

## Internal Air Cooling Systems (IACS) in blow molding

### 中空成型機 & 射吹機專用壓縮空氣冷卻系統 (IACS)

WITTMANN's innovative **Internal Air Cooling Systems (IACS)** in blow molding operations, shorten cooling times, reduce stresses in the finished product, and decrease crystallization rates.

威猛的創新壓縮空氣冷卻系統 (IACS) 用於吹塑操作，縮短了冷卻時間，減少了成品中的壓力，並降低了結晶速率並提高產品的品質尺寸穩定。



**WITTMANN Internal Air Cooling Systems (IACS)**  
for blow molding: **Blow Molding Booster (BMB, left)**  
and **Blow Air Chiller (BAC).**

用於吹塑製程的威猛壓縮空氣冷卻系統模組 (IACS)：  
低溫吹塑冷卻器 (BMB，左) 和超低溫吹塑冷卻器 (BAC，右)。

In all blow molding methods throughout the plastics industry, one of the most critical steps is the cooling of the plastic parts. Selecting the right technology for this work step can yield the greatest time and material savings.

在整個塑料行業的所有吹塑方法中，最關鍵的步驟之一是塑料部件的冷卻。為該工作步驟選擇正確的技術可以最大程度地節省生產時間和材料以及提升產品尺寸穩定及良率。

In blow molding, parts are typically formed by injecting compressed air, which presses the hot material out against the mold surface from within, whereupon the parts are then cooled along the walls of the mold merely by means of cold water. This not only creates material stresses due to the temperature difference between the inner and outer wall of the parts, but it also results in a significantly slower rate of heat removal because that removal takes place exclusively through the outer wall of the formed parts. And that's where the **Internal Air Cooling Systems (IACS)** from WITTMANN make all the difference. The added cooling of the inner wall of the parts by cold compressed air generally increases production by at least 15%, whereby considerably better values can be achieved in most cases. Moreover, the lower material stresses make significant material savings possible, reducing the weight of the finished product by up to 10% while ultimately still passing the same leak, drop and strength tests

as before. Experience has shown that the amortization period for such internal air cooling systems is much less than one year.

在吹塑中，通常通過注入壓縮空氣來形成零件，該壓縮空氣從內部將熱塑料壓向模具表面，然後僅借助於冷卻水沿模具壁冷卻零件。這樣的冷卻方式僅會由零件的內壁和外壁之間的溫度差而產生材料應力，而且還會導致排熱速度明顯降低，因為排熱只能通過成型產品的模具水路進行。這就是威猛的**空氣冷卻系統模組 (IACS)** 發揮所有作用的地方。通過冷壓縮空氣對零件內壁進行的額外冷卻通常可將產量提高至少 15%，從而在大多數情況下可實現更高的價值。此外，較低的材料應力使節省大量材料成為可能，最終產品的重量減少了 10%，同時最終仍通過了與以前相同的洩漏、跌落和強度測試。經驗表明，這種內部空氣冷卻系統的攤銷期大大少於一年。

Any **Internal Air Cooling System** starts with a compressed air cooler. In this case, that means either the **WITTMANN Blow Molding Booster (BMB)**, which produces a compressed air temperature of about 5 °C, or else the **Blow Air Chiller (BAC)**, which cools the compressed air down to about -35 °C. Specially developed **Blow Valve Blocks (BVBs)** control the various processes via a control box: the flow of the compressed air through a core pin into the interior of the product and the subsequent discharge of compressed air out of the product via controlled ventilation. Each individual product to be cooled in this way in the blow molding process requires the development of its own special core pin. This is because the precise distribution of the air to be established inside differs from one product to another. That distribution, together with the right balance of supply and exhaust air, plays a hugely important role here.

任何**空氣冷卻系統**均始於壓縮空氣冷卻器。在這種情況下，威猛低溫吹塑冷卻器 (**BMB**) 可產生約 5°C 的壓縮空氣溫度，而**超低溫吹氣冷卻器 (BAC)** 可將該壓縮空氣冷卻到約 -35°C。專門開發的**吹氣閥塊模組 (BVBs)** 通過控制箱控制各種生產過程需求：將壓縮空氣通過芯銷流入產品內部，隨後通過受控通風將壓縮空氣從產品中排出。在吹塑過程中要以這種方式冷卻的每個產品，都需要開發自己的特殊型芯銷。這是因為要在內部建立的空氣的精確分配因一種產品而異。這種分配以及正確的供氣和排氣平衡在這裡起著極其重要的作用，威猛公司有專業吹風芯銷設計與技術團隊可以提供技術支援。

## Production increase of up to 50% or more

### 產量增加高達 50% 或更多

The **Blow Molding Booster (BMB)** was specially developed with certain properties in mind – properties which now characterize it. It is compact, inexpensive, maintenance-free, and – in terms of the quality of the compressed air used – features perfectly simple operation. The air discharge temperature always remains above freezing, thereby eliminating the need for a complicated system to dry the compressed air and obviating the question of which oil to use in such a system. The only requirements are compressed air pressure between 6 and 15 bar and an adequate supply of cold filtered water that does not exceed 15 °C. **Blow Molding Booster** units are available in three different sizes with compressed air capacities ranging from 160 to 600 Nm<sup>3</sup>/h and generally achieve production increases ranging from 10 to 35%. In most cases, the compact design of these devices enables direct installation on the production machine, which keeps supply lines short and production floors clear.

**低溫吹塑冷卻器 (BMB)** 是在開發時特別考慮非大型吹塑件來做為開發設計，這些特性現已成為其特徵。它結構緊湊，價格便宜，免維護，並且-就所用壓縮空氣的質量而言-操作極為簡單。排氣溫度始終保持在冰點以上，從而消除了對乾燥壓縮空氣的複雜系統的需求，並且避免了在這種系統中使用哪種油的問題。唯一的要求是 6 至 15 bar 之間的壓縮空氣壓力以及不超過 15°C 的充足冷過濾水供應。低溫**吹塑冷卻器**裝置有三種不同的尺寸，壓縮空氣量範圍為 160 至 600Nm<sup>3</sup>/h，通常可將產量提高 10% 至 35%。在大多數情況下，這些設備的緊湊設計使其可以直接安裝在生產機器上，極短的管路銜接與不佔空間設計，可以很容易的使用在舊有的設備上不需特殊的改變即可使產能提升。

The design of the **Blow Air Chiller (BAC)** is considerably more complex. It also demands suitably high-quality compressed air ranging in pressure from 7 to 15 bar with a residual oil content of 0.01 mg/m<sup>3</sup> and a pressure dew point of 5 °C at 7 bar (or lower). The molecular sieve in use here also requires

maintenance from time to time. This expense yields production increases ranging from 15 to above 50%. In some cases, blowing and ventilation time could even be cut to one third of the original value. With the **Blow Air Chiller**, the compressed air is fed through the internal **Pressure Air Dryer (PAD)** equipped with a molecular sieve, which regenerates itself simply by means of dry compressed air. The dew point of the process air is lowered to  $-40^{\circ}\text{C}$  to prevent ice from forming in the system. The **Blow Valve Blocks** that control the processes are designed to operate at such low temperatures. Like the **Blow Molding Booster**, the **Blow Air Chiller** also requires a cold water supply with a maximum temperature of  $15^{\circ}\text{C}$  – at a pressure of 3 to 8 bar. WITTMANN **Blow Air Chillers** are equipped with an integrated **FIT** controller, a control display for visualizing the process and accessing all relevant device data. The user can also store data and use special control functions to pass it along to other process machinery.

超低溫吹氣冷卻器 (BAC) 的設計要複雜得多。它還需要合適的高質量壓縮空氣，壓力範圍為 7 至 15 bar，殘餘油含量為  $0.01\text{ mg/m}^3$ ，壓力露點在 7 bar（或更低）下為  $5^{\circ}\text{C}$ 。這裡使用的分子篩還需要不時維護。這筆費用使產量增加了 15% 到 50% 以上。在某些情況下，吹風和通風時間甚至可以減少到原始值的三分之一。

使用吹氣式冷水機時，壓縮空氣通過配有分子篩的內部壓力空氣乾燥器 (PAD) 進料，該分子篩可通過乾燥的壓縮空氣簡單地再生。處理空氣的露點降低至  $-40^{\circ}\text{C}$ ，以防止系統中結冰。控制過程的吹氣閥體設計為在如此低的溫度下運行。像低溫吹塑冷卻機一樣，吹氣冷水機還需要供應最高溫度為  $15^{\circ}\text{C}$  的冷水-壓力為 3 至 8 bar。威猛吹氣式冷水機組配備了集成的 **FIT** 控制器，控制顯示器，可直觀顯示過程並訪問所有相關設備數據。用戶還可以存儲數據並使用特殊的控制功能將其傳遞給其他過程機械。

WITTMANN Group's specialists offer a full range of consulting services for all internal air cooling systems. Following a comprehensive review of their system requirements, each customer receives a customized, free-of-charge quotation, including an estimate of the expected production increase. 威猛集團的專家為所有中空吹塑空氣冷卻系統提供全方位的諮詢服務。在全面確認客戶系統要求之後，每個客戶都會收到一份定制的報價，包括對預期產量增長的估計，歡迎洽詢。

## The WITTMANN Group

The WITTMANN Group is a globally leading manufacturer of injection molding machines, robots and auxiliary equipment for processing a great variety of plasticizable materials – both plastic and non-plastic. The group of companies has its headquarters in Vienna, Austria and consists of two main divisions: WITTMANN BATTENFELD and WITTMANN. Following the principles of environmental protection, conservation of resources and circular economy, the WITTMANN Group engages in state-of-the-art process technology for maximum energy efficiency in injection molding, and in processing standard materials and materials with a high content of recyclates and renewable raw materials. The products of the WITTMANN Group are designed for horizontal and vertical integration into a Smart Factory and can be interlinked to form an intelligent production cell.

The companies of the group jointly operate eight production plants in five countries, and the additional sales companies at their 34 different locations are present in all major industrial markets around the world.

WITTMANN BATTENFELD pursues the continued strengthening of its market position as a manufacturer of injection molding machines and supplier of comprehensive modern machine technology in modular design. The product range of WITTMANN includes robots and automation systems, material handling systems, dryers, gravimetric and volumetric blenders, granulators, temperature controllers and chillers. The combination of the individual areas under the umbrella of the WITTMANN Group enables perfect integration – to the advantage of injection molding processors with an increasing demand for seamless interlocking of processing machines, automation and auxiliaries.

威猛集團是射出機、機械手和周邊輔助設備的全球領先製造商，用於加工各種可塑材料（包括塑料和非塑料）。威猛集團總部設在奧地利維也納，由兩個主要部門組成：威猛巴頓菲爾和威猛。威猛集團遵循環境保護、節約資源和循環經濟的原則，致力於最先進的工藝技術，以最大程度地提高注塑成型的能效，以及用於處理標準材料以及回收料和可再生原料含量高的材料。威猛集團的產品旨在將水平和垂直方向集成到智能工廠中，並且可以相互鏈接以形成智能生產單元。

威猛集團在全球 5 個國家設有 8 個生產工廠，其中 34 個直屬分公司銷售遍布全國所有主要工業市場。

威猛巴頓菲爾致力於不斷增強其作為注塑機製造商和模組化設計的綜合現代機械技術供應商的市場地位。威猛的產品系列包括機械手和自動化系統、中央供料系統、除濕乾燥機、秤重式和體積式的計量機、粉碎機、模具溫度控制器和冷卻器。威猛集團的結合已經使所有產品線連接為一體，提供塑料加工商在射出機、自動化和輔助設備的無縫接軌，成為尋求集成方面的所在優勢 - 所有這些都以漸進的速度發生。

威猛台灣分公司針對客戶需求提供系統方案為主力；以技術性整合、技術性提供之「整合」系統，從技術提供、技術諮詢，服務、訓練工程師到位、不間斷服務及教育訓練之售服，從觀念、技術及加工條件之支援，來自奧地利總公司之技術支援等，滿足全面性服務。

更多信息可參訪我們的網站 [www.wittmann-group.tw](http://www.wittmann-group.tw) LINE@: [@witw](https://www.line.me/tw/00000000000000000000)

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