

Large Thermoforming Machines

TRIPLO[®] & CAMBIO

“TRIPLO[®]” & “CAMBIO”: EFFECTIVE AND FLEXIBLE SOLUTIONS ALSO ON LARGE THERMOFORMING MACHINES

Cannon Ergos has recently delivered two oversized thermoforming machines that can process extremely large thermoplastic sheets (up to 4.250 x 2.500 mm) assuring high flexibility for tool change. These thermoformers have been equipped with adjustable reduction plates of Cannon’s patented design “TRIPLO[®]” (Thermoforming Reduction Instant Plates Operation) and “CAMBIO” (Changing A Mould Becomes Instant Operation) system, the ideal solution for those customers demanding for quick and easy mould change. The range of adjustment of “TRIPLO[®]” system is the widest available on the market.

Cannon Ergos, namely its Forma Division dedicated to thermoforming machines, thanks to a long recognised experience in building large machines have the expertise to study the right solution to overcome the critical aspects this complex forming may arise.

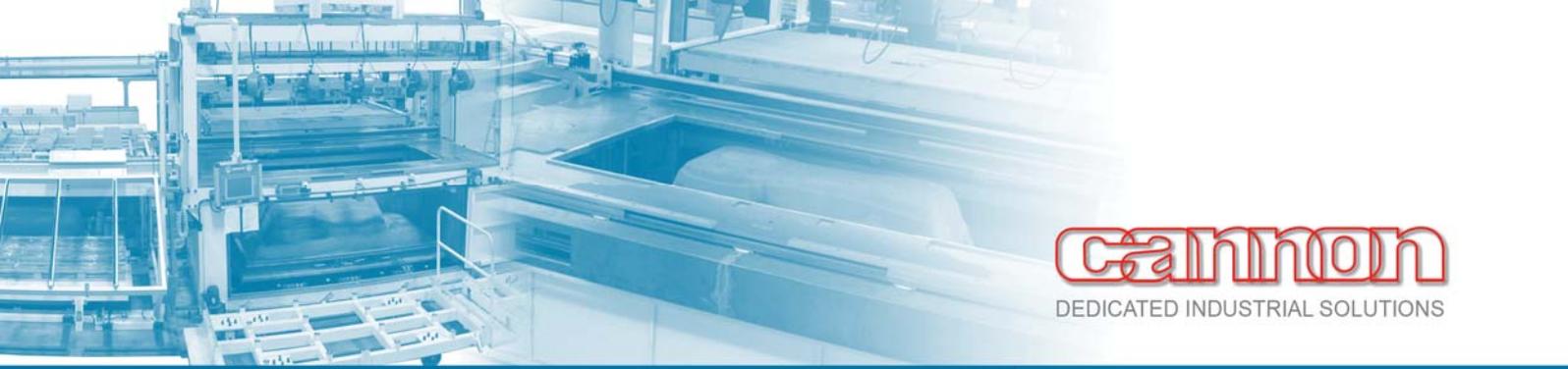
End-users of these special machines produce thermoformed parts such as drip-off oil containers to be used under big gear boxes in wind power generation, motor hoods for caravans, headliners for vehicles or multiple impression moulds to speed up production.



*One of these large machines has been supplied to **Gibo Plast**, a leading Scandinavian manufacturer of thermoformed plastic products.*

Cannon take to the larger sizes the benefits typically related to the “European” thermoforming style: material saving by zone heating, sag control during heating and pre-stretching bubble during the forming cycle achieved by a sealed mould box.

Processing big format thermoplastic sheets on capital intensive equipment means that each thermoformed part has a high value: no scrap is allowed. Each critical aspect is considered to conceive the right design solution to guarantee a high reliability also during shift production.



MECHANICS - For these large-size machines a correct alignment between the structural elements is very important in order to allow a controlled thermal expansion and straight movements. Machined tool connections of the frame are the key for the perfect alignment. Besides this when a new set of tool is required there is no need for adjustment or thicker gaskets to solve imprecision.

Cannon's manufacturing culture has been since many years sensitive to these aspects. Machine tools of large size are to fulfil even the most demanding needs.



CLAMPING SYSTEM - Cannon improved clamp frames have toe sections to allow the heating on the edges, despite the telescopic adjustment. The clamping frame distributes the clamping pressure evenly on the perimeter of the sheet: considering that this perimeter is 13,500 mm long and exposed to serious heating this is not so trivial!

Furthermore, the rigidity of the clamp frame and the reduction plate system have to withstand enough clamping force to avoid the sheet slipping during the pre-stretching phase or the forming process.

The "TRIPLO[®]" reduction plate system is stiff enough to withstand the force produced by the clamp frame: this is realised also with the minimum opening size which is the most critical in this respect.

HEATING AND PROCESS CONTROL - Sag control of the plastic sheets is fundamental for material saving. Big sheets are heated between hot surfaces at nearly the same distance as for smaller sizes. The sag control is assisted by photocell helping in avoiding contacts between the sheet and the heaters.

Larger heating panels ask for increased air flow, therefore strong air draughts are to be kept under control for a uniform and stable heating. Cannon mount standard components for heating system which is designed with focal length control ensuring heating uniformity to all areas of the plastic sheets.

Cannon care about a properly designed mould table, sized and manufactured. FEM analysis is an invaluable tool for right dimensioning, as well as proper milling of the surface allowing the correct planarity needed for sealing.

Increased tooling weights and heavier material gages require suitable forces. Cannon supply servo motors thus granting the best control of table movements and the possibility to easily set different start/stop positions of the mould table. Cannon have studied and propose an original solution for driving the mould table: the mechanical parts are moved away from the mould box, thus protecting them from excessive heat. The mould box, free from these components, allows easier cleaning and spotless mould so that on the thermoformed part no debris lays down damaging the part itself.





Cannon offer all sort of heating elements according to customer's specific needs. For bigger machines, reactive heating elements (halogen, quartz or even fast ceramics) can be selected as warm-ups and stand-by time turns into energy cost savings. In any case, heaters are positioned over reflective panels avoiding IR emissions dispersion in rest position. Heat dispersion must be reduced to minimum and the heater banks have properly designed heating panels, reflecting emitted energy back to the plastic sheet. The rest position on automatic close loop control decreases the heater's voltage maintaining the data set point. Energy saving can reach 20-30%

ERGONOMICS - The attention to the ergonomics of the working place requires that material handling is accomplished by automatic loading/unloading systems.



Sheet separation is less problematic because of sheet weight, but clamping the part with lifting fingers for unloading can generate issues in cases of heavy thickness HDPE and double impressions.

Cannon **"TRIPLO"** nears the forming area to the operator. The obvious advantages are concerning visual control of the process and the easier handling of the sheet in case of manual operation.

OPERATOR'S INTERFACE - Cannon Thermoformers are widely appreciated for the HMI Operator Panel. This is really user-friendly and it offers a high degree of control on the process operations, allowing operator's intervention in any condition or phase of the thermoforming cycle.

This is especially important when the operator's prompt intervention can "save" a forming. Quick parameters set (like heating power settings or bubble blow duration) can be adjusted on the fly while looking at the part processing. Changes can then be stored and become the working parameters for next cycles.

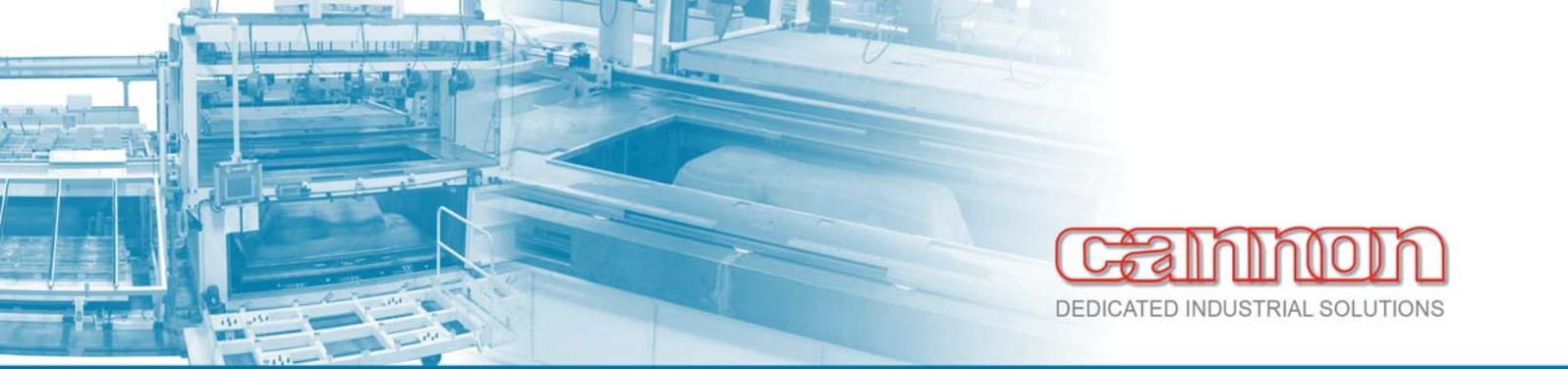


SAFETY - Due to the extreme importance, the clamp frame is secured from uncontrolled movements by three independent locking systems. Safety catchers are used to lock hanging loads thus preventing unexpected failures.

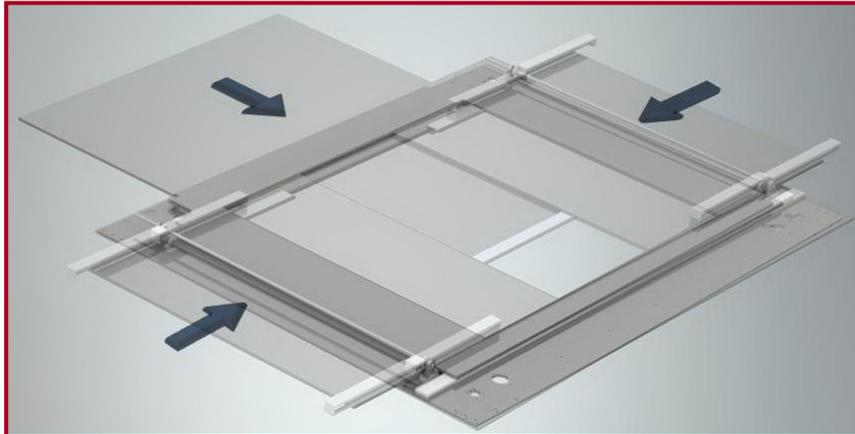
FLEXIBILITY - The **"CAMBIO" tool change system** is the best solution when moulds are to be changed in a fixed and fast time, guaranteeing no waste part after the operation: tools need to be simple and storage room reduced to a minimum.

Cannon can offer **"CAMBIO"** tool change systems for large dimensions where only the mould (plug, when needed) and the pallet of plastic sheets are dedicated. Quick and easy adjustment of the clamp frame in 2 axis adjustment of the aperture plate and mould locking on the mould table can be done automatically with servo motors.





“TRIPLO”[®] CONCEPT



Cannon real break-through is given by the patented solution for the **adjustable reduction plates – “TRIPLO 3X”** system: Cannon machine allows an extremely wide range of adjustment.

Length: from 4.250 mm down to 2.500 mm

Width: from 2.500 mm down to 500 mm

This is done by only ONE set of plates! No dangerous operations for changing sets of plates, no need to find a place to store them, no extra dedicated frame for the change. Cannon customers buy the “TRIPLO”[®] motorised axis with encoders and few minutes after the operator has keyed in the sheet size the machine is ready to run production.

“TRIPLO”[®] option kills the manufacturing of big dedicated reduction plates (with big space saving consequence), is ideal for long and narrow parts and keeps everything closer to the operator’s side.

The clamp frame adjusts 2D as in a traditional way and the loader doesn’t need any manual operation: machine sets automatically with the “TRIPLO”[®] tooling options.

Cannon can evaluate with the customer the payback time for the investment in these features, but it’s generally recognised within few months. The production requirements by the reduced batch size in the thermoforming industry are set to one tool change per shift: saving time in tool change is mandatory.

Cannon “TRIPLO”[®] and “CAMBIO” solutions are additional to those specifically required by the customer’s application and **can be proposed on almost whole CREA thermoforming machines serie.**

These proven innovations in the thermoforming technology have been introduced by Cannon thanks to the experience made in several years of works to answer with the best solutions to specific needs.

THINKING LARGE? THINK CANNON!