

WIPING SYSTEM INTRODUCTION (Tack-off Machine)

DARWON IND. CO., LTD

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Contents

- 1. Company History
- 2. Customer Reference
- 3. Company Information
- 4. Business Area
- 5. Organization
- 6. Tack off Mechanism
- 7. System Specification
- 8. Wiping Machine Drawing
- 9. Wiping Machine Utility
- 10. Wiping Machine Photograph
- 11.Certification
- **12.Press Release**

1. Company History

• 1987. 8 : Darwon Industries. Company Ltd. Foundation.

- 1989.12 : Development of top coat auto-electrostatic painting system for the first time and apply the system in KIA Motor Company at Sohari.
- 1991. 5 : Installation of the auto finishing system of 3-stage at Primer Line, and top coat line in SSANGYONG Motor Company.
- 1993. 8 : Installation of Two Tone Spray Booth in DAEWOO Motor Company.
- 1995.4 : Installation of auto spray system of Bus in HYUNDAI Motor Company at Jeonju Factory.
- 1996. 6 : Installation of Top Coat Robot Auto Spray System in HYUNDAI Motor Company.
- ◆ 1997.12 : Development and installation of AUTO WIPING SYSTEM(TACK OFF MACHINE) in domestic for the first time in Top Coat Line at Asan Factory of HYUNDAI Motor Company.
- 1998.11 : Installation of Top Coat Auto Spray System at DAEWOO-FSO in Poland.
- 2009. 3 : Construction completed, the 2^{nd} factory(Hyangnam).

2. Customer Reference

(Auto wiping system only)2013.04

NO	Company	Factory	Date	UPH	Remarks
1	Hyundai Motor Company	Asan Top1 Line	1998.01	-	
2	Hyundai Motor Company	Asan Top2 Line	1998.10	-	
3	Hyundai Motor Company	Ulsan #4 Top2 Line	1998. 12	27	
4	Daewoo Motor Company	Bupyeong #1 Primer Line	1999. 10	70	
5	Hyundai Motor Company	Ulsan #4 Top1 Line	2001.05	12	
6	Hyundai Motor Company	Ulsan #1 Top1 Line	2001.10	45	
7	Hyundai Motor Company	Ulsan #2 Primer Line	2001.11	76	
8	Kia Motor Company	Gwangju #1 Top Line	2001.12	20	
9	Kia Motor Company	Gwangju #1 Primer Line	2001.12	20	
10	Kia Motor Company	Gwangju #2 Top Line	2001.12	32	
11	Hyundai Motor Company	Ulsan #2 Repair Line	2002.09	25	
12	BHMC(Beijing Hyundai Motor)	Beijing Top2 Line	2003.12	44	China
13	Hyundai Motor Company	Ulsan #5 Top1 Line	2004. 01	30	
14	Kia Motor Company	Hwaseong #2 Primer	2004. 02	100	
15	BHMC(Beijing Hyundai Motor)	Beijing Primer Line	2004. 03	72	China
16	Kia Motor Company	Gwangju KM Primer Line	2004. 04	42	
17	Kia Motor Company	Gwangju KM Top Line	2004. 04	44	
18	Hyundai Motor Company	Ulsan #5 Top2 Line	2004. 07	30	
19	Hyundai Motor Company	Ulsan #5 Primer Line	2004. 08	50	
20	Hyundai Motor Company	Ulsan #1 Primer Line	2004. 08	75	
21	Kia Motor Company	Hwaseong #2 Top3	2004. 09	40	
22	Kia Motor Company	Hwaseong #2 Top2	2004.10	40	

NO	Company	Factory	Date	UPH	Remarks
23	Kia Motor Company	Hwaseong #2 Top1	2004. 11	40	
24	GM Daewoo Motor Company	Bupyeong #2 Top1 Line	2004. 12	39	
25	GM Daewoo Motor Company	Changwon Top1 Line	2005.01	30	
26	GM Daewoo Motor Company	Changwon Top2 Line	2005.02	30	
27	GM Daewoo Motor Company	Bupyeong #2 Top2 Line	2005.02	20	
28	BHMC(Beijing Hyundai Motor)	Beijing Top1 Line	2005.02	44	China
29	Kia Motor Company	Gwangju UN Top & Primer Line	2005.10	44	
30	KMS(Kia Motors Slovakia)	Zilina Primer Line	2006. 12	67	Slovakia
31	Ssangyong Motor Company	#1 Primer Line	2006. 08	32	
32	Ssangyong Motor Company	#1 Top Line	2006. 10	28	
33	KMS(Kia Motors Slovakia)	Zilina Top1 Line	2006. 12	37	Slovakia
34	KMS(Kia Motors Slovakia)	Zilina Top1 Line	2006. 12	37	Slovakia
35	KMS(Kia Motors Slovakia)	Zilina Top2 Line	2006. 12	37	Slovakia
36	Kia Motor Company	Hwaseong #3 Top3	2006. 12	35	
37	GM Daewoo Motor Company	Changwon Primer Line	2006. 10	59	
38	Hyundai Motor Company	Ulsan #1 Repair Line	2007. 01	20	
39	Hyundai Assan	Haos Topcoat Line	2007. 02	30	Turkey
40	DYKMC	YANCHENG #2 Top	2007.12	40	China
41	DYKMC	YANCHENG #2 Primer	2007. 12	36	China
42	Hyundai Motor Company	Ulsan #5 Top Line	2007. 12	36	
43	Hyundai Motor Company	Ulsan #5 Primer Line	2007. 12	32	
44	GW(Baoding Great Wall Motor)	Baoding Top Line	2008.01	31	China
45	Ssangyong Motor Company	#2 Primer Line	2008.02	32	
46	Ssangyong Motor Company	#2 Top Line	2008. 02	28	
47	BHMC(Beijing Hyundai Motor)	Beijing #2 PLAN Top1 Line	2008.03	27	China

NO	Company	Factory	Date	UPH	Remarks
48	BHMC(Beijing Hyundai Motor)	Beijing #2 PLAN Top2 Line	2008.03	27	China
49	BHMC(Beijing Hyundai Motor)	Beijing #2 PLAN Primer Line	2008.03	48	China
50	Kia Motor Company	Hwasung#2 Primer	2008.05	100	
51	Hyundai Motor Company	Ulsan #4 Primer Line	2008.08	30	
52	Hyundai Motor Company	Ulsan #4 Top2 Line	2008.09	34	
53	Hyundai Motor Company	Ulsan #4 Top1 Line	2008.09	15	
54	HMMC(Hyundai Motor Czech)	Ostrava Nosovice Primer Line	2008. 11	53	Czech
55	HMMC(Hyundai Motor Czech)	Ostrava Nosovice Top1 Line	2008. 11	29	Czech
56	HMMC(Hyundai Motor Czech)	Ostrava Nosovice Top2 Line	2008. 11	29	Czech
57	GEELY(LINHAI) Automotive	Top Line	2008. 11	20	China
58	Donghee Auto	Top 2 Line	2009. 02	32	
59	GEELY(NINGBO) Automotive	Top Line	2009. 09	20	China
60	DERWAYS Automotive	Primer	2010. 03	1.62	Russia
61	DYKMC(Dongfeng Yueda Kia Motor)	YANCHENG #2 Top 2	2010. 03	40	China
62	JINAN GEELY AUTOMOBEL CO.,LTD	Top Line	2010. 05	20	China
63	Hyundai Motor Company	Ulsan #3 Top 1Line	2010. 08	38.5	
64	Hyundai Motor Company	Ulsan #3 Top 2Line	2010. 08	38.5	
65	HMMR(Hyundai Motor Manufacturing Russia)	Saint Petersburg Primer Line	2010. 10	35	Russia
66	HMMR(Hyundai Motor Manufacturing Russia)	Saint Petersburg Top Line	2010. 10	38	Russia
67	Kia Motor Company	Sohari CARNIVAL#2 Primer	2010. 10	33	
68	Kia Motor Company	Sohari CARNIVAL#1 Primer	2010. 10	31	
69	Hyundai Motor Company	Ulsan #1 Primer Line	2010. 11	81	
70	CHENGDU GEELY AUTOMOBILE CO.,LTD	Top Line	2010. 11	20	China
71	CIXI GEELY AUTOMOBILE CO.,LTD	Top Line	2011.04	20	China
72	Hyundai Motor Company	Asan Primer Line	2011.07	72	

NO	Company	Factory	Date	UPH	Remarks
73	Great Wall Motor Holding Co.,LTD	Tianjin #4 Top 1Line	2011.08	26	China
74	Great Wall Motor Holding Co.,LTD	Tianjin #4 Top 2Line	2011.08	26	China
75	Hyundai Motor Company	Ulsan #1 TOP2 Line	2011.08	45	
76	Kia Motor Company	Sohari CARNIVAL#2 TOP	2011.09	33	
77	DF HONDA	Top Line	2012. 05	36.8	China
78	GMUZ	Top1 Line	2012. 02	42	Uzbekistan
79	GMUZ	Top2 Line	2012. 02	42	Uzbekistan
80	GMUZ	Primer Line	2012. 02	42	Uzbekistan
81	Kia Motor Company	Sohari #2 TOP1 Line	2012.05	30	
82	Kia Motor Company	Sohari #2 TOP1 Line	2012.05	30	
83	TAIZHOU GEELY AUTOMOBILE CO.,LTD	Top Line	2012.06	20	China
84	Great Wall Motor Holding Co.,LTD	Tianjin #5 Top 1Line	2012.08	30	China
85	Great Wall Motor Holding Co.,LTD	Tianjin #5 Top 2Line	2012.08	30	China
86	HMI(Hyundai Motor India)	HMI #1 TOP1 Line	2012.08	36	India
87	HMI(Hyundai Motor India)	HMI #1 TOP2 Line	2012.08	36	India
88	Kia Motor Company	Sohari CARNIVAL#1 TOP	2012.08	26	
89	Donghee Auto	Top 1 Line	2012. 10	36	
90	XIANGTANG GEELY AUTOMOBILE CO.,LTD	Top Line	2012. 10	20	China
91	Kia Motor Company	Gwangju #2 Top Line	2013.02	30	
92	Great Wall Motor Holding Co.,LTD	Baoding #6 Top 1Line	2013.04	26	China
93	Great Wall Motor Holding Co.,LTD	Baoding #6 Top 2Line	2013.04	26	China
94	HMI(Hyundai Motor India)	HMI #1 Primer Line	2013.08	60	India
95	Hyundai Motor Company	Ulsan #3 TOP4 Line	2013.08	30	
96	Hyundai Motor Company	Ulsan #2 TOP1 Line	2013.08	39	
97	Hyundai Motor Company	Ulsan #2 TOP2 Line	2013.08	39	

NO	Company	Factory	Date	UPH	Remarks
98	Hyundai Assan	Haos Primer Line	2013.09	30	Turkey
99	DYKMC(Dongfeng Yueda Kia Motor)	YANCHENG #3 Primer 1 Line	2013.10	36	China
100	DYKMC(Dongfeng Yueda Kia Motor)	YANCHENG #3 Primer 2 Line	2013.10	36	China
101	DYKMC(Dongfeng Yueda Kia Motor)	YANCHENG #3 Top 1 Line	2013.10	40	China
102	DYKMC(Dongfeng Yueda Kia Motor)	YANCHENG #3 Top 2 Line	2013.10	40	China
103	DYKMC(Dongfeng Yueda Kia Motor)	YANCHENG #1 Topcoat Line	2013.10	45	China
104	Kia Motor Company	Gwangju #1 Top 2 Line	2013. 11	10	
105	Shanghi FANUC	Changan Suzuki	2013. 11	30	China
106	Hyundai Motor Company	Ulsan #3 Primer2 Line	2013. 11	30	
107	Mazda	Mexico Top Line	2013. 12	37	Mexico
108	Ruima automobil Co.,LTD	Jiangsu Top Line	~ing	20	China
109	BHMC(Beijing Hyundai Motor)	Beijing#1 Primer Line	2014.01	72	China
110	Tianjin Hawtai automobil Co.,LTD	Tianjin Top Line	2015.06	20	China
111	GM Motor Company	Bupyeong #2 Primer Line	2014.08	45	
112	Hyundai Motor Company	Ulsan #3 Primer Line	2014.08	70	
113	KMM(Kia Mexico Motors)	Mexico Top 1 Line	2015.11	40	Mexico
114	KMM(Kia Mexico Motors)	Mexico Top 2 Line,	2015.11	40	Mexico
115	Kia Motor Company	Hwasung#3 Top 1 Line	2015.07	32	
116	DYKMC(Dongfeng Yueda Kia Motor)	YANCHENG #3 Top 3 Line	2015.10	40	China
117	Changan	Chongqing Top 1 Line	~ing	36	China
118	Changan	Chongqing Top 2 Line	~ing	36	China
119	BHMC(Beijing Hyundai Motor)	ChangZhou #4 Top 1 Line	~ing	40	China
120	BHMC(Beijing Hyundai Motor)	ChangZhou #4 Top 2 Line	~ing	40	China
121	BHMC(Beijing Hyundai Motor)	ChangZhou #4 Primer Line	~ing	72	China
122	Hyundai Motor Company	Ulsan #1 Primer Line	~ing	45	

3. Company Information

- Commercial Registered ID: 133-81-23087
- Company Name: Darwon Industry Co., Ltd.
- Tel: +82-31-354-9400 / Fax: +82-31-354-4123
- Home Page URL: <u>www.darwon.co.kr</u>
- President: Changho Choi (<u>chchoi@darwon.co.kr</u>)
- Category of Business: Manufacturing Industry



- Address : 33-12 Changgok-ri Paltan-myeon Hwaseong-si Gyeonggi-do Korea
- Employee: 48

- The Day of Foundation: August 1st in 1987
- The Capital of Foundation: 1.2 billion Won





- Wiping Machine (Tack-off Machine, EMU Machine)
- Automatic Painting System
- Switch-gear Panel

♦ ENCLOSURE





Major Contact Point

	Name	E-mail	Phone
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Technical Dept.	Changwoo Yang	yang@darwon.co.kr	+82-10-7441-4237
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6. Tack off Mechanism

1.Purpose

Darwon

To obtain quality painting of exterior surface of a vehicle body, dust, dirt and sanding particles must be removed form the body surface just prior to painting these surfaces.

2. Principal

It rejects the dusts on the surface of body by rotating ostrich feather roll on it, which draws out through the exhaustion chamber of girder after it is sucked.



Major Factor For Quality

- 1. Teaching Data
- 2. Wiping Brush
- 3. Ionizer Bar
- 4. Exhaust Air Speed
- 5. Booth Humidity
- 6. Cleaning

Darwon 7. System Specification

1) Introduction

This documentation is the specification of Darwon Auto Wiping System that will be applied to the preparing work zone at the Paint Shop of Auto Mobile factory, for the purpose of improving the quality dramatically by eliminating dusts on the surface of the body.

Darwon Auto Wiping System is composed of two functional parts that are Auto Wiping System and Air Blow Unit as below.

2) Contents of Quotation

2-1.	Roof Machine	:1Set
2-2.	Side Machine	:4Set
2-3.	Air blower Machine	:1Set
2-4.	Electric control Panel	:1Set
2-5.	Operation desk & computer	:1Set
2-6.	Pneumatic control Panel	:1Set

- 2-7. Installation of Machine & Panel
- 2-8. Duct Construction for Exhaust system
- 2-9. Software (PLC & HMI)
- 2-10. Additional work for the 2nd Utilities
- Electric : Terminal connection of main control panel.
- Pneumatic : Air manifold connection of pneumatic control panel.

3) Basic Considerations

- 3-1. Booth size (Preparing zone): User spec.
- 3-2. Conveyor speed: User spec., especially Conveyor Speed should be constant when using Darwon Auto Wiping System.
- 3-3. the total number of Body types: Basic 20 Types (standard)
 - Body size: User spec.



- 3-4. Utilities
- Electric: supplied by buyer
- Air: max 5.5kg/cm²
- Humidity: 70~80%

4) Mechanical Specifications

- 4-1. Roof Wiping Machine: 1 Set
- 4-1-1. Up/Down Driving and Control
- 1) Motor: Geared Motor (D2G4, 1.5kW or 2.2KW)
- 2)Up/Down Control: controlled by using Inverter for affording efficiently to change up/down speed and position control with the potential meter base on the body types.
- 3)Up/down position datum of each white bodies are adjusted and saved to PLC via HMI program.
- 4)Up/Down Speed: 15m/min, Up/Down Stroke: 2105mm
- 4-1-2. Swivel Driving and Control
- 1) Driving-Motor: Geared Motor (D2G4, 0.55kW or 0.75KW)
- 2) Transfer Method for driving: Timing Belt and Timing Pulley
- 3)Swivel Control: same as up/down control.
- 4)Swivel Motion: ±74°,
- 5)Swivel Speed (Max.): 45°/sec
- 4-1-3. Feather Roll Rotation and Control
- 1)Feather: Ostrich Feather (roller diameters; Ø900, Ø800, Ø700) disk
- 2) Driving: by V-belt and pulley in using Geared Motor(D2G4, 0.25kW)
- 3)Control: by Inverter.
- 4)Rotation Speed (Max.): 41 rpm



4-1-4. Suction Device

Function: to exhaust easily the gathered dust by feather roller for cleaning.
Configuration: Shroud – 1 Set, Ionizing Bar – 1 Set, Air blow with Nozzle–1 Set

4-1-5. Anti-Collision Unit

It is composed of Steel Disk, Air Mechanical valve, Wire Rope, and Pressure Switch at the both side of feather disk. If car body touches the wire rope connected in mechanical valve, air valve connected at air pressure switch cuts off supplying air.

At once, pressure switch is acknowledged this status and protects the collision car body with machine. Besides, installed parallel photo sensor to protect collision, the stability on anti-collision is higher.

- 4-2. Side Wiping System : Total 4 Sets
- 4-2-1. Position Driving and Control
- 1) Function: to maintain to be constant distance between car body and machine.
- 2) Driving : positioned from transferring to guide (roller and LM guide) though the ball screw and nut to drive Geared Motor (D2G4, 0.55kW).
- 3) Position Control: by Inverter.
- 4) Position Sensing: by potential meter
- 5) Position Speed: 3.3m/min
- 4-2-2. Tilting Driving and Control
- 1)Function: to maintain to be parallel status between car body and feather roller.
- 2) Driving : to transfer the rotation of Geared Motor(D2G4,0.55kW)
 - to vertical moving by Rack-jack
- 3) Position Control: by Inverter.
- 4) Position Sensing: by potential meter
- 5) Tilting Speed: 4°/sec



- 4-2-3. Roller Rotation and Control
- 1) Function: to clear absorbing the dust particles on the surface (side) of car body.
- 2) Driving: to rotate the roller shaft by Geared Motor (D2G4, 0.25kW)
- 3) Rotation Control (max.): 45 rpm
- 4-2-4. Suction Device
- 1) Function: to exhaust easily the gathered dust by feather roller for cleaning.
- 2) Configuration: Shroud 1 Set, Ionizing Bar Unit 1 Set

4-2-5. Anti-Collision Unit

If car body presses the rubber pad attached in cover of side M/C, the pressure in the rubber is changed.

At once, pressure switch is acknowledged this status and sends the signal to PLC. The collision of car body with machine is protected.

4-3. Roof & Side Ionizing Air Blow Machine: Total 1 Sets

- 4-3-1. Roof Ionizing Machine
- Ionizing Bar with Power Unit 1 Set
- Up-Down Driving and Control
- 1) Motor: Geared Motor (D2G4, 0.37kW)
- 2) Up-Down Control: controlled by using Inverter for affording efficiently to change up/down speed and controlled by sensing starting or stop point from the potential meter according to the kinds of car body
- 3) Up/down points according to car body are pre-inputted to and memorized in PLC. These pre-inputted program in PLC. Also, these data can be determined on trial or on demand and can be changeable by what want to be positioned.
- 4) Up/Down Speed: 21.1m/min



5) Anti-Collision Unit & Control

When the de-ionizing bar approaches too close to the car body, the counter value of sensor is compared with pre-inputted data on the type of car body and the emergency occurs. At this emergency, according to programmed data, rising with high speed prevent the ionizing bar from collision with the car body.

- 4-3-2. Side Ionizing Air Blow Device (Fixed Type)
- Ionizing Bar with Power Unit- 4 Set (Side LH 2 Set, RH 2 Set)

4-4. Pneumatic Panel

- Pneumatic operation is performed such as: Ionizing Air Blow On-Off, Air Regulation, etc.
- Each pneumatic device is used such as: FESTO, SMC, equivalent products, etc.

5) Selection of the Type of Car Body

As the car body enters into the Type Identification Zone according to Conveyor, the type of the car body is confirmed from the signal in the photo sensor or manual type selection panel.

6) Operation of Auto Wiping System

As the car body enters into the zone of the Auto Wiping System according to Conveyor, photo sensor in front of Auto Wiping System confirms the entrance and the type of the car body. Wiping program receive the datum from file according to the acknowledged type and starts the scheduled operation.

This program makes Auto Wiping System to start wiping by the information that is pre-inputted according to each type of the car body such as: Machine Start Point, Feather Roller On-Off, etc.

When the Roof & Side Ionizing M/C stated, it makes the high voltage power of de-ionization to be on and then off automatically after passing by counter (body passing time).



7) Electrical Specifications

7-1. All electrical units that are used in booth working area and inside booth are the type of intrinsic safety and flameproof enclosure.

7-2. PLC: User spec.

7-3. Control Panel

Control panel is installed outside booth in which is installed Auto Wiping System and ionizing air blow unit. In this panel, units to display all kinds of control, instruction, and operating status as below are installed.

- Main-monitoring subjects

Control System "ON" Indication and Push Button /Control System "OFF"

- Conveyor "ON" Indication and Push Button / Conveyor "OFF"
- Machine Operating Status
- Pre-selection Indication Lamp
- Type Selection Indication & Push Button
- Reset, Lamp Test

7-4. Operation Desk

This panel includes inside personal computer to monitor the system. Program to operate the system is FIX Program. And in this panel can be performed by virtual operating of Machine, manual operating and the status of currently progressing car body, and the distance of Conveyor speed, the monitoring of Machine, input and printing of data, all over the system.

7-5. Interlocking Device

This device interlocks the fire-fighting apparatus and conveyor, exhausting system of booth. In case of stopping of conveyor, halting the exhaustion of booth, auto wiping machine will stop automatically.

In case of stopping of auto wiping machine, conveyor also stops and the flowing of the Line stops



8) Others

- 8-1. Excluding in this estimate about the construction of the 1st electricity and compressed air piping work.
- 8-2. Testing car body to set the M/C is supplied by buyer.
- 8-3. Excluding in this estimate about Adaptable Booth Construction.





- Roof Machine









- Air Blower Machine





- Stroke







9. WIPING M/C UTILITY

1. Electric Power Consumption 1) Motor

Description	Quantity	Moter Capacity (KW)	Inverter Capacity (KW)	Inverter Capacity (KW)
ROOF UP/DOWN MOTOR	1SET	1.5	2.2	2.2
ROOF SWIVEL MOTOR	1SET	0.55	0.75	0.75
ROOF ROTATION MOTOR	1SET	0.25	0.4	0.4
SIDE POSITION MOTOR	4SET	0.55	0.75	3
SIDE TILTING MOTOR	4SET	0.55	0.75	3
SIDE ROTATION MOTOR	4SET	0.25	0.4	1.6
AIR BLOWER UP/DOWN MOTOR	1SET	0.37	0.4	0.4
TOTAL				11.35

 \therefore 11.35KW \div COSØ = 14.1875KVA (COSØ = 0.8)

2) Control Panel : 2KVA

∴ 1) + 2) = 16.1875KVA x 1.2 ≒ **19.4KVA** (Rest 20%)

2. Air Consumption

Air Nozzle : 88EA 88 x $0.123 \text{ m}^{\circ}/\text{min} = 10.824 \text{ m}^{\circ}/\text{min} -- 1$ (for 2bar) Control Air : 1 $\text{m}^{\circ}/\text{min} -- 2$ $\therefore 1 + 2 = 11.824 \text{ m}^{\circ}/\text{min} \times 1.2 = 14 \text{ m}^{\circ}/\text{min}$ (Rest 20%)



3. Diameter of Air Pipe : at input 1 $\frac{1}{2}$ " Ball Valve - at output 1 $\frac{1}{2}$ "

4. Exhaust Air Quantity

 $\mathbf{Q} = \mathbf{A} \times \mathbf{V}$

Q: Exhaust Air (m/min)

A : Sectional Area of Exhaust Manifold(m^{*})

V: Exhaust Air Velocity (m/min)

Optimal Exhaust Air Velocity 20m/sec)

1) For Roof M/C

A = 20mm X 1812 mm x 10-6 = 0.036m² V = 20m/sec X 60sec/min = 1200m/min ∴ Q = 0.036 x 1200 = 43.2 m²/min

2) For Side M/C

A = 20mm X 1120 mm x 10-6 = 0.0224 m² V = 20m/sec X 60sec/min = 1200m/min ∴ Q = 0.0224 x 1200 = 26.88 m²/min x 4 SET = 107.52 m²/min ∴ 1) + 2) = 150.72 m²/min





BOOTH INSIDE TYPE







BOOTH OUTSIDE TYPE



































11. CERTIFICATION

		7 <i>R</i>	ORD		
	Regist K	rier-Nr./ Ro 1216/	gistered No.: M05		
	Machiner amended by	ry-Dire the Di	ctive <mark>98/37/E</mark> 0 rective 98/79/	C EC	
verenze of applicant Date of episitienton 10.08.2005	File reference 82-05-P-19	g	Test report No. K2233/M05	Cate of issue 07.10.2005	Ravision D
his is to certify that the follo rentioned European Directi	owing products over and the follo	comply to wing stan	the essential requ dard(s):	i <mark>rements</mark> (Annex 1) of	the above
ertificateholder:	DARWON (33-12, Char	CO., LTE ngog-ri, l). Paltan-myun, G	yeonggi-do 445-9	13, Korea
lanufacturer:	Same as ab	ove			
roduct:	Auto Wiping	g Machir	ie		
ype designation(s):	DW-AWM1				
tandard(s):	EN ISO 121 EN 60204-1	00-2:20	03	1888	
his Certificate of Conformi sessment of the productio 7 TOV NORD, he holder of this certificat	ty is based on th in, and it does n e may use this	te evaluat ot permit Certificat	ion of samples of the use of a mark e together with hi	the product. It does no of conformity or of a s s EC-Declaration of (ot imply an afety mark Conformity.
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	TU	VN	ORD		
	Re	gistrier-Nr./Registrier-Nr./R	stered No.: E05		
Electro	magnetic C amended	Compatibili by the Dire	ty Directive 89 ctive 93/68/EE	/336/EEC C	
eterence of applicant Date of 10.05	equivation 2005	File references 82+05-P-200	Test report No. K2234/ED5	Data of losse 07.10.2005	Annakan. O
his is to certify that the fine following standard(s):	ollowing produ	ct complies wit	th the above mentio	ned European Dir	ectives and
Certificateholder:	DARWO 33-12, Cl	N CO., LTD. nangog-ri, P	altan-myun, Gye	onggi-do 445-9	13, Korea
Manufacturer:	Same as	above			
Product:	Auto Wip	ing Machine			
Type designation(s)	DW-AWN	41			
Standard(s):	EN 6100 EN 6100	0-6-2:2001 0-6-4:2001			
This Certificate of Conforr issessment of the produc of TOV NORD. The holder of this certific	nity is based o tion, and it doe ate may use t	n the evaluatio s not permit th his Certificate	n of samples of the e use of a mark of together with his E	product. It does n conformity or of a C-Declaration of	iot imply an safety mark Conformity.
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12. Press Release

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도장품질 1등 공신 '타조 깃털'

이일수 현대자동차 홍보팀 차장 🗐 기자의 다른 기사보기 입력 : 2008.02.19 23:24

긴 목과 우람한 체격을 자랑하는 타조(駝島)는 현존하는 가장 큰 조류다. 그러나 2m가 넘는 키에 몸무 게가 150-180kg에 이를 만큼 덩치가 커서 하늘로 날지 못하고 껑충껑충 '뛰어다니는 새'다. 알도 만 만찮다. 한 개 무게가 1.6kg이나 되고 껍질도 두꺼워 장식용품으로 널리 이용된다. 그래서 타조는 버 릴 게 없다고 한다.

그런데 이 타조가 자동차의 도장(塗裝) 품질을 지키는 1등 공신이다. 각종 첨단 장비들이 즐비한 곳이 자동차 공장이지만, 눈에도 잘 보이지 않는 미세한 면지를 완벽하게 털어내 제거하는 데는 타조의 깃 털만한 것이 없기 때문이다.

자동차 공정에서 편편한 철판이 프레스를 거치면 부위별 차체의 기본 형태를 갖추게 되고, 용접공정을 거쳐 자동차 모양(차체)이 완설된다. 하지만 아직은 표면이 거친 상태여서 말끔한 도장을 입히기 위해 기름기 등 여러 이물질을 깨끗이 씻어내야 한다. 마치 여성들이 화장이 잘 먹히게 얼굴을 정성껏 씻는 것과 같은 원리다.



▲ 타조털로 만든 와이핑머신이 완설된 차체에서 미세한 먼지들을 털어내고 있다. 와 이핑 공정을 마친 차체는 도장공정에서 색을 입히게 된다.

타조떨이 위력을 발휘하는 것은 바로 이 때다. 타조의 부드러운 깃털이 도장품질을 방해하는 미세한 먼지까지 확실히 제거해 준다. 수많은 깃털로 만든 일명 '태조텔 와이핑 머신'은 일반 주류소에 있는 세차장비와 비슷한 모양을 하고 있다. 다른 점이 있다면, 주류소 세차장비는 세제와 물을 이용하지만, 이 장비는 털 자체가 세제와 물의 역할을 하는 것이다.

혼한 오리나 닭 대신 구하기 힘든 타조의 깃털을 쓰는 이유는 털이 크기 때문이다. 닭이나 오리 등의 깃털은 덩치가 큰 자동차의 먼지 제거용으로 적용하기가 어렵다. 현대자동차의 경우 울산, 아산, 전주 공장의 도장작입장에 '타조털 의이핑 머신'이 설치돼 있다. 1997년부터 본격 설치한 이 장비는 한 대 가격이 4억원을 웃돈다. 파거에는 손작업으로 일일이 먼지를 털었으나, 이 장비를 설치한 뒤부터는 생 산설이 크게 올라갔다. 물론, 도장 불량률도 획기적으로 낮아졌다.

날개가 있어도 날지 못하는 타조의 슬픔이 자동차 메이커에게는 오히려 매끈한 자동차를 뽑아낼 수 있 는 고마운 일이 되었다.