

Air Film Roll

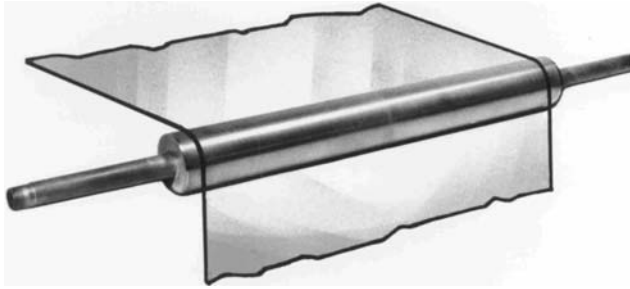
Engineering & Product Guide



mott *corporation*

84 Spring Lane, Farmington, CT 06032-3159
860-747-6333 Fax 860-747-6739
www.mottcorp.com

Mott Precision Air Film Rolls



An Air Film Roll is a component of a web-conveying system which is specifically designed to guide the web stock on a cushion of air during transport. By suspending the web stock on a cushion of air, Mott Air Film Rolls eliminate transport friction, streaks and other disturbances of web coatings caused by contact of the web with the roll.

Constructed of Mott porous metal, Mott Air Film Rolls solve traditional production problems that occur with fragile or surface-sensitive webs during manufacturing and packaging. Their physical strength and elimination of web friction make Mott Air Film Rolls ideal for process conveying, or as turning bars to change the direction of, or to flip, a web. Typical applications include:

- Photographic Film
- Magnetic Audio, Video or Computer Tape
- Pressure-Sensitive Adhesive Tapes
- Metal Foils
- Polyethylene Film
- Other Highly Surface-Sensitive Materials

By providing uniform air flow over the entire active surface of the roll, Mott Air Film Rolls create a stiff boundary layer for precise support of the web, eliminating the “jetting effect” that occurs with conventional drilled or slotted air rolls. This assures uniformly coated webs, without a pattern being created, particularly on the wet end of coating operations.

Features and Benefits

Manufactured to close tolerances:

- High-quality surface finish of 32 micro inch or better
- Concentricity of 0.005” TIR or better
- Uniform porosity $\pm 10\%$ maximum along length of roll

Durable construction to withstand industrial use:

- 316L stainless steel porous media
- 300 Series stainless steel hardware
- Aluminum truss supports
- Other materials are available on special order; consult the factory

Wide range of configurations:

- Standard diameters of 1”, 1.250”, 2”, 3”, and 4” (3.875”)
- Standard lengths up to 108”
- Squared ends, counterbored ends, or tapped ends available for rolls up to 36” long (42” for 1.250” diameter)
- Journal end mounts or tapped ends with straight, truss-supported, and cantilever-mounted configurations for longer roll assemblies

mott corporation

Glossary and Operation Notes

Web: Impermeable* surface-sensitive sheet material being transported.

Porous Metal: Mott precision-sintered metal to produce uniform air flow through the roll, and create a stiff boundary layer for precise support of the web.

Wrap Angle: Defined as the angle of the web being supported by the air film from the entrance tangent to the exit tangent. Minimum wrap angle recommended for effective operation is 30°.

Active Surface Angle: Normally, the wrap angle plus 20°, (plus 10° on both entrance and exit tangents). Or the entire surface of the roll may be open.

Mask: A method for blocking the air flow from the non-active surface area of the roll, to conserve air. This can be done by selectively reactivating the air roll surface after finish grinding, leaving the inactive surface area closed, or by inserting an internal mask of polyethylene film or similar materials that is cut to cover the desired inactive surface. The internal mask has the advantage of mask removal and relocation if the surface of the air roll is damaged, allowing utilization of the undamaged portion of the air roll.

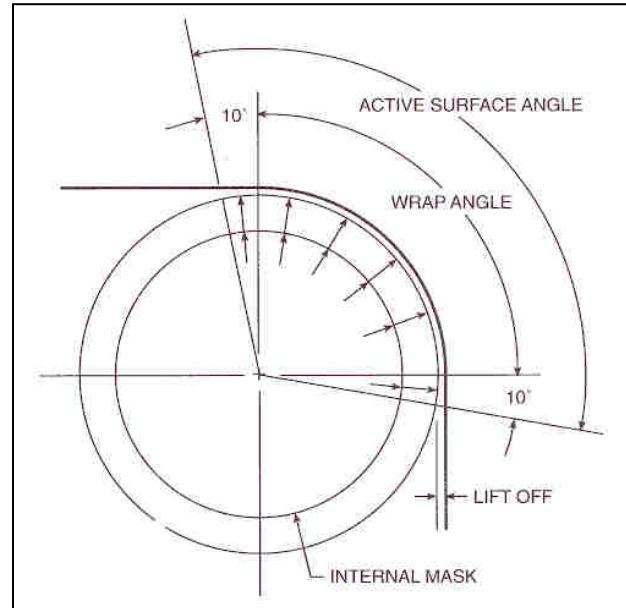
Life Off: The gap between the web and the air roll during operation can be up to 0.030" depending on web tension and air pressure in the roll.

Active Surface Area: The air roll surface area being used, based on the active surface angle =

$$3.14 \times \text{Roll Dia} \times \frac{\text{Active Surface Angle}^\circ}{360^\circ} \times L_g = \text{in}^2$$

Web Tension: Linear tension of the web, measured in PLI (lbs. per inch of web width).

Web Speed: Linear speed of the web being conveyed, measured in FPM (ft per min). Mott Air Film Rolls will operate over a wide range from static to high-web speeds.



Roll Air Pressure: Static air pressure within the roll during operation. Depends on web tension, wrap angle, roll diameter, and air roll model; typically from 1-2 psi above web tension for wrap angles 90° and greater, higher pressures for lower wrap angles.

Air Consumption: Mott Air Film Rolls are available with a standard air flow of 0.15 SCFM** per inch² of active surface area at 5 psig, and a special air flow of 0.15 SCFM per inch² at 20 psig.

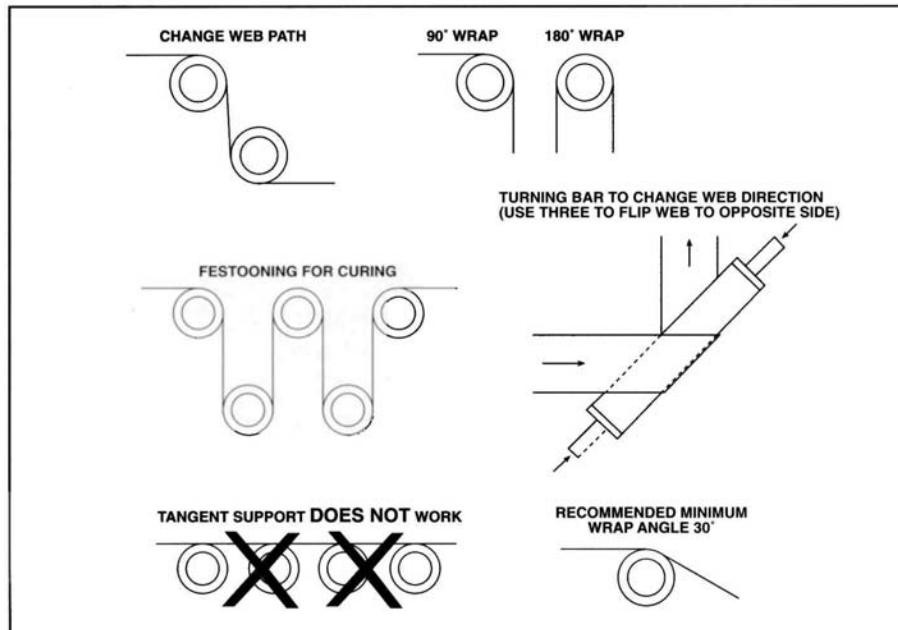
Operating Air: Mott Air Roll systems operate either on blower air or compressed air. Air must be clean and oil- and water-free. A 0.5µm filter and coalescer is recommended, or instrument-quality air may be used.

* Webs must be impermeable (not allowing air to pass through the web), such as polyethylene or Mylar® film, coated stocks, and metal foils.

** 1", 2", 3" and 4" Nominal OD. The air flow for the 1.25" OD is 2500 sccm/inch² OD active surface at 5 psig to atm.

mott corporation

Application Notes



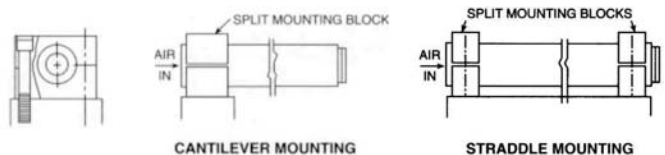
Mounting Mott Air Rolls and Air Roll Assemblies

Mott Precision Air Film Rolls are available in several mounting configurations to meet a wide variety of application requirements.

NOTE: Air film rolls are fixed, non-rotating. Following are some suggested mounting methods that may be used.

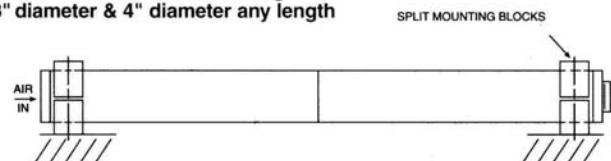
- **Squared ends and counterbored ends** – can be used for custom mounting needs.
- **Tapped ends on plain air rolls** – for use with split or bored bearing blocks, either cantilever or straddle mounted.
- **Journal mounts** – for retrofitting for replacement of rotating rolls, or wherever required, are available in all sizes.

Plain Air Rolls

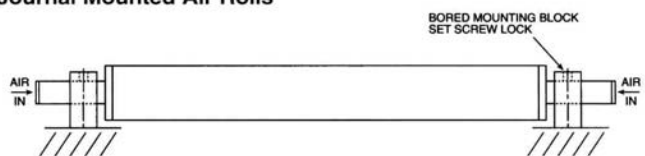


Plain Tapped Air Rolls

2" diameter < 36" diameter long
3" diameter & 4" diameter any length

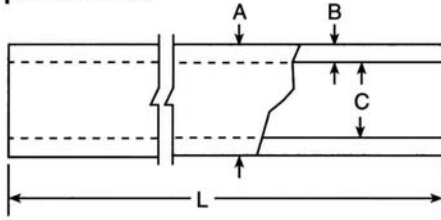


Journal Mounted Air Rolls

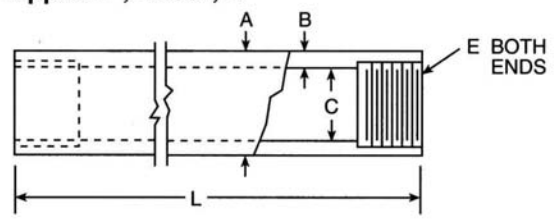


Plain Air Rolls

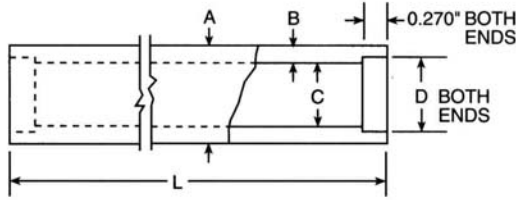
Squared Ends



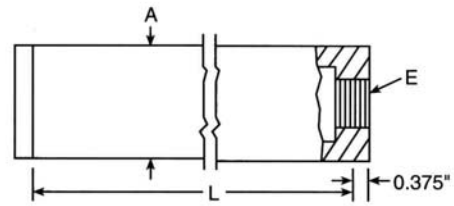
Tapped 1", 1.250", 2"



Counterbored



Tapped 3" & 4" Diameter



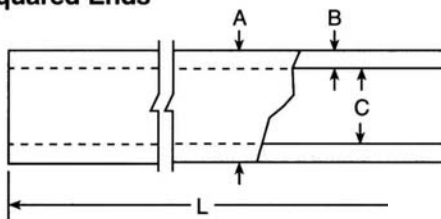
Number	Type	A O.D."	B Wall"	C I.D."	D C'Bored Dia." +/- 0.001"	E NPT	L* Max."
3010-L	Squared	1.000	0.156	0.688			36
3012-L		1.250	0.188	0.875			42
3020-L		2.000	0.250	1.500			36
3030-L		3.000	0.375	2.250			36
3040-L		3.875	0.438	3.000			36
3010C-L	C'Bored	1.000	0.156	0.688	0.750		36
3012C-L		1.250	0.188	0.875	1.000		42
3020C-L		2.000	0.250	1.500	1.6875		36
3030C-L		3.000	0.375	2.250	2.500		36
3040C-L		3.875	0.438	3.000	3.500		36
3010T-L	Tapped	1.000	0.156	0.688		1/2"	36
3012T-L		1.250	0.188	0.875		3/8"	42
3020T-L		2.000	0.250	1.500		1/4"	36
3030T-L		3.000	0.375	2.250		1"	36
3040T-L		3.875	0.438	3.000		1"	36

* Specify length L as required. For longer lengths, consult factory to develop an acceptable design. Diameter and length of journals, and keyway arrangement for driving the roll to be determined.

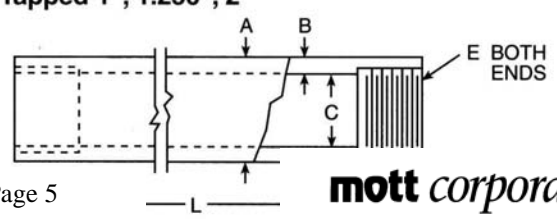
Examples:

- 3020-24** – Plain air roll, 2" diameter, 24" long, with squared ends.
- 3030C-30** – Plain air roll, 3" diameter, 30" long, with counterbored ends.
- 3010T-18** – Plain air roll, 1" diameter, 18" long, with tapped ends.
- S3020C-10** – Plain air roll, 2" diameter, 10" long, with counterbored ends, special flow.

Squared Ends



Tapped 1", 1.250", 2"



Counterbored



Tapped 3" & 4" Diameter



Ordering Information

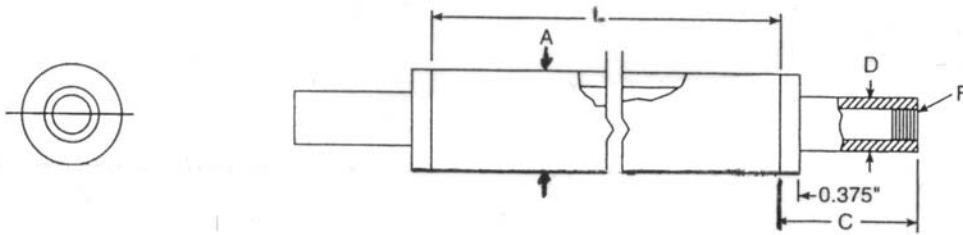
- Specify product number and length.
- Standard increment for pricing is 6", up to maximum length. (ie, L=20" would be priced at 24")
- Standard air flow – 0.15 scfm/in² of active area, at 5 psig air pressure for 1", 2", 3" and 4" OD.
- Air flow for 1.25" OD is 2500 sccm/in² of active area at 5 psig to atm.

Common Tolerances – "A" OD +/- 0.010", "L" Length +/- 0.060", "B" wall and "C" ID are nominal.

Materials of Construction:

- 316L stainless steel porous air roll
- 316 stainless steel hardware
- Aluminum trusses

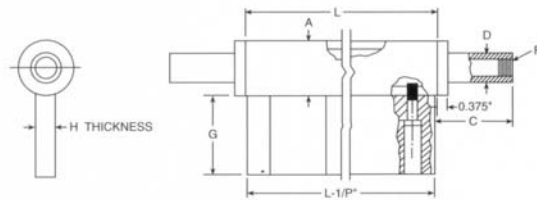
Straight Air Roll Assemblies



Number	A Dia. +/- 0.010"	L Porous Length (Max.)	C	D Dia. +/- 0.002"	F NPT Optional
3110-L	1.000"	72"	2.875"	0.562"	1/8"
3112-L	1.250"	84"	2.875"	0.562"	1/8"
3120-L	2.000"	108"	3.875"	1.062"	1/2"
3130-L	3.000"	Up to 36"	3.875"	1.500"	1"
3130-L	3.000"	37" to 108"	3.875"	1.125"	3/4"
3140-L	3.875"	Up to 36"	3.875"	2.250"	1 1/2"
3140-L	3.875"	77" to 108"	3.875"	1.125"	3/4"

Example: 3140-48 – Straight air roll assembly, 4" (3.875) diameter, 48" long, with journaled ends.

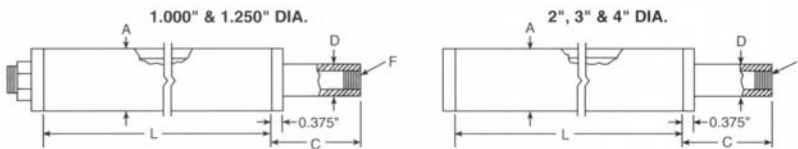
Truss-Supported Air Roll Assemblies



Number	A Dia. +/- 0.010"	B Porous Length (Max.)	C	D Dia. +/- 0.002"	F NPT Optional	G	H
3210-L	1.000"	108"	2.875"	0.562"	1/8"	3"	1/2"
3212-L	1.250"	108"	2.875"	0.562"	1/8"	3"	1/2"
3220-L	2.000"	108"	3.875"	1.062"	1/2"	3"	3/4"
3230-L	3.000"	37" to 108"	3.875"	1.125"	3/4"	4"	1"
3240-L	3.875"	37" to 108"	3.875"	1.125"	3/4"	4"	1 1/4"

Example: 3220T-72 – Truss-supported air roll assembly, 2" diameter, 72" long, with tapped journaled ends.

Cantilever Air Roll Assemblies

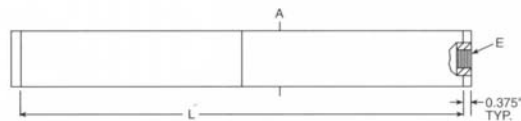


Number	A Dia. +/- 0.010"	B Porous Length (Max.)	C	D Dia. +/- 0.002"	F NPT Optional
3310-L	1.000"	24"	3.375"	0.625"	1/8"
3312-L	1.250"	24"	3.375"	0.625"	1/8"
3320-L	2.000"	24"	3.875"	1.062"	1/2"
3330-L	3.000"	24"	3.875"	1.125"	3/4"
3340-L	3.875"	24"	3.875"	1.125"	3/4"

Example: S3330T-18 – Cantilever air roll assembly, 3" diameter, 18" long, tapped journal end, special flow.

Tapped End Air Roll Assemblies (>36" Long)

Number	A Dia. +/- 0.010"	L Porous Length (Max.)	E NPT
3420-L	2.000"	37" to 108"	1/2"
3430-L	3.000"	37" to 108"	3/4"
3440-L	3.875"	37" to 108"	3/4"



Example: 3420-48 – Tapped end plain air roll, 2" diameter, 48" long.

Mott Precision Porous Vacuum Rolls

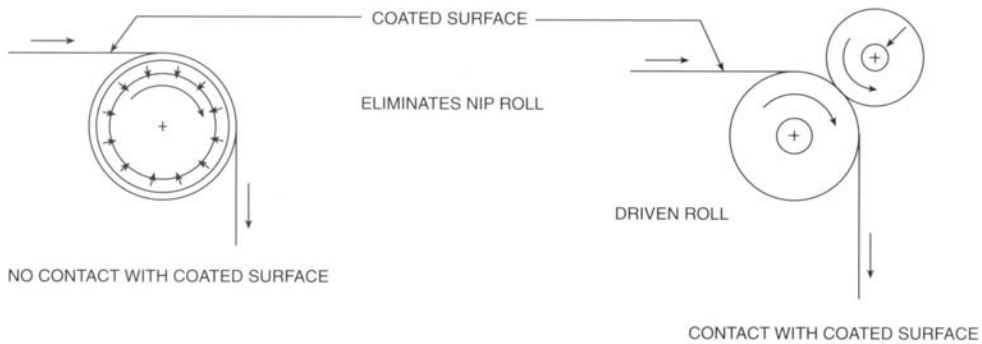
Mott Corporation supplies precision Vacuum Drive or Pull Rolls for conveying critical surface-sensitive webs. Mott Vacuum Rolls eliminate the need for "nip rolls" that can disturb the sensitive coatings on products such as computer, audio, or video tape, adhesive tapes and printed webs. Vacuum Rolls are "driven" rolls.

Vacuum Rolls feature Mott Duplex Porous Media, which is used to provide rapid response time for optimum performance. The duplex media consists of an outer layer of fine porous material over a backup layer of coarse porous media, which provides a smooth contact surface for the web with maximum flow capacity.

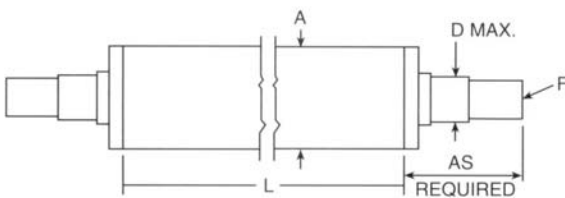
Standard sizes include nominal 2", 3" and a maximum of 3.875" diameters. Other diameters can be produced on special order. Vacuum Rolls are journal-mounted with tapped ends for connection to a rotary fitting to the vacuum source.

Mott Vacuum Rolls are designed for each specific application. A typical design is shown below for reference.

Mott Vacuum Roll Duplex Porous Media



Standard Design Parameters



Number	A O.D.	D Max. Dia.	E NPT Max.	L* Max.
V3130-L	3.000"	1.500"	1"	36"
V3140-L	3.875"	2.250"	1½"	36"

* Specify length L as required. For longer lengths, consult factory to develop an acceptable design. Diameter and length of journals, and keyway arrangement for driving the roll to be determined.