

VACUUM FORMING

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DESCRIPTION:

Vacuum formed products such as sandwich boxes, toy cars, protective covers, automotive components play a big part in our day to day life.

Unlike other forming processes, where powder or resin are the starting point, vacuum forming uses extruded thermoplastic sheets made from Acrylonitrile butadiene styrene (ABS), polyethylene, polypropylene, polycarbonate, polyvinyl chloride etc. to form everyday products.



PROCESS

Vacuum forming involves heating a thermoforming sheet until soft and then forcing it against the mould by applying vacuum in the range of 50-200 mbar. The part is cooled and then ejected from the mould.

More sophisticated machines and moulds are used for continuous automated production of high-volume items like yoghurt pots, disposable cups and packaging trays. Once the moulding process is complete, the moulded sheets are trimmed and cut which are re-ground and recycled.

Vacuum formed toy car canopy made of HIPS



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1. CHALLENGE

- Air between the sheet and the mould needs to be evacuated gently by introducing vacuum to reduce the chance of webbing or folding of the heated sheet.
- Thickness inconsistencies occur due to inadequate, inconsistent or improper vacuum pressure.
- Higher rejection of parts with advanced geometry or aesthetic designs is seen due to inconsistent or inadequate vacuum application.
- Chill marks or wavy undulations occur on the surface due to trapped air and non-uniform material cooling.
- Small footprint with minimal generation of waste water/oil disposal.

2. SOLUTION

EDC dry claw pumps

- Consistent pumping performance during continuous forming.
- Reliability featuring easy start up and stop regime for short operation cycles.
- Robust pump capable of fast evacuation for higher throughput.
- No waste oil generated eliminating disposal costs.



nES single stage rotary vane pumps

- High pumping speed at low pressures with good condensable vapour handling capability.
- Integrated mist filter to capture the exhaust oil mist while in operation.
- Designed to run continuously for extended periods of time well suited for large batches.
- Extensive capacity range with low noise levels.



3. MAIN BENEFITS

Dry vacuum system and oil sealed rotary vane pumps work best due to their consistent pumping performance and vacuum stability. With larger vacuum forming chambers, a vacuum reservoir is used together with a high-volume capacity vacuum pump. This provides a two-stage instantaneous vacuum enabling rapid moulding of the heated sheet and avoids the sheet temperature to drop below its ideal forming temperature.