore, if left unchecked, converted water-wash systems can develop excessive air velocities. By altering the pulley speed on the fan and motor to match the average resistance required by Columbus Industries' overspray collection systems, reduced energy usage will result from less heat loss in the winter and constant lower energy requirements. An initial velocity of 125 fpm or more is suggested. Refer to fan and motor manufacturer charts and recommendations in order to properly size your system.



Typical water-wash booth *before* conversion.



Typical water-wash booth *after* conversion to a dry Columbus Industries' collector system.

Other Conversions are Also Easily Accomplished.

Pleated kraft-type filter installations can easily be converted by installing the Columbus Industries' conversion grids directly in the channel produced for the pleated-type media. Columbus Industries' roll media can then be easily installed, providing efficient and economical collection of overspray particulates from the exhaust airstream. Another easy and economical option is to remove the pleated filter bank well and replace it with a Columbus Industries' modular collection bank.

When other types of dry filters are used, Columbus Industries' overspray collectors can readily replace them as well. Usually, if other filter medias are replaced, it is possible to reduce the number of pads or rolls (filter area). This is because Columbus Industries' collectors typically have higher holding capacity and less resistance to airflow.

Spray Booth System Analysis – Determining Collector Bank Holding Capacity and Service Life.

Simple, yet very conclusive calculations can be performed on new and existing spray booth operations in order to determine a spray booth's collector bank approximate holding capacity and service life. The data required to complete these formulas must be supplied from both Columbus Industries and the end users.

As an example for the calculations that are involved in determining a collector bank's holding capacity and service life with a specific application situation, let's analyze the following hypothetical spray booth system. This exercise has also been designed so that end users can simply plug in their appropriate figures under the column labeled "Actual" and easily complete the necessary calculations.

Information Supplied by the End User:

	EXAMPLE	ACTUAL
1) Booth size (square footage of the collector bank): 8' high x 10' wide = 80 square feet	80 sq. ft.	_____
2) Weight of the coating per gallon.	10 lbs./gal.	_____
3) Gallons of coating sprayed per shift.	30 gal./shift	_____
4) Pounds of coating sprayed per shift: 30 gallons sprayed per shift x 10 lbs. per gallon coating weight = 300 lbs. of coating sprayed per shift.	300 lbs./shift	_____
5) Transfer efficiency.	60%	_____
6) Percentage of solids in the coating.	70%	_____
7) Percentage of overspray solids in the coating by weight generated per shift: 300 lbs. of coating sprayed per shift x 40% overspray (100% sprayed — 60% transfer efficiency) = 120 lbs. of overspray generated per shift x 70% solids in the coating = 84 lbs. of overspray solids generated per shift.	84 lbs./shift	_____

The end user will also need to supply the following for a laboratory analysis of collector performance on a specific overspray:

- Exact type of coating and consistency of the spray (i.e., tacky, semi-tacky, viscosity, drying time, etc.). All overspray collectors perform at their peak efficiency when the overspray reaching them has not totally dried to a dust-like powder; therefore, these variables can be used to optimize the overspray collector performance.
- One gallon of the coating for testing in Columbus Industries' laboratory (including the Material Safety Data Sheet) and mixing instructions.
- Velocity of the airstream in feet per minute (fpm). Since OSHA requires a minimum of 100 linear fpm over the open face of a manned booth, the following final velocities at the filter bank should be used as a rule of thumb:

- Totally enclosed spray booth 100 fpm
- Enclosed spray booth with conveyor opening 150 fpm
- Open spray booth 300 fpm
- Down-draft booth — similar to upright booths depending upon booth wall configuration
- In an electrostatic operation requiring 60 linear fpm, the numbers should be adjusted accordingly.

- Gun pressures including fluid and air where applicable.
- Objectives of the end user such as efficiency and holding capacity requirements (or emissions standard).
- Any other related information or suggestions.

Information Supplied by Columbus Industries:

	EXAMPLE	ACTUAL
1) Average efficiency (arrestance) of the recommended collector: Columbus Industries' Supra I pad recommended and tested with the end user's actual coating employing a modified ASHRAE Standard 52-76 procedure with 20" x 20" pads.	99.8%	_____
2) Holding capacity of the recommended collector (Supra I) at 0.5" W.C.: 719.12 grams per square foot holding capacity ÷ 453.6 grams per pound conversion factor = 1.585 lbs. per square foot holding capacity. This data was again obtained through the use of the modified ASHRAE test.	1.585 lbs. per sq. ft.	_____

Now that the necessary data has been obtained, the calculations for the collector bank holding capacity and service life can be completed.

Collector bank holding capacity: 80 square feet collector bank size x 1.585 lbs. per square foot collector holding capacity (Supra I) = 126.8 lbs. collector bank holding capacity.

Collector bank service life: 126.8 lbs. collector bank holding capacity ÷ 83.83 lbs. actual overspray solids collected per shift (84 lbs. of overspray solids generated per shift x 99.8% Supra I average efficiency rating = 83.83 lbs. actual overspray solids collected per shift) = 1.51 shifts collector bank service life based on 0.5" W.C. (this varies depending on the booth, motor, etc.).

From this exercise it is evident that the Supra I Collector would work exceptionally well in this specific spray booth and would last at least one full shift.

With the service life established, the quantity of the material used per shift can be multiplied by the price per unit, deriving a per day or per shift operating cost.

Our staff will gladly assist in recommending the collector to be used. Additional cost breakdowns and comparisons covering all of Columbus Industries' overspray collectors are available through Columbus Industries' technical representatives.

Overspray Collection System Exhaust Fan Sizing Calculations.

The following static loss ranges provide a general guideline when sizing an exhaust fan for a spray booth.

<i>Resistance</i>	<i>Typical Range</i>	<i>Typical Averages</i>	<i>Actual (Calculated)</i>
Loaded intake filter (not powered)	0.20"-0.30" W.C.	0.25" W.C.	_____
Booth entrance loss	0.05"-0.15" W.C.	0.10" W.C.	_____
<i>Loaded overspray collectors</i>	0.30"-0.40" W.C.	0.30" W.C.	_____
Duct work and elbows (typical)	0.20"-0.30" W.C.	0.25" W.C.	_____
TOTAL SYSTEM RESISTANCE		0.90" W.C.	_____

To ensure 100 linear feet per minute (or other required velocity) through the cross section of the booth when the intake filters and overspray collectors are loaded, a start-up velocity of 125 fpm or more is recommended, depending on the booth type.

Typically, loaded overspray collectors become prohibitive to use from an airflow standpoint as the loaded resistance ranges from 0.30" up to 0.50" W.C., depending upon the fan/booth capabilities.

The formula for booth airflow volume is: $V=HWv$, where
 V = Airflow volume (cfm) W = Booth width
 H = Booth height v = Airflow velocity (fpm)

Why Efficiency Is Important.

Filter Efficiency	Overspray Released into the Environment	Exhausted Paint Particles
90%	100 lbs.	
95%	50 lbs.	2 times less
98%	20 lbs.	5 times less
99.8%	2 lbs.	50 times less

This comparison is based on 1000 lbs. of overspray passing into a filter bank. It explains why efficiency is important.

Laboratory Testing, Research and Technical Support.

Columbus Industries' testing serves two primary purposes:

- Support of ongoing product research and development.
- Furnishing customers with coating-specific* paint overspray collector performance data as well as industrial plant and paint spray booth intake filter performance data. Specific testing performed is as follows:

Filter Evaluated	Test Method	Product Performance Data Generated	Challenge Aerosol or Dust
Paint Overspray Collector (Liquid & Powder Coatings)	Modified ASHRAE 52-76	<ul style="list-style-type: none"> – Clean Resistance to airflow – Loaded Resistance to Airflow – Weight Arrestance – Holding Capacity 	– End-User Supplied Coatings (Liquid & Powder Paint)
Paint Overspray Intake Filters and General Industrial Filters	ASHRAE 52.1	<ul style="list-style-type: none"> – Clean Resistance to Airflow – Loaded Resistance to Airflow – Weight Arrestance – Holding Capacity 	– “ASHRAE DUST”

* This is an especially valuable tool for industrial end-users attempting to approximate the efficiency that they can expect from their paint spray booth exhaust particulate removal system. (Often a prerequisite in environmental permitting for existing and new booths and to help support annual particulate emission reporting.) The data can also be helpful as a tool for estimating VOC-abatement system inlet conditions.

The CI Commitment to a Cleaner Environment.

We at Columbus Industries are committed to promoting an increased awareness concerning the environment and our industry's relationship to it.

As the concern over environmental issues becomes more urgent, the need for higher efficiency filters increases. The chart on page 10 shows the relationship between filter efficiency and the amount of overspray passed through the filter and into the environment.

The more efficient the filter, the less overspray passed into the environment. Higher efficiency is especially important when VOC-abatement systems are being used.

Improve Your Finishing and Your Future with Overspray Collectors Made from Recycled Materials.

Columbus Industries has redesigned its overspray collector product line to utilize recycled materials. This is in line with the environmental conservation theme of today and takes our already unsurpassed commitment to the industry even further. By incorporating the newest technology, we are now able to provide you with:

- **Overspray collectors constructed of multilayered, slit and expanded recycled kraft and polyester fiber**
- **Even more environmentally-friendly overspray collectors**
- **Maximum utilization of recycled materials within each component of our overspray collectors**
- **Supra™ collectors which employ a final collection layer partially made from recycled nonwoven materials**
- **Polyester overspray collector media is made from recycled plastic consumer products**
- **A comprehensive product line designed to perform on today's coatings including WATERBORNE, HIGH SOLIDS, bake dry and other compliance and conventional coatings**
- **Packaging for our collectors which also incorporates recycled materials**



BOOTHGUARD®, Tuff Stuff CLEANGUARD™ and Tuff Stuff FLOORSHIELD Protective Spray Booth Sheeting.

A Diverse and Multifunctional Line of Quality Spray Booth Sheeting from Columbus Industries Allows You to Cost-Effectively Maintain a Safe and Clean Spray Booth Environment.

- Facilitates economic and convenient disposal of accumulated overspray residue in spray booth areas
- Flame and nonflame-resistant protection
- Easily cut and trimmed to fit desired spray booth surfaces
- Accommodates all paint spray applications from lacquers to clear coats to high solids and beyond
- Fulfills OSHA Safety and Health Standard 1910.107 (b),(j) and NFPA Standard #33
- Available in a variety of widths and grades of durability. Contact your local distributor for details
- When laden with overspray, it should be disposed of in accordance with the same standards and codes that relate to any paint-laden material
- Can be shipped UPS

Technical Data.

When Do You Change Out Loaded Paint Collectors?

Since OSHA requires approximately 100 linear fpm airflow through the booth and to maintain a safe level of the volatile organic compound concentrations in the booth's airstream, it must be possible for the spray booth operator to tell when the overspray collectors are loaded and the airflow is reduced to an unacceptable point. However, accurate detection of this point is crucial and required by code. This can be established by simulation by blocking off areas of the exhaust bank in an even distribution pattern until airflow drops below the required level. Once this airflow point has been reached, it can be matched to the static pressure resistance in water column (W.C.) through the loaded overspray collector media by the use of gauges. The gauges can be manually read or equipped with an automatic system of lights or horns. This resistance point can then be matched to the airflow rate and a change out standard for all or part of the collector media can be established.

Disposal and Compliance Approvals.

Columbus Industries' overspray collector products are non-hazardous and biodegrade faster than man-made mineral fibers. Loaded overspray collectors should be

disposed of in the same manner as any paint-laden waste material. The proper procedures are contained in OSHA Standard 1910.107, NFPA Standard #33 and the Code of Federal Regulations #40. Additionally federal, state and local codes and regulations should be followed in establishing where and how to dispose of this material.

All Columbus Industries' clean collector medias are non-hazardous. It is, therefore, the coatings contained in these medias which will determine disposal procedures.

Columbus Industries' overspray collection products are available in UL Class 2 Approved and Non-Approved versions. The UL Approved collectors comply with standards set forth by the New York City Board of Standards and Appeals under Calendar No. 292-80 and standards set forth by:

- OSHA 1910.107
- NFPA Standard #33
- EPA
- Underwriters Laboratory, Inc. (U.L.) (where applicable)
- New York City Board of Standards and Appeals
- State and local governments

UL products will be specified on package – otherwise they are Non-UL.

Advantages of Having Columbus Industries' Overspray Collection Products Stocked Locally.

Columbus Industries maintains an extensive network of highly professional representatives which provide you with:

- Personal attention and individual analysis of your system
- Factory-backed technical assistance
- Locally stocked product (after determination of a system's requirements) for quicker delivery and to keep inventories lower on site
- Reduced freight costs

Columbus Industries' Unparalleled Dedication to Customer Service.

Columbus Industries continually strives to meet the industry's needs through the development of new overspray collectors which effectively fulfill specific spray systems' requirements. It is this unparalleled dedication to customer service that has enabled Columbus Industries to become a leading industry supplier of "performance engineered" overspray collection and air filtration products.

WARRANTY DISCLAIMER

Columbus Industries warrants that its overspray collectors shall be of good quality workmanship and free of any material defects. **EXCEPT AS SPECIFICALLY SET FORTH IN THE PRECEDING SENTENCE, COLUMBUS INDUSTRIES DOES NOT ASSUME ANY LIABILITY UNDER ANY WARRANTY, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY EXPRESS OR IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, NOTWITHSTANDING ANY STATEMENTS CONTAINED IN COLUMBUS INDUSTRIES' SALES LITERATURE OR STATEMENTS MADE BY COLUMBUS INDUSTRIES' AGENTS TO THE CONTRARY. COLUMBUS INDUSTRIES' AGENTS HAVE NO AUTHORITY TO GIVE WARRANTIES THAT EXCEED THOSE CONTAINED IN THIS WARRANTY DISCLAIMER. IN NO EVENT SHALL COLUMBUS INDUSTRIES BE**

LIABLE FOR INCIDENTAL, SPECIAL OR CONSEQUENTIAL DAMAGES. COLUMBUS INDUSTRIES' SOLE AND EXCLUSIVE LIABILITY UNDER ANY WARRANTY SHALL BE THE REPLACEMENT OF A DEFECTIVE OVERSPRAY COLLECTOR PRIOR TO ANY USE OF SUCH OVERSPRAY COLLECTOR BY BUYER, PROVIDED THAT COLUMBUS INDUSTRIES RECEIVES NOTICE OF THE BUYER'S CLAIM RELATING TO SUCH DEFECT IN WRITING WITHIN THIRTY (30) DAYS OF THE BUYER'S RECEIPT OF SUCH OVERSPRAY COLLECTOR, AT THE FOLLOWING ADDRESS: COLUMBUS INDUSTRIES, INC., STATE ROUTE 752, ASHVILLE, OHIO 43103. ALL CLAIMS NOT MADE IN WRITING AND WITHIN THE TIME PERIOD SPECIFIED IN THE PRECEDING SENTENCE SHALL BE DEEMED WAIVED BY BUYER.