

**REPORT OF THE EVALUATION OF THE
PAINT TRANSFER EFFICIENCY
OF THE ANEST IWATA W200 SUCTION
AND PRESSURE FED SPRAY GUN
CARRIED OUT BY THE
MOTOR INSURANCE REPAIR
RESEARCH CENTRE,
THATCHAM TRAINING
AT THE REQUEST OF THE
ANEST IWATA CORPORATION**

7th July 1998

OBJECTIVE

To confirm that the Anest Iwata W200 Suction and Pressure Fed Spray Guns can achieve a paint transfer efficiency (weight) of greater than 65% based on the ASTM D5286-95 test methods for testing transfer efficiency.

METHOD

Paint materials used for evaluation of the spray guns were 2K HS primer, 2K HS direct gloss, water based base coat and 2K HS lacquer onto aluminium foil and painted steel substrates simulating a refinish process.

It was decided to spray panels in an upright and horizontal position in a conventional down draft spray booth keeping the spray within the area of the foil/panel (see Appendix A3).

The transfer efficiency was assessed with various fluid nozzle sizes, and spraying techniques. Appendix B1 details the variables assessed together with the number of samples prepared at each variable.

All aluminium foils were given one coat of paint, the number of gun passes per panel detailed in the result sheets. Appendix B5.

The steel panels were prepared with the normal substrate for the particular paint being sprayed, the paint being sprayed as in a refinish operation. For details of number of gun passes and number of coats applied see result sheets. Appendix B5.

Before evaluation began, paint fluid flow, viscosity and solids of the paint were measured (see Appendix B2).

Foils were pre-weighed and then re-weighed after coating and stoving to give 'dry-up' materials. The spray gun was weighed before and after the paint application to determine 'wet spray material'. A wire was attached to the gun to maintain the correct spraying distance. Each aluminium foil was secured to a steel backing panel and placed on the spraying jig for spraying. After spraying, the foils were placed into a further spray booth on a steel backing panel for stoving.

Steel panels after preparation (see Appendix B3) were pre-weighed and then re-weighed after coating and stoving to give 'dry-up' material. The spray gun was weighed before and after the paint application to determine 'wet spray material'. A wire was attached to the gun to maintain the correct spraying distance. Each panel was placed on the spraying jig for spraying. After spraying the panels were placed in a further spray booth for stoving.

RESULTS

See Appendix B5 for recorded results and calculations

Appendix A1 summaries the results

CONCLUSION

The Anest Iwata W200 Suction and Pressure Fed Spray gun complies with the requirements of the Environmental Protection Act 1990 Part 1 – 1997 Revision as detailed in PG6/34 (97), PG6/23 (97), PG6/40 (94) and PG6/41 (94) when used as detailed in this report achieving a Transfer efficiency (weight) of greater than 65%.

LIST OF APPENDICES

- A1 Summary of Results T.E.
- A2 Transfer Efficiency (T.E.) Calculations – see previous report
- A3
- a) Position of Panels in Spray Booth
 - b) Foil Test Sample - Size and Area Sprayed
 - c) Steel Panel Test Sample – Size and Area Sprayed



- B1 Variables assessed and Panel Numbers
- B2 Method for Material Solids
Viscosity
Paint Fluid Flow
- B3 Preparation of Steels for T.E.
- B4 Spraying and Stoving of Test Samples
- B5
- | | |
|----------------|-----------------------|
| Result Sheet 1 | 2K Primer |
| Result Sheet 2 | Direct Gloss 2K HS |
| Result Sheet 3 | Water Based Base Coat |
| Result Sheet 4 | Clear Lacquer 2K HS |

APPENDIX A1

SUMMARY OF RESULTS T.E.

PANEL	FOIL/PANEL POSITION	SUCTION GUN		PRESSURE FED GUN
		BRITISH POT	EUROPEAN POT	
Primer Foil	Upright	93.1	-	96.2
	Horizontal	91.5	-	91.4
Primer Steel	Upright	95.2		93.2
Direct Gloss Foil	Upright	81.1	-	87.8
	Horizontal	78.9	-	85.9
Direct Gloss Steel	Upright	77.8		84.5
Base Coat Foil	Upright	78.9	79.6	87.7
	Horizontal	85.8	81.0	85.8
Base Coat Steel	Upright	73.8	83.7	82.3
Clear Lacquer Foil	Upright	68.2	-	79.4
	Horizontal	69.6	-	79.7
Clear Lacquer Steel	Upright	77.4		73.5

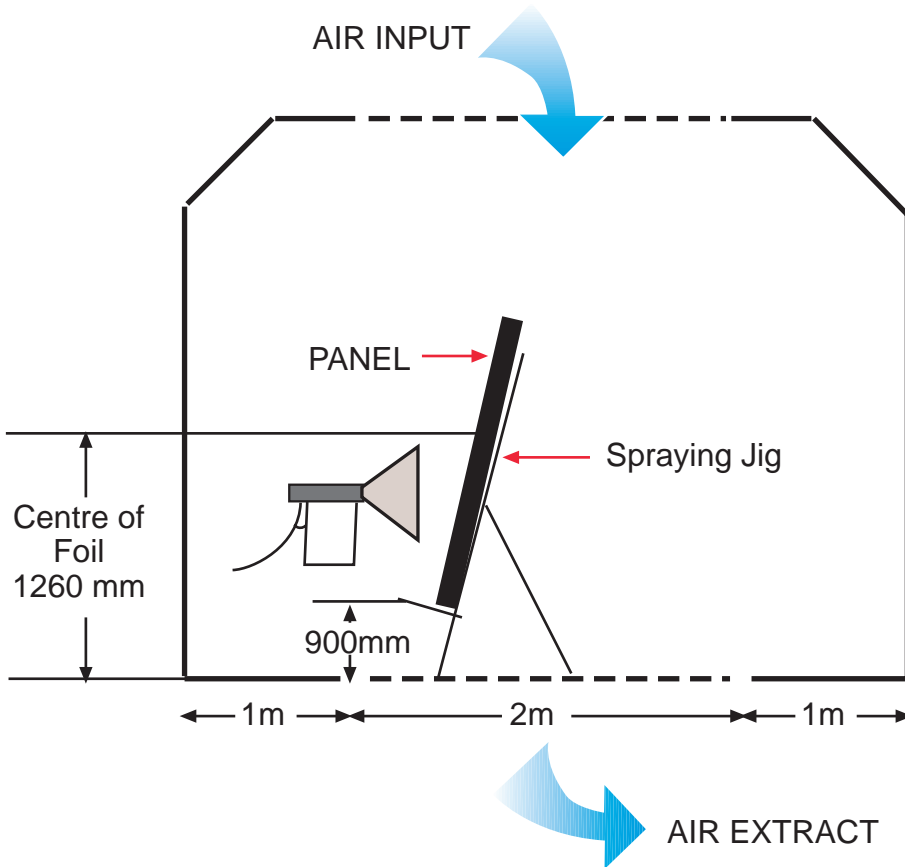
APPENDIX A2

TRANSFER EFFICIENCY (T.E) CALCULATIONS (WEIGHT)

1. Weight of Foil/Steel panel
2. Weight of Foil/Steel panel + 'Dry-up'
3. $(2-1) =$ Weight of 'Dry-up'
4. Wet Spray Material
i.e. Gun weighed before and after application - weight difference.
5. Spray Solid = $(4 \times \text{Av. Mat. Solids})$
6. $\text{T.E. (weight)} = (3 \div 5) \times 100\%$

APPENDIX A3

a) POSITION OF TEST PANELS IN SPRAY BOOTH

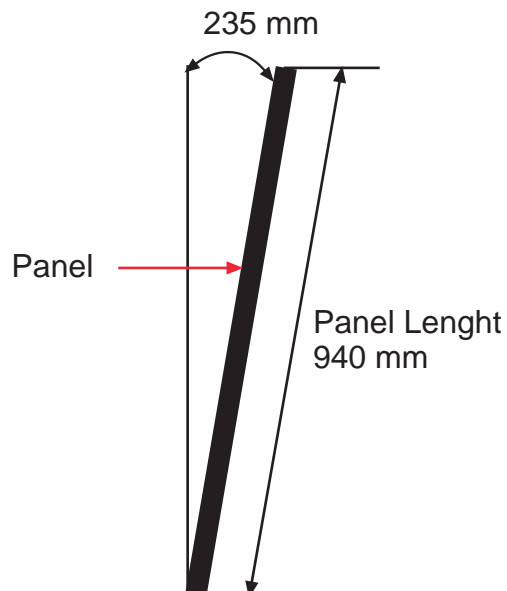


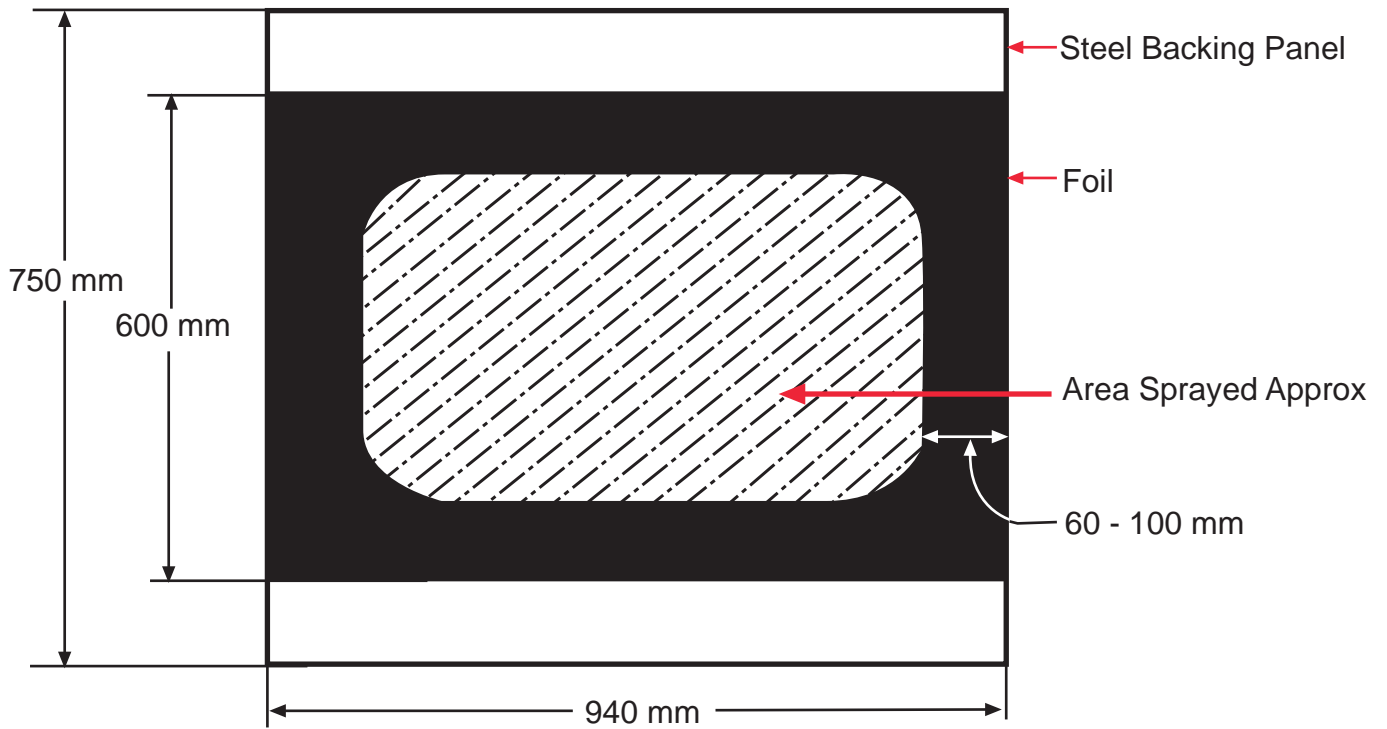
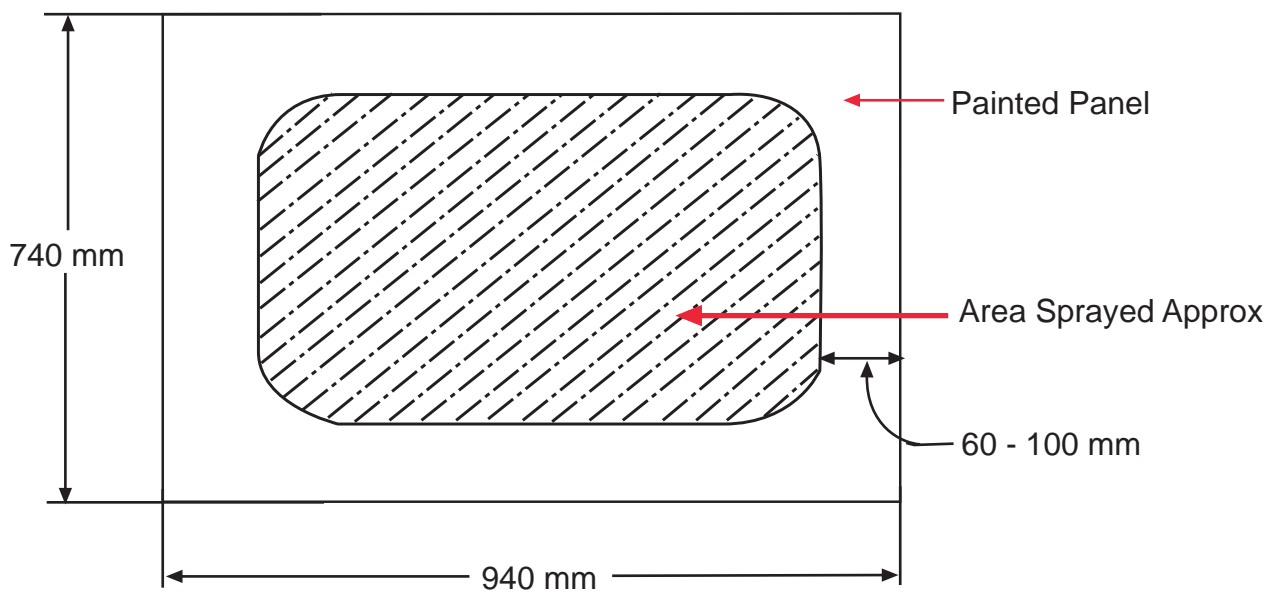
SPRAYBOOTH DETAILS

Volume	70 m ³
Height	2.5 m
Width	4 m

Down draft air movement
 Velocity of Air } 0.35 m/sec
 Over Test Panel } Downward
 Air changes/min 6 ¹/₂

PANEL IN UPRIGHT POSITION



APPENDIX A3 contd.**b) FOIL TEST SAMPLE - SIZE AND AREA SPRAYED****c) STEEL PANEL TEST SAMPLE - SIZE AND AREA SPRAYED**

VARIABLES ASSESSED AND PANEL NUMBERS

ALUMINIUM FOIL

Spray Product	Gun		Foil Position	Number of Foils
	Suction	Pressure Fed		
1) 2K HS Primer	W200 2.0mm British Pot	W200 1.2mm	Upright Horizontal	Three One
2) 2K HS Direct Gloss	W200 1.8mm British Pot	W200 1.2mm	Upright Horizontal	Three One
3) Water Based Base Coat	W200 1.5mm British Pot & European Pot	W200 1.2mm	Upright Horizontal	Three One
4) 2K HS Clear Lacquer	W200 1.5mm British Pot	W200 1.2mm	Upright Horizontal	Three One

STEEL PANELS

Spray Product	Substrate	Gun		Panel Position	Number of Panels
		Suction	Pressure Fed		
1) 2K HS Primer	Etch Primer	W200 2.0mm British Pot	W200 1.2mm	Upright	Two
2) 2K HS Direct Gloss	Etch Primer + 2K HS Primer	W200 1.8mm British Pot	W200 1.2mm	Upright	Two
3) Water Based Base Coat	Etch Primer +2K HS Primer	W200 1.5mm British & European Pot	W200 1.2mm	Upright	Two
4) 2K HS Clear Lacquer	Etch Primer +2K HS Primer + Water Based Base Coat	W200 1.5mm	W200 1.2mm	Upright	Two

APPENDIX B2

MATERIAL SOLIDS

Paint was weighed into a pre-weighed aluminium foil dish (approx. size 215mm x 215m). By tipping the dish the paint was allowed to run and cover the bottom. After stoving at 130°C for 120 minutes (see Result Sheet 3, Appendix B5 for details of base coat stoving), the dishes were allowed to cool and re-weighed.

Calculation:

1. Aluminium dish weight
2. Wet material weight
3. 'Dry-up' material & dish weight
4. 'Dry up' weight = (3 - 1)
5. Material solids = (4 ÷ 2)

Note

All paint was mixed by weight using the s.g of each material. This was considered a more accurate way of mixing than by volume.

VISCOSITY

The viscosity was tested using a DIN 4 Cup

PAINT FLUID FLOW THROUGH THE GUN

After setting up the gun, it was weighed, the paint sprayed for 20 seconds in the booth and the gun re-weighed. Weight difference gave paint fluid flow for 20 seconds (S)

APPENDIX B3

PREPARATION OF STEEL PANELS FOR T.E. - EVALUATION AS PER REFINISH PROCESS

Mild steel flat sheet 1mm thick 740mm x 940mm.

1. Both sides cleaned using scotchbrite grey and solvent wipe
Then Cleaned twice again
2. One side spray coated with Standox 1K full primer thinned 50% with
1K thinner - 2 coats applied with 10 minute flash off between coats.

Flash off at 20°C for 20 minutes

Stoved at 70°C for 40 minutes

These panels used for 2K HS Primer T.E. evaluation after grey
scotchbrite and tack cloth.

3. For base coat and direct gloss, one coat of Standox 1K full primer
applied, flashed off at 20°C for 20 minutes.
2 coats of Standox 2K HS Fuller thinned 4:1 with Fuller hardener
applied using W200 Gun 1.8mm fluid tip, flash off between coats at
20°C for 10 minutes, and stoved at 65°C for 40 minutes.
P500 dry flat and spirit wiped, tack wiped prior to applying base coat or
direct gloss for T.E.
4. For Lacquer T.E. evaluation the panels sprayed for base coat T.E.
evaluation were grey scotched fully coated with base coat, two coats
applied with drying in between, and stoved at 70°C for 40 minutes.
After grey scotch and tack wipe, lacquer applied for T.E.

APPENDIX B4

SPRAYING AND STOVING OF TEST SAMPLES

All foils and steel panels were placed onto the panel spray jig inside the spray booth in an upright position. Foils sprayed horizontally were placed on a steel sheet panel and laid on a table 710mm above the spray booth floor. All panels/foils were sprayed keeping the sprayed material within the area of the panels/foils (See Appendix A3 for details).

Foils were sprayed with one coat of paint, the number of gun passes being 3 to 4 (see test result sheet for exact number of passes) using a slow spraying speed.

The steel painted panels were sprayed as per data sheet instructions on the use of the particular paint product to give an acceptable finish.

2K HS Primer - two coats applied with 5 minutes flash off between coats

2K HS Direct Gloss - half a coat followed directly by one full coat

Waterbased Base Coat - two coats with drying in between coats

2K HS Clear Lacquer - half a coat followed directly by one full coat

In order to maintain the correct spraying distance from the panels, a wire was attached to the spray gun handle extending to the side of the gun, then forward for the correct distance, towards the panel. When spraying the tip of the wire was kept just above the panel surface. The wire did not interfere with the spray pattern.

Air pressure at the inlet to the gun and pot was continually monitored and maintained at the stated figures in Appendix B5.

After spraying, the panels/foils were placed in a further booth for stoving at the relevant schedules (See Appendix B5 Result Sheets).

For the steel panels, a control panel having the same substrate as the panels being painted was stoved at the same time to determine any weight loss due to the substrate.

SUCTION GUN

APPENDIX B5

RESULT SHEET 1

Date: 5.3.1998

- 1. Materials: Standox 2K HS Primer
 Viscosity: 34S DIN 4 18°C
 Spray Temp. 20°C
 Spray Humidity 35% RH
 Mix Ratio 4:1 (Mixed by wt. 6.24g Primer: 0.96g Hardener)

Stoving Schedule: -Foil 70°C for 90 minutes
 - Steel -----"-----
 Solids Temp/Time 130°C for 120 minutes

2. Material Solids

Panel Dish No.	(1) Aluminium Foil Weight	(2) Wet Material	(3) Dry-up & Foil	(4) (3)-(1) Dry Up	(5) (4)/(2) Material Solids	Average Material Solids
D.	5.95	9.44	12.09	6.14	0.6504	0.6519
E.	6.30	9.93	12.77	6.47	0.6516	
F.	5.47	11.29	12.85	7.38	0.6537	

3. Transfer Efficiency (TE) On Foil Suction Gun with British Paint Container

Foil No.	Gun Model	Paint Adj.	Pressure at Gun	Spray Distance	Foil Position	Number of Gun Passes	Paint Output	(1) Foil Weight	(2) Dry-up & Foil	(3)(2)-(1) Dry Up	(4) Wet Spray Material	(5) Spray Solid	(6) T.E. (3)/(5)	T.E. Average
5.	W200	Fully	2 Bar	150mm	Upright	3	261gm	26.43	47.23	20.80	34.2	22.295	93.3	93.1
6.	2.0	Open	"	"	"	"	per min	26.48	48.35	21.87	35.7	23.273	94.0	
7.	"	"	"	"	"	"		27.54	48.85	20.81	34.7	22.621	92.0	
8.	"	"	"	"	Horizontal	"	"	25.14	50.07	24.93	41.8	27.249	91.5	91.5

SUCTION GUN

APPENDIX B5

RESULT SHEET I (CONTINUED)

DATE: 5.3.1998

Materials: 2K HS Primer
 For Steel Panels
 Material Solids

Panel Dish No.	(1) Aluminium Foil Weight	(2) Wet Material	(3) Dry-up & Foil	(4) (3)-(1) Dry Up	(5) (4)/(2) Material Solids	Average Material Solids
D.	5.95	9.44	12.09	6.14	0.6504	0.6519
E.	6.30	9.93	12.77	6.47	0.6516	
F.	5.47	11.29	12.85	7.38	0.6537	

4. Transfer Efficiency (TE) On Steel Panel Suction Gun with British Paint Container Substrate Etch Primer

Panel No.	Gun Model	Paint Adj.	Pressure at Gun	Spray Distance	Panel Position	Number of Gun Passes	Number of Coats	Paint Output	(1) Panel Weight	(2) Dry-up & Panel	(3)(2)-(1) Dry Up	(4) Wet Spray Material	(5) Spray Solid	(6) T.E. (3)/(5)	T.E. Average
E7		Control Panel							4891.8	4891.6	0.2*				
E10	W200	Fully Open	2.0 Bar	150mm	Upright	5	2	261gm per min	4904.1	4956.9	52.8	85.6	55.80	95.0	95.2
E11	"	"	"	"	"	"	"	"	4893.2	4952.4	+0.2 = 53.0* 59.4*	95.5	62.26	95.4	

Weight adjusted for loss of weight on control panel in accordance with ASTM procedures

PRESSURE FED GUN

APPENDIX B5

RESULT SHEET 1 (CONTINUED)

Date: 5.3.1998

- 1. Materials: Standox 2K HS Primer
 Viscosity: 34S DIN 4 18°C
 Spray Temp. 20°C
 Spray Humidity 35%
 Mix Ratio 4:1 (Mixed by wt. 6.24g Primer: 0.96g Hardener)

Stoving Schedule: -Foil 70°C for 90 minutes
 - Steel---" -----
 Solids Temp/Time 130°C for 120 minutes

2. Material Solids

Panel Dish No.	(1) Aluminium Foil Weight	(2) Wet Material	(3) Dry-up & Foil	(4) (3)-(1) Dry Up	(5) (4)/(2) Material Solids	Average Material Solids
A.	6.42	11.04	13.61	7.19	0.6513	0.6524
B.	6.01	10.17	12.63	6.62	0.6509	
C.	5.49	15.80	15.84	10.35	0.6551	

3. Transfer Efficiency (TE) On Foil

Foil No.	Gun Model	Paint Adj.	Pressure	Spray Distance	Foil Position	Number of Gun Passes	Paint Output	(1) Foil Weight	(2) Dry-up & Foil	(3)(2)-(1) (Dry Up)	(4) Wet Spray Material	(5) Spray Solid	(6) T.E. (3)/(5)	T.E. Average
3	W200 1.2	Fully Open	Gun 2.0 Bar Pot	150mm	Upright	3	412 gm per min	26.37	47.01	20.64	33.0	21.529	95.8	96.2
9	"	"	0.5 Bar	"	"	3	"	24.75	41.92	17.17	27.2	17.745	96.7	
4	"	"	"	"	Horizontal	4	"	27.82	34.92	7.1	11.9	7.764	91.4	91.4

NOTE: Material thickening up during these tests

PRESSURE FED GUN

APPENDIX B5

RESULT SHEET I (CONTINUED)

DATE: 9.3.1998

Materials: 2K HS Primer

For Steel Panels
Material Solids

Panel Dish No.	(1) Aluminium Foil Weight	(2) Wet Material	(3) Dry-up & Foil	(4) (3)-(1) Dry Up	(5) (4)/(2) Material Solids	Average Material Solids
G.	5.29	9.70	11.61	6.32	0.6515	0.6515
H.	5.42	15.19	15.33	9.91	0.6524	
J.	5.67	12.11	13.55	7.88	0.6507	

4. Transfer Efficiency (TE) On Steel Panel

Substrate Etch Primer

Panel No.	Gun Model	Paint Adj.	Pressure	Spray Distance	Panel Position	Number of Gun Passes	Number of Coats	Paint Output	(1) Panel Weight	(2) Dry-up & Panel	(3)(2)-(1) Dry Up	(4) Wet Spray Material	(5) Spray Solid	(6) T.E. (3)/(5)	T.E. Average
E7		Control Panel							4891.8	4891.6	0.2				
E8	W200 1.2	Fully Open	Gun 2.0 Bar Pot	150mm	Upright	6	2	263gm per min	4940.6	5004.6	64.0 +0.2 = 64.2*	105.8	68.93	93.1	93.2
E9	"	"	0.5 Bar	"	"	"	"	"	4954.9	5019.6	64.9*	106.7	69.52	93.3	

* Weight adjusted for loss of weight on control panel in accordance with ASTM procedures

SUCTION GUN

APPENDIX B6

RESULT SHEET 2 (CONTINUED)

Date: 7.5.1998

1. Materials: Standox 2K HS Direct Gloss – Ford Provence Green
 Viscosity: 30S DIN 4 18°C
 Spray Temp. 20°C
 Spray Humidity 30% RH
 Mix Ratio 2:1
- Stoving Schedule: -Foil 70°C for 90 minutes
 - Steel
 Solids Temp/Time 130°C for 120 minutes

2. Material Solids

Panel Dish No.	(1) Aluminium Foil Weight	(2) Wet Material	(3) Dry-up & Foil	(4) (3)-(1) Dry Up	(5) (4)/(2) Material Solids	Average Material Solids
N.	6.32	9.96	11.77	5.45	0.5472	0.5457
P.	5.53	5.54	8.56	3.03	0.5470	
R.	6.29	6.43	9.78	3.49	0.5428	

3. Transfer Efficiency (TE) On Foil - Suction Gun with British Paint Container

Foil No.	Gun Model	Paint Adj.	Pressure at Gun	Spray Distance	Foil Position	Number of Gun Passes	Paint Output	(1) Foil Weight	(2) Dry-up & Foil	(3)(2)-(1) Dry Up	(4) Wet Spray Material	(5) Spray Solid	(6) T.E. (3)/(5)	T.E. Average
24	W200	Fully open	2.0 Bar	150mm	Upright	3	175 gm	24.83	35.01	10.18	23.2	12.660	80.4	81.1
11	1.8	open	"	"	"	"	per minute	24.30	35.90	11.60	26.3	14.352	80.8	
12	"	"	"	"	"	"	"	23.95	32.72	8.77	19.6	10.696	82.0	
25	"	"	"	"	Horizontal	"	"	25.46	35.49	10.03	23.3	12.715	78.9	78.9

SUCTION GUN

APPENDIX B5

RESULT SHEET 2 (CONTINUED)

DATE: 9.3.1998

Materials: 2K HS Direct Gloss

For Steel Panels -
Material Solids

Panel Dish No.	(1) Aluminium Foil Weight	(2) Wet Material	(3) Dry-up & Foil	(4) (3)-(1) Dry Up	(5) (4)/(2) Material Solids	Average Material Solids
N.	6.32	9.96	11.77	5.45	0.5472	0.5457
P.	5.53	5.54	8.56	3.03	0.5470	
R.	6.29	6.43	9.78	3.49	0.5428	

4. Transfer Efficiency (TE) On Steel Panel Suction Gun with British Paint Container Substrate Etch Primer + 2K HS Primer

Panel No.	Gun Model	Paint Adj.	Pressure at Gun	Spray Distance	Panel Position	Number of Gun Passes	Number of Coats	Paint Output	(1) Panel Weight	(2) Dry-up & Panel	(3)(2)-(1) Dry Up	(4) Wet Spray Material	(5) Spray Solid	(6) T.E. (3)/(5)	T.E. Average
P1		Contr	ol Panel	for	weight	loss			4998.9	4998.5	0.4*				
P4	W200	Fully	2.0 Bar	150mm	Upright	3	2	175 gm	4982.6	4997.4	14.8	35.6	19.43	78.2	77.8
P5	1.8	Open	"	"	"	"	"	per min	5031.8	5045.9	+0.4 = 15.2* 14.5*	34.4	18.77	77.3	

* Weight adjusted for loss of weight on control panel in accordance with ASTM procedures

PRESSURE FED GUN

APPENDIX B5

RESULT SHEET 2 (CONTINUED)

Date: 9.3.1998

- 1. Materials: Standox 2K HS Direct Gloss - Ford Provence Green
- Viscosity: 28S DIN 4 20°C
- Spray Temp. 20°C
- Spray Humidity 30% RH
- Mix Ratio 2:1

Stoving Schedule: -Foil 70°C for 90 minutes
 - Steel ----- " -----
 Solids Temp/Time 130°C for 120 minutes

- 2. Material Solids

Panel Dish No.	(1) Aluminium Foil Weight	(2) Wet Material	(3) Dry-up & Foil	(4) (3)-(1) Dry Up	(5) (4)/(2) Material Solids	Average Material Solids
K.	6.07	5.39	9.03	2.96	0.5492	0.5488
L.	5.74	7.46	9.83	4.09	0.5483	
M.	5.44	8.82	10.28	4.84	0.5488	

- 3. Transfer Efficiency (TE) On Foil

Foil No.	Gun Model	Paint Adj.	Pressure	Spray Distance	Foil Position	Number of Gun Passes	Paint Output	(1) Foil Weight	(2) Dry-up & Foil	(3)(2)-(1) Dry Up	(4) Wet Spray Material	(5) Spray Solid	(6) T.E. (3)/(5)	T.E. Average
14.	W200	Fully	Gun	150mm	Upright	3	199 gm	25.22	41.19	15.97	33.6	18.440	86.6	87.8
15.	1.2	Open	2.0 Bar	"	"	"	per min	26.08	42.88	16.80	34.5	18.934	88.7	
16.	"	"	Pot 0.5 Bar	"	"	"	"	25.40	42.38	16.98	35.1	19.263	88.1	
17.	"	"	"	"	Horizontal	"	"	26.32	42.53	16.21	34.4	18.879	85.9	85.9

PRESSURE FED GUN

APPENDIX B5

RESULT SHEET 2 (CONTINUED)

DATE: 9.3.1998

Materials: 2K HS Direct Gloss

For Steel Panels -
Material Solids

Panel Dish No.	(1) Aluminium Foil Weight	(2) Wet Material	(3) Dry-up & Foil	(4) (3)-(1) Dry Up	(5) (4)/(2) Material Solids	Average Material Solids
K.	6.07	5.39	9.03	2.96	0.5492	0.5488
L.	5.74	7.46	9.83	4.09	0.5483	
M.	5.44	8.82	10.28	4.84	0.5488	

4. Transfer Efficiency (TE) On Steel Panel

Substrate Etch Primer + 2K HS Primer

Panel No.	Gun Model	Paint Adj.	Pressure at Gun	Spray Distance	Panel Position	Number of Gun Passes	Number of Coats	Paint Output	(1) Panel Weight	(2) Dry-up & Panel	(3)(2)-(1) Dry Up	(4) Wet Spray Material	(5) Spray Solid	(6) T.E. (3)/(5)	T.E. Average
P1		Control	Panel	for	weight	loss			4998.9	4998.5	0.4*				
P2	W200 1.2	Fully Open	Gun 2.0 Bar Pot	150mm	Upright	4	2	199 gm per min	5065.2	5087.7	22.5 +0.4 = 22.9*	49.6	27.22	84.1	84.5
P3	"	"	0.5 Bar	"	"	"	"	"	4966.2	4987.2	21.4*	46.0	25.24	84.8	

* Weight adjusted for loss of weight on control panel in accordance with ASTM procedures

SUCTION GUN

APPENDIX B5

RESULT SHEET 3 (CONTINUED)

Date: 7.5.1998

1. Materials: Water based Base Coat Stadox Vauxhall Oriental Blue Met. 24L 97196-900
 Viscosity: 21S DIN 4 18°C Stoving Schedule: -Foil)
 Spray Temp. 20°C - Steel) As page 23
 Spray Humidity 52% RH Solids Temp/Time: -----
 Spray Time 45 minutes approx
 Mix Ratio 4:1 (Mixed by wt. 1528.1g Base Coat: 375gmVe Wasser)

2. Material Solids

Panel Dish No.	(1) Aluminium Foil Weight	(2) Wet Material	(3) Dry-up & Foil	(4) (3)-(1) Dry Up	(5) (4)/(2) Material Solids	Average Material Solids
A1.	10.96	8.94	12.13	1.17	0.1309	0.1295
A2.	11.00	12.83	12.63	1.63	0.1270	
A3.	12.12	11.18	13.58	1.46	0.1306	

3. Transfer Efficiency (TE) On Foil - Suction Gun with British Paint Container

Foil No.	Gun Model	Paint Adj.	Pressure at Gun	Spray Distance	Foil Position	Number of Gun Passes	Paint Output	(1) Foil Weight	(2) Dry-up & Foil	(3)(2)-(1) Dry Up	(4) Wet Spray Material	(5) Spray Solid	(6) T.E. (3)/(5)	T.E. Average
6.	W200	220mm	1.75Bar	150mm	Upright	4	124gm	28.39	30.68	2.29	22.3	2.888	79.3	78.9
7.	1.5m	Fan	"	"	"	4	per	28.25	30.66	2.41	23.8	3.082	78.2	
8.	m	"	"	"	"	4	Minute	28.51	30.96	2.45	23.9	3.095	79.2	
9.	"	"	"	"	Horizontal	4	"	26.74	29.50	2.76	24.8	3.212	85.8	85.8

SUCTION GUN

APPENDIX B5

RESULT SHEET 3 (CONTINUED)

DATE: 8.5.1998

Materials: Water Based Base Coat

For Steel Panels -
Material Solids

Panel Dish No.	(1) Aluminium Foil Weight	(2) Wet Material	(3) Dry-up & Foil	(4) (3)-(1) Dry Up	(5) (4)/(2) Material Solids	Average Material Solids
FA1.	11.33	16.10	13.40	2.07	0.1286	0.1290
FB2.	11.91	9.91	13.19	1.28	0.1292	
FC3.	10.61	9.13	11.79	1.18	0.1292	

4. Transfer Efficiency (TE) On Steel Panel - Suction Gun with British Paint Container

Substrate Etch Primer + 2K HS Primer

Panel No.	Gun Model	Paint Adj.	Pressure at Gun	Spray Distance	Panel Position	Number of Gun Passes	Number of Coats	Paint Output	(1) Panel Weight	(2) Dry-up & Panel	(3)(2)-(1) Dry Up	(4) Wet Spray Material	(5) Spray Solid	(6) T.E. (3)/(5)	T.E. Average
M1		Control	Panel	for	weight	loss			5093.9	5093.2	0.7*				
M2	W200 1.5mm	220 mm Fan	1.75 Bar	150mm	Upright	4	2.5 F/O	132 gm per mins	5091.2	5095.3	4.1 +0.7 = 4.8*	50.0	6.45	74.4	73.8
M3	K2 Air Cap	"	"	"	"	4	till dry	"	5051.0	5054.9	4.6*	48.7	6.28	73.2	

* Weight adjusted for loss of weight on control panel in accordance with ASTM procedures

SUCTION GUN

APPENDIX B5

RESULT SHEET 3 (CONTINUED)

Date: 8.5.1998

1. Materials: Water Based Base Coat Stadox Vauxhall Oriental Blue MET 24L 97196-900
 Viscosity: 21S DIN 4 18°C Stoving Schedule: -Foil 35°C for 20 minutes then 70°C for 45 minutes
 Spray Temp. 20°C -Steel -----
 Spray Humidity 55%
 Spray Time 90 Mins Solids Temp/Time 40°C for 45 minutes, then 130°C for 70 minutes
 Mix Ratio 4:1 (Mixed by wt. 1528.1 gm Base Coat: 375 gm Ve Wasser)

2. Material Solids

Panel Dish No.	(1) Aluminium Foil Weight	(2) Wet Material	(3) Dry-up & Foil	(4) (3)-(1) Dry Up	(5) (4)/(2) Material Solids	Average Material Solids
FA1	11.33	16.10	13.40	2.07	0.1286	0.1290
FB2	11.91	9.91	13.19	1.28	0.1292	
FC3	10.61	9.13	11.79	1.18	0.1292	

3. Transfer Efficiency (TE) On Foil - Suction Gun with European Paint Container

Foil No.	Gun Model	Paint Adj.	Pressure at Gun	Spray Distance	Foil Position	Number of Gun Passes	Paint Output	(1) Foil Weight	(2) Dry-up & Foil	(3)(2)-(1) Dry Up	(4) Wet Spray Material	(5) Spray Solid	(6) T.E. (3)/(5)	T.E. Average
1.	W200	220mm	1.75 Bar	150mm	Upright	4	149 gm	26.94	29.60	2.66	25.9	3.341	79.6	79.6
2.	1.5m m K2 Air Cap	"	"	"	"	4	"	26.07	28.23	2.16	21.0	2.709	79.7	
3.	"	"	"	"	"	4	"	25.37	27.81	2.44	23.8	3.070	79.5	
4.	"	"	"	"	Horizontal	4	"	26.00	29.01	3.01	28.8	3.715	81.0	81.0

PRESSURE FED GUN

APPENDIX B5

RESULT SHEET 3 (CONTINUED)

Date: 7.5.1998

1. Materials: Water Based Base Coat Stadox Vauxhall Oriental Blue MET 24L 97196-900
 Viscosity: 21S DIN 4 18°C Stoving Schedule: -Foil As previous results
 Spray Temp. 20°C -Steel for water based
 Spray Humidity 52% Solids Temp/Time: -----“ -----
 Spray Time 45 Mins
 Mix Ratio 4:1 (Mixed by wt. 1528.1 gm Base Coat: 375 gm Ve Wasser)

2. Material Solids

Panel Dish No.	(1) Aluminium Foil Weight	(2) Wet Material	(3) Dry-up & Foil	(4) (3)-(1) Dry Up	(5) (4)/(2) Material Solids	Average Material Solids
A1	10.96	8.94	12.13	1.17	0.1309	0.1295
A2	11.00	12.83	12.63	1.63	0.1270	
A3	12.12	11.18	13.58	1.46	0.1306	

3. Transfer Efficiency (TE) On Foil

Foil No.	Gun Model	Paint Adj.	Pressure	Spray Distance	Foil Position	Number of Gun Passes	Paint Output	(1) Foil Weight	(2) Dry-up & Foil	(3)(2)-(1) Dry Up	(4) Wet Spray Material	(5) Spray Solid	(6) T.E. (3)/(5)	T.E. Average
1.	W200 1.2	280mm Fan	Gun 1.75 Bar	150mm	Upright	3	354 gm per min	27.58	32.84	5.26	47.1	6.100	86.2	87.7
2.	“	“	Pot 0.43 Bar	“	“	“	“	27.51	33.93	6.42	55.8	7.226	88.8	
3.	“	“	Bar	“	“	“	“	26.42	33.06	6.64	58.2	7.537	88.1	
4.	“	“	“	“	Horizontal	“	“	26.28	31.50	5.22	47.0	6.086	85.8	

SUCTION GUN

APPENDIX B5

RESULT SHEET 4 (CONTINUED)

Date: 8.5.1998

1. Materials: Standox 2K HS Clear Lacquer
 Viscosity: 23S DIN 4 21°C
 Spray Temp. 21°C
 Spray Humidity 53% RH
 Mix Ratio 2:1 (Mixed by wt. 495g Lacquer: 250gm Hardener Kurtz)

Stoving Schedule: -Foil 70°C for 90 minutes
 -Steel -----"-----
 Solids Temp/Time 130°C for 120 minutes

2. Material Solids

Panel Dish No.	(1) Aluminium Foil Weight	(2) Wet Material	(3) Dry-up & Foil	(4) (3)-(1) Dry Up	(5) (4)/(2) Material Solids	Average Material Solids
LA1	11.45	8.14	16.63	5.18	0.6364	0.6120
LA2	11.01	8.39	16.11	5.10	0.6079	
LA3	12.30	9.01	17.63	5.33	0.5916	

3. Transfer Efficiency (TE) On Foil - Suction Gun with British Paint Container

Foil No.	Gun Model	Paint Adj.	Pressure at Gun	Spray Distance	Foil Position	Number of Gun Passes	Paint Output	(1) Foil Weight	(2) Dry-up & Foil	(3)(2)-(1) Dry Up	(4) Wet Spray Material	(5) Spray Solid	(6) T.E. (3)/(5)	T.E. Average
5.	W200	280mm	1.75 Bar	150mm	Upright	3	122 gm	28.32	34.79	6.47	15.5	9.486	68.2	
6.	1.5	Fan	"	"	"	"	per min	27.28	33.80	6.52	15.6	9.547	68.3	68.2
7.	"	"	"	"	"	"	"	27.94	33.74	5.80	13.9	8.507	68.2	
8.	"	"	"	"	Horizontal	"	"	26.59	33.96	7.37	17.3	10.588	69.6	69.6

PRESSURE FED GUN

APPENDIX B5

RESULT SHEET 4 (CONTINUED)

Date: 8.5.1998

1. Materials: Standox 2K HS Clear Lacquer
 Viscosity: 23S DIN 4 21°C
 Spray Temp. 21°C
 Spray Humidity 53%
 Mix Ratio 4:1 (Mixed by wt. 495g Primer: 250g Hardener Kurtz)

Stoving Schedule: -Foil 70°C for 90 minutes
 - Steel---" -----
 Solids Temp/Time 130°C for 120 minutes

2. Material Solids

Panel Dish No.	(1) Aluminium Foil Weight	(2) Wet Material	(3) Dry-up & Foil	(4) (3)-(1) Dry Up	(5) (4)/(2) Material Solids	Average Material Solids
LA1.	11.45	8.14	16.63	5.18	0.6364	0.6120
LA2.	11.01	8.39	16.11	5.10	0.6079	
LA3.	12.03	9.01	17.63	5.33	0.5916	

3. Transfer Efficiency (TE) On Foil

Foil No.	Gun Model	Paint Adj.	Pressure	Spray Distance	Foil Position	Number of Gun Passes	Paint Output	(1) Foil Weight	(2) Dry-up & Foil	(3)(2)-(1) Dry Up	(4) Wet Spray Material	(5) Spray Solid	(6) T.E. (3)/(5)	T.E. Average
9	W200 1.2	240mm Fan	Gun 2.0 Bar	150mm	Upright	3	240gms per min	26.87	40.61	13.74	29.1	17.809	77.2	79.4
10	"	"	Pot 0.43 Bar	"	"	"	"	23.61	44.58	20.97	42.0	25.704	81.6	
12	"	"	"	"	Vertical	"	"	22.63	37.76	15.13	30.8	18.850	79.7	79.7

PRESSURE FED GUN

APPENDIX B5

RESULT SHEET 4 (CONTINUED)

DATE: 8.5.1998

Materials: 2K HS Lacquer

For Steel Panels -
Material Solids

Panel Dish No.	(1) Aluminium Foil Weight	(2) Wet Material	(3) Dry-up & Foil	(4) (3)-(1) Dry Up	(5) (4)/(2) Material Solids	Average Material Solids
LA1.	11.45	8.14	16.63	5.18	0.6364	0.6120
LA2.	11.01	8.39	16.11	5.10	0.6079	
LA3.	12.03	9.01	17.63	5.33	0.5916	

4. Transfer Efficiency (TE) On Steel Panel - Suction Gun with British Paint Container/ Substrate Etch Primer + 2K HS Primer + W/B B/CT

Panel No.	Gun Model	Paint Adj.	Pressure at Gun	Spray Distance	Panel Position	Number of Gun Passes	Number of Coats	Paint Output	(1) Panel Weight	(2) Dry-up & Panel	(3)(2)-(1) Dry Up	(4) Wet Spray Material	(5) Spray Solid	(6) T.E. (3)/(5)	T.E. Average
PF1		Control	Panel	for	weight	loss			5049.6	5048.8	0.8				
PF2	W200 1.2mm	240mm Fan	Gun 2.0 Bar Pot	150mm	Upright	4	2	240 gm per mins	5074.0	5088.2	14.2 +0.8 = 15.0*	33.3	20.38	73.6	73.5
PF3	"	"	0.43 Bar	"	"	4	2	"	5080.3	5096.9	17.4*	38.7	23.68	73.5	

* Weight adjusted for loss of weight on control panel in accordance with ASTM procedures