

Conformal Coating Systems model: **TCM45A⁺**



▲ [PHOTO TCM45A⁺ Coating WorkCell](#)

TTnS patented (PAT. 10-0550606) bubble-free & energy saving conformal coating systems with total solution specializes 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_WIN7 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 here](#) ■

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, silicone and water based coatings.

[Info. about coating materials available / click here](#) ■
 ※Material conversion chart in the Library

TTnS conformal coating systems with total solution can provide edge-defined transparent film-build in a continuous production due to the technology of non-atomized film patterning, tri-mode spiral dispensing in addition to the patented ideas of magazine base cyclic and focused curing which is better efficient and user-environment friendly. It comes true the bubble-free selective films where is no material losses due to almost 100% of material transfer efficiency, high energy saving more than 50% compared to the usual IR-cure, minimum double up improved throughput(UPH) by aids of TTnS intermittent coating technology.

※TTnS bubble-free Case Study report
 in the Library

♣ Conformal Coatings Today. & TTnS Inc.

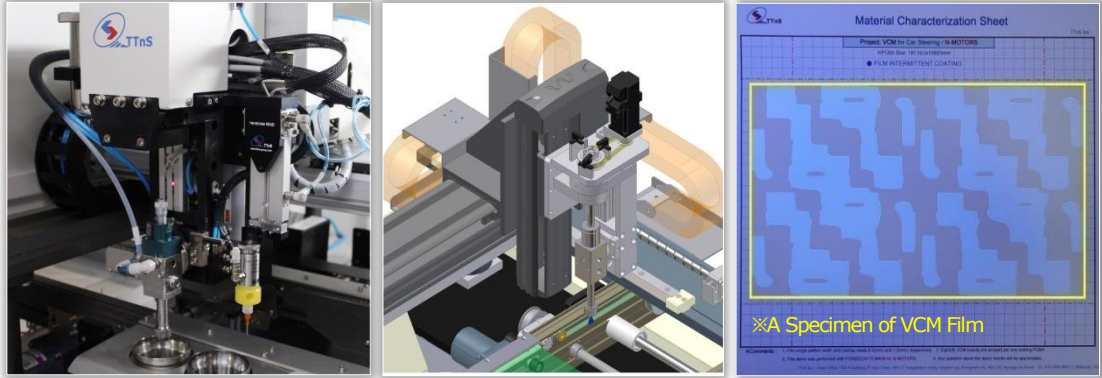
Presently PCB manufacturers have been continually challenged by the need to balance throughput(UPH), materials and labor investments in addition to addressing the regulatory and environmental concerns related to the processes. As a result, potential customers who need conformal coatings, more and more, 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 inline production. **TCM45A⁺** coating workcell which is well compatible with **ECO99C** curing oven, the state of the art and 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 systems virtually eliminates extensive masking and coating reworks while it maximizes the throughput(UPH), performance of dispensing accuracy and film repeatability.



▲ 5-Axis, Film NCAF-gun Dual Dispensing Head

▲ 5-Axis, Robot Assembly

▲ Selective Film-build

II. Equipped with EasyCoat Manager ECM_WIN7, TtNS exclusive the system operation software which is compatible with Windows7. Even entry level of operators can easily handle it with no trouble. This programming 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/Rotate Program menu | ※ Coating programming assistant |
| 7. Pulse-Spray Coating menu | ※ 1/1000 sec control, Spiral gun only adopts |

코팅영역편집/표시-창 *.jpg, *.dwg Display

컨베이어자동 폭-조정 實行

코팅프로그램 실행작업-창

장비운전버튼


Error Message 및 코팅범수/정보표시

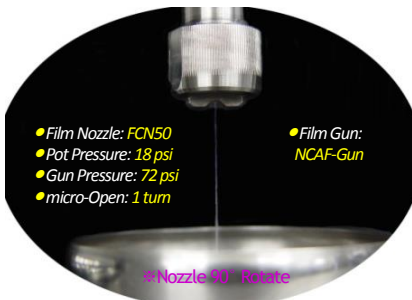
코팅-장 화면기능설정

활성-프로그램의 코팅영역정보/순서

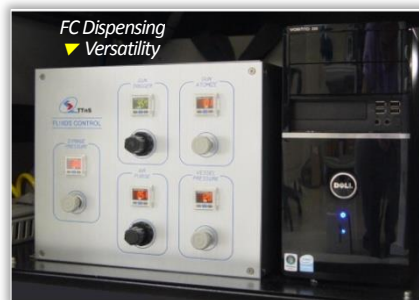
No.	Type	StartX	StartY	EndX	EndY	Tilt	Theta	Dir	Z Coat	Z Appr	Speed	Rpt	Description
1	MID	-188.00	118.00	-23.00	118.00	90	X	10.00	10.00	250	1		
2	MID	-23.00	113.00	-188.00	113.00	90	X	10.00	10.00	250	1		
3	MID	-188.00	107.00	-25.00	107.00	90	X	10.00	10.00	250	1		
4	MID	-25.00	101.00	-174.00	101.00	90	X	10.00	10.00	250	1		
5	MID	-174.00	95.00	-25.00	95.00	90	X	10.00	10.00	250	1		
6	MID	-24.00	89.00	-172.00	89.00	90	X	10.00	10.00	250	1		
7	MID	-172.00	83.00	-24.00	83.00	90	X	10.00	10.00	250	1		
8	MID	-10.00	80.00	-172.00	80.00	90	X	10.00	10.00	250	1		

▲ TCM45A⁺ Exclusive Coating Program ECM_WIN7

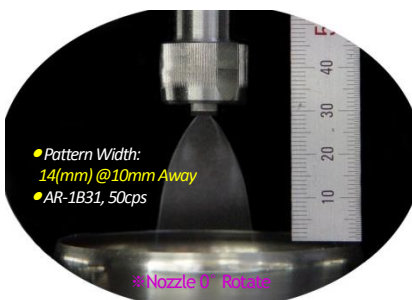
III. The World Class conformal coating master TCM45A⁺, backed by film intermittent coating technology, has been completed by the integration of TtNS film dispensing **NCAF-gun** that performs non-atomized film pattern with almost 100% TE, precision fluid/pneumatic controls, and advanced knowledge and experiences in robotics. As a result, many customers who need PCB coatings at high UPH with definition could be familiar with the broadcast **Jetting on Flying** recognized as the true solution in SMT. Additionally it ensures a **precise selective coating** even under 2-3 times faster coating speed over conventional skills. [TtNS Intermittent coating video / click here](#) 



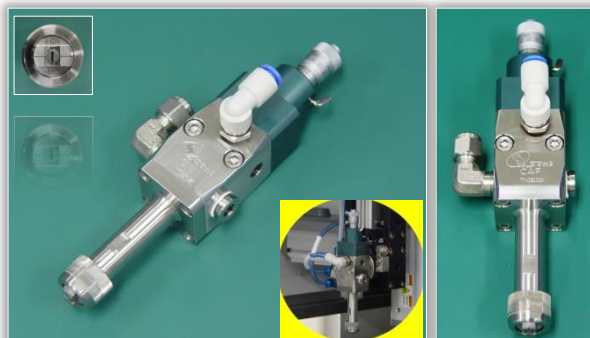
▲ NCAF Film Pattern (side-view)



▲ Central, Fluid Controls & DELL PC



▲ NCAF Film Pattern (front-view)



▲ FCN Film Nozzle + NCAF Film Gun (exclusive)

IV. TtNS Versatile spiral dispensing NCAS-gun is eligible for various coating applications. It performs tri-mode coatings such as Bead/Spiral-Bead/Spiral-Spraying in good material penetration, adhesion and better transfer efficiency(T.E.) by aids of millisecond-scale Pulse-Time controller **TPC999**. TtNS completed the pulse-assist conformal coating application, and introduced to the public in the first place worldwide.



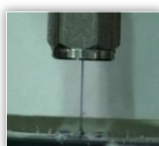
▲ Spiral-Spraying Pattern
NCAS Spiral-gun @S6CN/S12CN



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



▲ Spiral-Bead Pattern

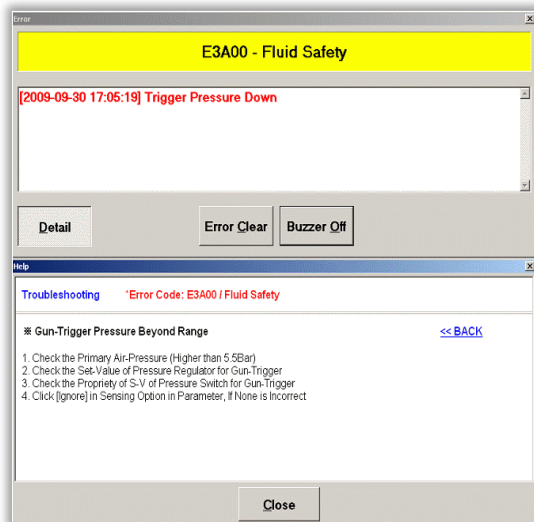


▲ Bead Pattern

[TPC999 Pulse Controller technical sheets](#)

※TDS1501, TDS1502_Impact Pulse Spray in the Library

V. **With an ideology of the safety and user friendly first**, TCM45A⁺ coating system has been developed. While the system is officially running, more or less twelve(12) safety concerned interlocks as below has been in active appropriately all the time.



▲ Error Message Pop-up / Troubleshooting

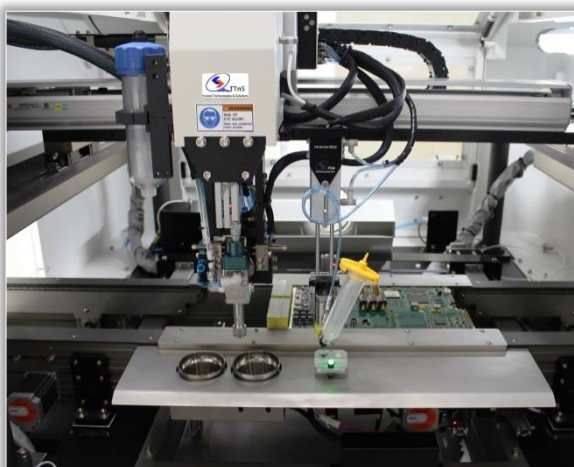
Once it comes either any system trouble or unexpected accident, TCM45A⁺ detects fault and displays error message accordingly with some instructions how to troubleshoot over the system windows. The system gives a beep along with control tower blinking.

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

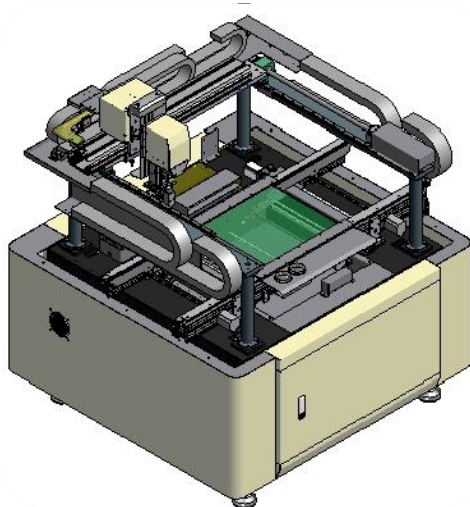
VI. **TCM45A⁺ Description of the systems structure and utilities,**

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

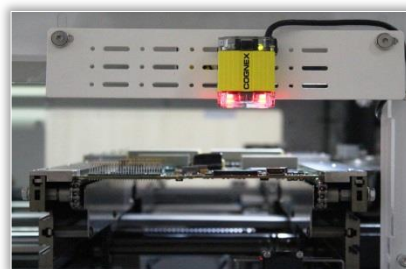
For the more, the workcell assembly provides four(4) wide access doors front and back for easy operations and maintenances, and besides an additional subsidiary deck front-door underneath for the preparations.



▲ WorkCell, Easy Access & Ample Inner-space



▲ Robust Understructure of TCM45A⁺ WorkCell Assembly



▲ 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 applicator as necessary.

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



▲ MC-2F / MC-3F ▲ Fluid Delivery Circuit / Material Changeover

VIII. TTnS, Patented conformal coating solution,

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

- Primary e-power for Curing Oven **ECO99C** / Entire Oven Length : 10(Kwh) / 2,500(L)mm
- Primary e-power for Curing Oven **ECO150C** / Entire Oven Length : 18(Kwh) / 3,000(L)mm

※Typical conformal coating systems Layout in the Library

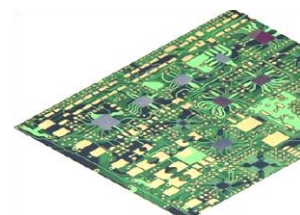
IX. After-sales service and Technical support

Presently, TTnS global business networks keep going on business talks with their customers for adopting TTnS coating solutions in more than ten major countries over the world. All the coating systems and devices which are originated from TTnS, and the systems stabilities field proven, shall be provided with a package of value upon request under one year warranty as standard after sale.

X. TCM45A⁺ Coating system, Primary utilities

- Primary Power Supply : 220/110(VAC)x1Øx50/60(Hz)x3(KvA)
- Primary Compressed Air : minimum of 85(psi) with Ø10mm air-hose, @DCA
- Primary Nitrogen Gas : minimum of 70(psi) with Ø6mm air-hose / only for SR coating
- Fume Vent Stack : Ø150mm vent-duct at one place ※15(CMM)x25(mmWC)
- Noise Level : <70dBA
- System Weight in Shipment : 720(Kg)
- Space Requirements : 1,650(D)x1,580(H)x1,470(W)mm

※TDS1504_TOP5_Common Errors in PCB Conformal Coatings
 ※TDS1505_Conformal Coating Technology & Systems Optimization
 ※TDS1506_Optimal Coating Parameters in the Library



♣ **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 PCB

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

- Electronics_40% *it mainly 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 PCB

- 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 optimized

- 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.