



Conformal Coating System

model: **TCM45A**



TTnS patented (PAT. 10-0550606)

bubble-free & energy saving conformal coating systems with total solution specialize in the application of conformal coatings for electronic components and circuitries on the printed circuit board assembly out of Automotive, Aerospace, Military, Medical, Industrials, Telecommunication and Appliances.

TCM45A Coating WorkCell,

the fully automated and programmable coating system backed by ECM_XP of TTnS exclusive coating program, integrates five(5) axis precise robot with advanced TTnS coating applicators to provide consistent applications, substantially reduce masking and minimize reworks.

[Info about TTnS coating applicator / click](#)

▲ PHOTO **TCM45A** Coating WorkCell

Particularly, you can expect the material utilization is typically improved by 40-60% compared to conventional spraying or dipping processes. The range of conformal coating materials currently available for **TCM45A** comprises acrylics, rubber, urethane, epoxy, silicone and water based coatings.

[Info about coating materials available / click](#)

※Material conversion chart available in the above Data Room

TTnS conformal coating systems with total solution can provide edge-defined transparent film-build in a continuous production thanks to the techniques of non-atomized film patterning, tri-mode spiral dispensing in addition to the patented selective curing ideas of user-environment friendly.

It comes true the bubble-free selective coatings where is no material losses due to 100% of material transfer efficiency, high energy saving more than 50% compared to the usual IR-cure, almost double up improved throughput(UPH) due to TTnS intermittent coating technique.

※TTnS bubble-free case study report
in the above Data Room

♣ Conformal Coatings Today. & TTnS Inc.

Presently PCB manufacturers have been continually challenged by the need to balance throughput, materials and labor investments in addition to addressing the regulatory and environmental concerns relating to the processes. As a result, potential customers who need conformal coatings, more and more, realize the importance of cost effective and environment friendly true solution.

TTnS patented,

bubble-free and energy saving conformal coating systems provides remarkable benefits for those, value analyzing investors, and specially high degree of coating performances, at every level of batch to in-line production. **TCM45A** coating workcell which is cooperative with **ECO99C** curing oven, the state of the art, backed by total solution guarantees the gross value of the systems utmost as well as earliest payback.

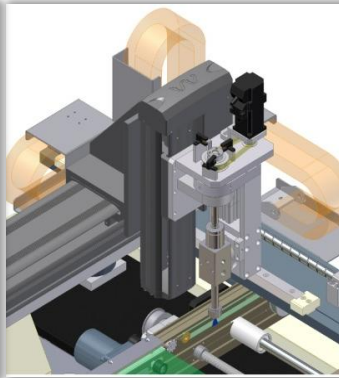
◆ Coating WorkCell, Features & Benefits / TCM45A

I. Precision five(5) axis robot assists,

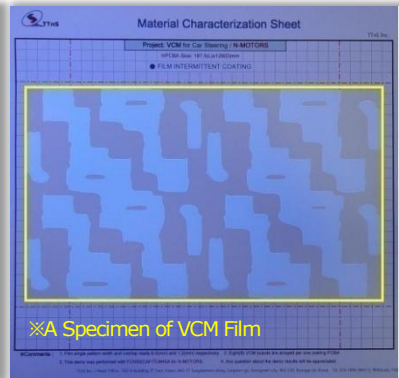
Selective conformal coating system virtually eliminates extensive masking and coating reworks while it maximizes the throughput(UPH) and repeatability.



▲ 5-Axis, Film CAF-gun



▲ 5-Axis, Robot Assembly



▲ Selective Film-build

II. Equipped with Easy Coating Manager ECM_XP which is TnS exclusive coating program and compatible with Windows-XP. Even entry level of operators can handle it with easy. This exclusive software is capable of performing various coating patterns as follows.

- | | |
|--|---|
| 1. Line Coating menu | ※ Film and Spiral gun adopt |
| 2. Area Coating (beyond-area coat) menu | ※ ditto |
| 3. Intermittent Coating (mid-on/off coat) menu | ※ Film gun only adopts |
| 4. Spot Coating menu | ※ Film and Spiral gun adopt |
| 5. Tilt Coating menu | ※ Film gun only adopts, Four-sides coating by 30° angle |
| 6. Duplicate Program menu | ※ Coating programming assistant |
| 7. Pulse-spray Coating menu | ※ 1/1000 sec control, Spiral gun only adopts |

코팅영역편집/표시-창
*.jpg, *.dwg Display

코팅-창 화면/기능설정

Error Message 및
코팅변수/정보표시

활성-프로그램의
코팅영역정보/출력

컨베이어자동
복-조정 実行

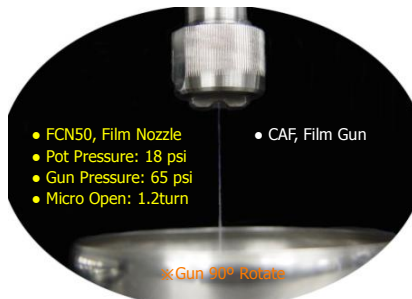
코팅프로그램
실행작업-창

장비유전버튼

▲ TCM45A Exclusive Coating Program ECM_XP

III. The world top conformal coating master TCM45A, backed by intermittent coating technique, has been completed by the integration of TTnS film dispensing **CAF-gun** that performs non-atomized film pattern with 100% TE, precision fluid/pneumatic controls, and advanced knowledge & experiences in robotics. As a result, many customers who need PCBA coatings could be familiar broadcast with **Coating On Flying** recognized as a dream in SMT. Additionally it ensures a **precise selective coating** even at almost **2 times higher throughput** over conventional skills.

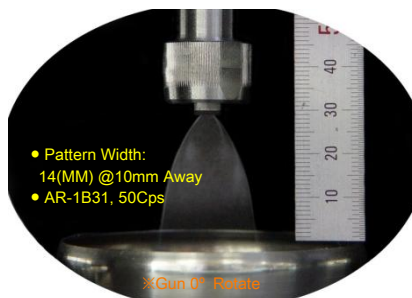
[TTnS Intermittent coating moving image / click](#) 



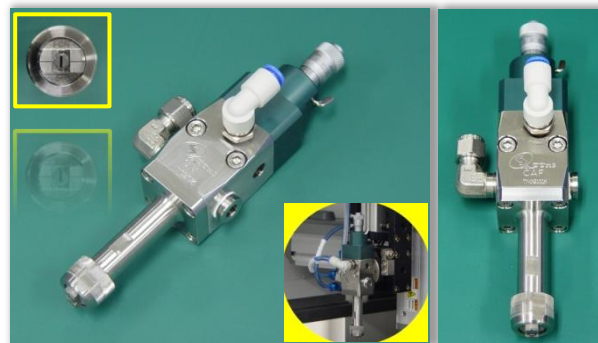
▲ CAF Film Pattern (side-view)



▲ Central, Fluid Controls & PC



▲ CAF Film Pattern (front-view)



▲ FCN Film Nozzle + CAF Film Gun (exclusive)

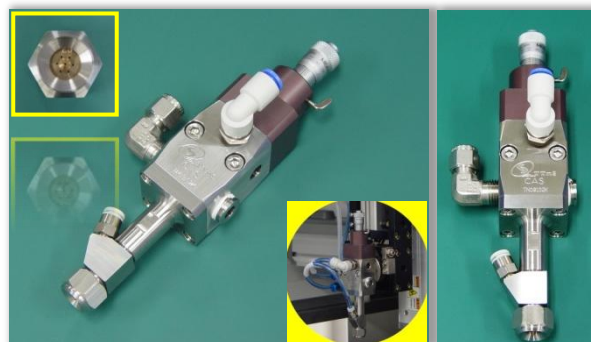
IV. TTnS Versatile spiral dispensing CAS-gun, eligible for various coating applications, performs tri-mode of coatings bead, spiral-bead, and spiral-spraying in good penetration and materials TE. And the milliseconds controllable Pulse-Time Controller **TPC999** raises up the system reliability.



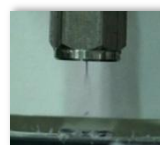
▲ Spiral Spraying Pattern
CAS Spiral Gun @S6CN/S12CN



▲ Pulse-Time Controller **TPC999**
Millisecond, 4 channels pulse (exclusive)



▲ S6CN Spiral Nozzle + CAS Spiral Gun (exclusive)



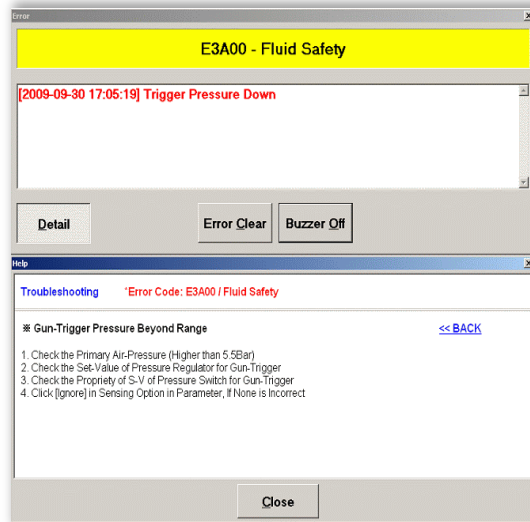
▲ Spiral-bead/spray Pattern



▲ Bead Pattern

[TPC999 Pulse Controller technical materials / click](#) 

V. With the philosophy of the system safety is top priority, TCM45A coating system has been developed. While the system is running, all of safety interlocks have to be in active appropriately.



▲ Error Message Pop-up / Troubleshooting

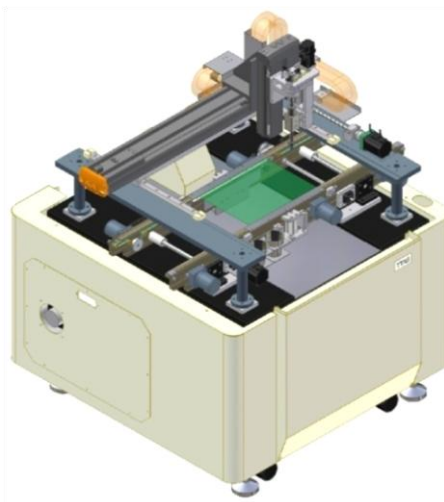
Once it comes any system trouble or unexpected accident, TCM45A detects fault then displays the error message and appropriate troubleshooting on the system windows along with buzzer and control tower blinking.

- Pre/After Purge_interlock
- Gun Trigger Pressure Low_interlock
- Atomizing Air Pressure Low_interlock
- Syringe Pressure Low_interlock (spare)
- Accidental Door Open_interlock
- X-Y-Z Robot Overrunning_interlock
- 30° Tilting-angle Outrange_interlock
- VOC Vent Fail_interlock
- Conveyor Jamming/Timeout_interlock
- Fluid Level Low_interlock (optional)

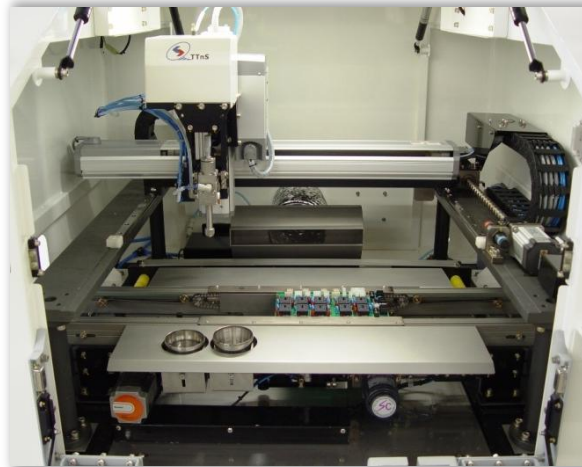
VI. TCM45A In consideration of the system utility and physical stabilities,

the underbody of the platform is constructed with a single-body robust welding structure under very stern inspections of every line of processes for welding with grinding, assembly annealing and machining, surface treatment with sand-blast then finally powder coating.

For the more, the workcell assembly provides four(4) wide access doors front and back for easy operations and maintenances, and besides an additional subsidiary deck front-door underneath for the preparations.



▲ Robust Understructure of TCM45A WorkCell Assembly



▲ WorkCell, Easy Access & Ample Inner-space



▲ Three-Step Independent Conveyor (Cut-view of Entry Conveyor)

VII. TCM45A Coating workcell is equipped with,
the precision & multipurpose fluids delivery circuit,
as standard, for appropriate responding to various
coating materials and applications. On the basis of
this standard fluids circuit, customers can extend
use of the workcell for film coating, spiral coating
and needle dispensing by the integration of
additional coating applicators as necessary.

The optional material changeover
can be useful in material change
and/or line cleaning with no risks
of exposure to harmful VOC.



▲ Fluids Delivery Circuit / Material Changeover

VIII. TTnS, Patented conformal coating solution,

guarantees bubble-free transparent coating layers in the continuous production. You can expect
minimal 50% of energy saving and maximal 25% of working space saving thanks to the unique
selective curing technique.

- Primary e-power for curing oven **ECO99C** / Entire Oven Length : 10(Kwh) / 2,400(mm)

※Conformal coating systems referenced layout
in the above Data Room

IX. After-sales service and Technical support

Presently, TTnS and its business networks worldwide are negotiating with customers for business
talks with TTnS coating solutions in more than ten major countries all over the world.
All the coating systems and devices originated from TTnS Inc. shall be provided with a package of
value and field proven quality under one year warranty after sale.

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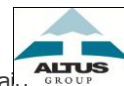
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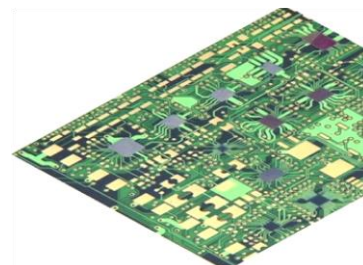
● **TTnS, India Distributor / International Marketing Corp.**

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X. TCM45A Coating system, Primary utilities

- Primary Power Supply : 220(VAC) x 1Ø x 50/60(Hz) x 6(Ampere)
- Primary Compressed Air : Minimum of 80(psi) at Ø10 hose, DCA
- Fume Vent Stack : Ø150 at one place ※15(CMM)x25(mmWC)
- Noise Level : <70dBA
- System Weight in Shipment : 550(Kg)
- Space Requirement : 1,200(D) x 1,750(H) x 1,150(W)mm

[TCM45A Coating workcell specifications / click](#) ■



To be continued on the following

♣ **Conformal Coating Application.** [APPENDIX](#)

● **Outline of the Conformal Coatings**

Transparent, polymeric coatings conform to the contours of the printed circuit board circuitry and its components creating a thin layer which is flexible. This improves its working life, ensures security and reliability of the performance remarkably. Virtually it protects circuitry from hazards such as dust, moisture, mechanical vibration, an extreme of temperature and chemical which may cause corrosion and current leakage.

● **Why Conformal Coatings?**

- Inhibit current leakage and short-circuit due to moisture/contaminants
- Inhibit arcing and corona discharge
- Allow higher power and closer track spacing from preventive current leakage
- Inhibit corrosions
- Improve fatigue life of solder joints to leadless packages
- Provide mechanical support for small parts to prevent damage from mechanical shock or vibration
- Improve the appearance of PCBA

● **Where the Conformal Coatings Applied?** (Estimate in FY2010)

- Electronics_40% *It consists of Mobile, Telecommunications & Home-appliances
- Automotive Components_20%
- Aerospace_15%
- Military Devices_5%
- Medical Devices_15%
- Industrial & Others_5%

● **How do they make Conformal Coatings?**

Conventional conformal coatings have been mostly dipping, brushing and air spraying with additional labors for masking and de-masking. It looks quite simple at a glance but such collateral much higher expenses are realistically unavoidable in terms of additional labors, material losses and environmental pollution/treatment despite the coating quality and repeatability is beyond controls. At present time, advanced conformal coatings are mostly covered by the technologies of non-atomized film dispensing, triple-mode spiral dispensing and partly needle dispensing where the programmable precision robotics assists coating performance in a designed area of the substrate or broadcast.

● **Design Considerations for Conformal Coatings**

I. Feasibility study for coating PCBA

- Target throughput, information on coating sides & dimension
- PCBA edge handle-able dimension with minimum 3.5mm edge clearance opposite sides
- Specification for the film bubbles, edge definition
- Propriety of the substrate cleaning prior to coat
- Selective coating or broadcast
- Heating temperature limits, if curing with heat

II. Feasibility study for coating materials

- Trying to protect against mainly what (solvents, humidity, vibration, etc)
- Planning to use what type of curing (convection, IR, humidity, UV)
- Propriety of the selected material in view of environment, regulations
- Granting priority to what (VOC, coating quality, productivity, others)

III. Feasibility study for the system appropriate

- Working hours & shift per day over anticipated volume per year
- Decision batch or in-line production based on 100(units) per shift
- Space available for the system
- Primary utilities availability including ventilation

※Note: For more information about Conformal Coating System, Please make a phone call TTnS.