Dual Chamber Vacuum Box Technology

Designers and manufacturers of high performance die systems

- Pre-sweep chamber pulls away entrained air from the casting roll, reducing the air barrier between polymer and roll.
- Primary chamber stabilizes the film forming area, reducing air gap and neck-in and stabilizing the film edge. This chamber sets up a substantially higher vacuum for accurate pinning.
- All stainless steel construction.
- Swing-out, split-chamber design is easy to clean and maintain.
- Easily mounts to the die, reducing space requirements as well as the air gap between die and roll. Insulation between die and vacuum box provided.
- Adjustable blades at pre-sweep section and between pre-sweep and primary chambers. Various blade configurations and materials are available.
Properties and Advantages of
Dual Chamber Vacuum Boxes for Cast Film

The Dual Chamber Vacuum Box consists of two chambers. The first is the pre-sweep chamber and the second is the primary chamber.

The pre-sweep chamber removes entrained air from the casting roll. This reduces the air gap between the polymer and the surface of the casting roll. The probability of contamination by dust and foreign particles traveling with the entrained air is also greatly reduced.

The primary chamber stabilizes the film forming area. This further reduces the air gap of the polymer to the roll and stabilizes the film forming area.

Overall Advantages of the Dual Chamber Vacuum Box:

Reduced Neck-in: A wider usable width of film.

Stabilization: Reduces or eliminates the need for air knife and edge pinning devices. Resonating ends of thin film are reduced or eliminated from draw resonance.

Faster Production Runs: Removal of entrained air and faster film cooling allows for faster, more stable runs.

Longer Production Runs: Polymer comes straight out of the lip with minimal drag at the lip exit. This creates less build up at the lip exit, which means longer runs between cleaning the lips.

Finished Product: With less air gap between the casting roll and polymer, the casting roll has more influence on the finish of the product.

The vacuum box is made from stainless steel. The design allows for ease of cleaning of the internal surfaces. Adjustable blades seal the box to the roll at variable positions within a smaller parameter. Insulation is provided between the die and the vacuum box for better die heat control.

Note: The vacuum box may give the film different properties. This may result in re-qualifying the film, or the continued use of an air knife, or alternating the air knife and the vacuum box for different products.
**Dual Chamber Vacuum Boxes**

Dual chamber design allows the first or pre-sweep chamber to pull away entrained air from the casting roll reducing or eliminating the air barrier between the molten polymer and the roll. The primary chamber stabilizes the film forming area, reduces air gap and neck-in. When films are run very thin or at high line speeds the outside edges become very unstable, resonating badly and causing web breaks and excessive edge trim. The vacuum box stabilizes the edges reducing these problems.

The mechanical design incorporates ease of maintenance and cleaning by a swing out split chamber design along with an all stainless steel construction.

Adjustable blades are provided at the pre-sweep section and between the pre-sweep and primary chamber. Various blade configurations and materials can be provided.

The vacuum box is mounted to the die reducing the space requirements and air gap between the die and roll. Insulation is provided between the die and vacuum box.

**Dual Vacuum Box Blower System**

- (2) 3 H.P. Venturi blowers for primary and secondary vacuum chambers. Stainless steel Venturi stacks with rain caps for thorough roof installation are included.
- Air volume/vacuum dampers to control air flow of the primary and secondary vacuum chambers.
- Stainless steel vacuum distribution manifolds designed for air flow balancing. Access covers for easy cleaning are included.
- Complete set of hoses for 20 ft. (6m) distance between vacuum box and Venturi blowers are provided.
- Motor disconnects, starters, fusing and wiring to be supplied by customer.

**Vacuum Boxes Accomplishments**

We have had great success with the Dual Chamber Vacuum Box. In one installation for .0009” (23 microns) to .0015” (38 microns) cast film at 600 feet (183m) per minute, we were able to produce 85” (2159mm) film with an 86” (2184mm) die. Die distance from the chill roll was 1/4” (6.35mm). Increasing the gap to 3/4” (19.05mm), the film width was reduced to 84” (2134mm). The amount of vacuum to achieve this was 10” (254mm) of water at the pre-sweep distribution manifold, and 6” (152mm) of water at the primary distribution manifold.

Reducing the vacuum to 9” (229mm) of water at the pre-sweep and 4” (102mm) of water at the primary reduced the film width to an 81” (2057mm) die. This is at the 3/4” (19mm) lip exit to roll gap.

Edge pinning devices were not required for the first two situations. Proper adjustment of the adjustable blades is essential to achieve optimum performance. When the vacuum was reduced to 9” (229mm) (pre-sweep) and 4” (102mm) of water (primary), the edge pinning devices were required.

In another installation for .0006” (15 microns) to .0008” (20 microns) stretch film (LLDPE/LDPE) at 1,500 feet (457m) per minute, we were able to achieve 4” (102mm) wider film. The die to chill roll gap is longer to allow for the proper stretch properties of the film to develop. The vacuum box was used in conjunction with electrostatic edge pinners in this case.

Lip exit to roll gap, roll location, line speed, amount of vacuum, blade adjustment, and film thickness are all factors in determining the extra width that can be achieved.