

# Energy-Saving Production Technologies for Brassiere Cup

## 低耗節能胸杯生產技術及系統

The intimate apparel industry has adopted a conventional trial and error approach to design and develop bra cup mold. Due to the lack of proper guidelines and knowledge, quality issues have occurred during the production of bra cup molding (e.g. post-mold shrinkage, cup crazing, cup de-lamination, barre mark and moire pattern). It always requires several rounds of re-machining and testing to overcome the above molding problems.

This project has successfully reduced energy and material wastes during the manufacturing process of the brassiere cup and has increased productivity. The solution assists brassiere cup manufacturers on the issues of production tool design and development.

一向以來，內衣業使用反復試驗的方法來設計及開發胸杯模具。由於缺乏適當的指引和知識，模壓成型胸杯生產經常出現質量問題（例如成型後收縮、胸杯破裂、貼合剝離、條紋標記和波紋圖案），需要多次反覆的再加工和測試，以克服上述之成型問題。

這研發項目成功改善了胸杯生產過程的環保程度和生產力，減少能源和材料浪費，協助本地胸杯生產商解決在生產工具設計與開發方面的問題。



### Application 應用

A CAE analysis in heat transfer can identify the effective heating zone of brassiere cup mold and insulation to reduce heat lost. The industry can take reference from the Molding and Lamination Technology Handbook for Lingerie Industry to eliminate and minimise the trial and error in mold design and fabrication.

熱傳導電腦輔助工程可應用於分析辨識胸杯模具的有效加熱區和隔離效能，以減少熱流失。項目出版的《應用於內衣工業之模壓與貼合技術手冊》讓業界在設計和製造模具時作參考，減低反復試驗的過程。

## ||| Technological Breakthrough 技術突破 |||

The CAD/CAM/CAE and knowledge-based engineering (KBE) technologies help streamline the manufacturing process in order to significantly increase the productivity. Different advantages of different deliverables are found:

- Standardised configuration of mold inserts can facilitate the rapid fabrication of brassiere cup mold and save material cost.
- A molding machine with auto-loader system can reduce the idle time in production of brassiere cups, reduce the human resources and thus increase the productivity.
- Computer Aided Engineering (CAE) for the simulation of heat transfer in brassiere cup molding process can optimize the heat distribution for better product quality and energy saving.
- The handbook which lays down brassiere cup molding guidelines can optimise the efficiency in the brassiere cup mold design and fabrication.

透過CAD/CAM/CAE和知識為本工程(KBE)技術的輔助可簡化製造過程，並大幅度提高生產力。項目不同的成果為業界帶來不同的技術優勢：

- 模內鑲件的標準化配置可方便快速地製造胸杯模具，節省材料成本。
- 半自動化的胸杯傳送系統過程無須人手控制，可減少閒置時間及人力資源，從而提升產能。
- 應用電腦輔助工程(CAE)於模擬傳熱胸杯成型工序，可優化熱分佈以提供更好的產品質量和節省能源。
- 技術手冊列出胸杯模壓指引可以優化胸杯模具設計，提昇製造的效率。

## ||| Industry Benefits 業界效益 |||

This project helps local brassiere cup manufacturers to develop an energy-saving and environmental-friendly manufacturing process, the process can be standardised and automated. Manufacturers can save material cost and improve the product quality, and finally increase the industry competitiveness. For major achievements, the development of a standardised mold library and customised CAM system can help manufacturers save around 40% of aluminum material. The semi-automatic loading system can reduce 30%-50% number of operators.

本項目可以協助本地內衣製造商開發節能和環保的生產工序，並將其工序標準化及自動化，從而節省材料成本和提高產品質量，最終能提昇內衣製造商的競爭力。主要優點包括標準化的模具庫和特製電腦輔助製造系統可節省約40%的鋁材，及半自動物料傳送系統可減少30%-50%操作人員。

## ||| Licensing Details 獲取專利 |||

A non-exclusive license includes a brasserie cup molding solution and /or a molding machine with auto-loader system.

非獨家專利授權許可包括一套胸杯成型解決方案及 / 或半自動化的胸杯傳送系統。

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