TECHNICAL SPECIFICATIONS TO BE FOLLOWED IN THE OPEN TENDER PROCEDURE FOR THE SUPPLY, INSTALLATION AND COMMISSIONING OF MACHINE TO MAKE HIGH PRESSURE FORMING OF PRINTED AND PLAIN PLASTIC FILMS, LAMINATES AND ALUMINIUM.

1. PURPOSE OF THE CONTRACT

The purpose of this document is to define the technical conditions that must govern the supply, installation and commissioning of a machine to make forming of printed and plain plastic films, laminates and aluminium, operating at low temperatures and very high forming pressures.

The equipment will be used mainly for forming films with printed tracks and SMD components with adequate precision as part of the in-mold electronics process.

Also, it will be the object of the contract, without any additional cost:

- Fundación Cidetec technical staff training.
- Remote online support during two years from the reception of the equipment.

The CPV code for the contract is the following: 42994200-2 (Machines to work with plastics).

2. SCOPE OF SUPPLY

In addition to the supply, installation and commissioning of the equipment, the scope of supply encloses the preventive maintenance previously detailed.

3. WARRANTY

A warranty period of at least 2 years (with a maximum operation time of 2 000 h) is established from the date of reception of the equipment with the agreement of the CIDETEC technical managers. The warranty includes travel, labour, parts and consumables necessary for the repair due to manufacturing defects.

If during the aforementioned warranty period the existence of faults or defects in the goods supplied is demonstrated, CIDETEC will have the right to demand from the contractor the replacement of the defective goods or their repair if that is considered sufficient.

If CIDETEC considers, during the warranty period, that the supplied product is not fit for its intended purpose, as a consequence of the faults or defects observed in it and attributable to the contractor, and there is a presumption that the replacement or repair of the product will not be sufficient to achieve such purpose, it may, before the expiration of said period, request the replacement of the unit with a new one.

4. TECHNICAL REQUIREMENTS

1. Process flow steps.

    (1) manual loading of films.

    (2) heating both film sides.

    (3) high pressure forming (automatic, with external control of parameters).

    (4) manual unloading of the formed films.

2. Machine parts and minimum technical requirements.

    a. Loading unit with positioning and fixing system.

    b. Film translation system.

    c. Contactless infrared heating module from upper and lower side with at least 84 calibrated infra-red elements each, individually adjustable for

precise substrate tempering from both sides.

d. High-performance infrared camera, hard- and software module for checking the temperature on every sheet processed during production, with, at least, the following features:

   Minimum measuring temperature range: 50 - 350 °C (125 - 650 °F). Minimum measurement frequency: 256 lines per second. Minimum spectral range: 8 - 14 µm.

   Stationary line pyrometer for contact-free detection of temperature distribution on forming substrates during movement from heating to forming station.

   Visualization of thermal images on the control panel screen with heating element numbers merged.

   Possibility of setting measurement areas and allowed Ø-temperature variation to get error message as soon values are outside this range.

   Minimum number of sensors: 128 (pyroelectric line sensor).

   Minimum aperture angle: 40 x 0,3°

e. High pressure forming machinery + Software controller for individual high pressure parameter adjustment (Pressure, filling time/flow speed, dwell- and exhaust time, temperature).

   Contactless forming process (just high pressure air from top) to avoid damage of susceptible coatings and allow usage of special coated materials (e.g. hard coated fims).

   Temperature control for forming tool heating up to 150 °C (300 °F).

   Pressure control unit with proportional valve, air heating system and unidirectional air stream.

   System control with all product relevant parameters via industry PC with touch-screen

   Double-sided tool opening actuation (DUO)

f. Tools

Mother tool with lamella sealing. Minimum forming size: 720 x 390 mm. Must have positioning system.

Film palette with Ø4mm pins. Size: suiting to mother tool.

g. UPS for control panel. Uninterruptible Power Supply for a controlled shutdown of the operating system in the event of a power failure or major power fluctuations that lead to failure of the machine operation.

h. Cloud-based remote maintenance using encrypted VPN-tunnel

3. Material: Equipment should be designed to work with the following material types:

    a. Plastic Films: thickness at least in the range of 150 µm – 750 µm

    b. Laminates

    c. Aluminium: thickness up to 300 µm

4. Minimum size range that the equipment can work with (in mm)

    a. Forming height: 80 mm (3").

    b. Forming area 650 x 400 mm (~ 26" x 15") adjustable to project

    c. Forming length: 720 mm (~ 28")

5. Specific requirements:

    a. Optimized sample accessing during loading/unloading.
    b. Forming position precision: ≤ +/- 0,5 mm (+/- 0,02").
    c. 3D shape precision: < 0,1 mm.
    d. Machine Cycle time: lower than 40 seconds plus handling of the films.
    e. Clamping force: at least 250 tons.
    f. High pressure supply: at least 250 bar (3 500 psi).
    g. Low pressure supply: 6 – 10 bar (90-145 psi).
    h. Power supply 220V or 380V 50 Hz available voltage.
    i. Maximum dimensions: WX× LY × HZ mm: 2 200 x 4 500 x 3 000 mm (the smaller the better)

To allow the equipment to be installed in its final location, it must be modular, so that its largest part can pass through a door 1 800 mm wide and 2 400 mm high.

j. Maximum weight: 7 tons.

6. Auxiliary equipment: High pressure compressor set up to 350 bar / 5 000 psi with integrated filter- / dryer- / cooling unit incl. noise protection cladding.

    a. Technical specifications of the auxiliary equipment:
    Medium: air
    Operating pressure: 90 bis 350 bar (1 300 – 5 000 psi).
    Scope of delivery: 500 l/min (18 cfm) (ISO 1217).
    Maximum noise level: 73 dB(A) ± 2 dB(A) (ISO 3744)
    Dimensions (maximum aprox.): L x W x H: 1 543 x 802 x 1 915 [mm]

7. All accessories and components will be first brands with technical support in Spain.

8. Criteria for FAT acceptance

    a. Verifying that all the technical characteristics compiled in this document are included.

    b. Functional test.

    Forming of 5 PC sheets from Covestro 250 µm-thick, with printed tracks of Ag ink with widths between 250 and 1 500 µm and rigid hybridized components (SMD) such as LEDs of maximum size 2 mm x 2 mm, joined with a solder paste. For the test, a mold with an area of approx. 650 x 390 mm provided by the supplier will be used.

    After forming, the tracks and hybridized components must be aligned with respect to a position X, Y, Z defined in the mold, with a precision $\leq \pm 0.5$ mm while the precision of the 3D geometry must be $< \pm 0.1$ mm.

9. Criteria for SAT acceptance: same test defined for FAT will be performed.

10. Documentation: It will be necessary one copy in paper format in Spanish, and another in electronic form. It must include electrical diagrams, tires, installation plans, user manual, detailed maintenance schedules indicating all spare parts.

11. The equipment must have CE marking and declaration of conformity.

5. TRANSPORTATION, INSTALLATION AND TRAINING

The transport, unloading, put in place and commissioning of the equipment supplied will be the responsibility of the successful bidder and will not involve any additional costs whatsoever.

The successful bidder will provide the necessary training with qualified personnel of the company that guarantees that the staff of FUNDACIÓN CIDETEC will be able to correctly use the acquired equipment, for the time necessary to prove the ability to put the machine into operation without any assistance from third parties.