THATCHAM
TRAINING CENTRE

EVALUATION REPORT ON THE ANEST IWATA W 400

CONDUCTED BY THATCHAM TRAINING CENTRE

FEBRUARY 1998

REPORT OF THE EVALUATION OF THE PAINT TRANSFER EFFICIENCY OF THE ANEST IWATA W400 GRAVITY SPRAY GUN CARRIED OUT BY THE MOTOR INSURANCE REPAIR RESEARCH CENTRE, THATCHAM TRAINING AT THE REQUEST OF THE ANEST IWATA CORPORATION

12th February 1998

OBJECTIVE

To confirm that the Anest Iwata W400 Gravity Spray Gun 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 gun 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 all panels in an upright position in a conventional down draft spray booth keeping the spray within the area of the foil/panel (see Appendix A3)

At 2.0 Bar inlet pressure to the gun, the transfer efficiency was assessed with various fluid nozzle sizes, spray distance from the panel 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 B6.

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 B6.
Before evaluation began, paint fluid flow, viscosity and solids of the paint were measured (see Appendix B2).

Foils were pre-weighed and then reweighed 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 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 reweighed 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. Paint thickness measurements were carried out before spraying and after spraying and stoving. See Appendix B5 for paint thickness applied.

RESULTS

See Appendix B6 for recorded results and calculations

Appendix A1 summaries the results.

NOTE

Because of the large rise in viscosity especially when carrying out the Direct Gloss evaluation, the foils sprayed last in this evaluation, namely those sprayed using the W400 162 gun, were repeated with newly mixed material to determine if this rise in viscosity had a dramatic effect on transfer efficiency. This exercise was also repeated for the 2K HS clear lacquer.

Results are recorded in Appendix B6 Result Sheets 2+ for D.G. and 4+ for lacquer and show the rise in viscosity had little effect on Transfer Efficiency although paint fluid flow was lower. See Appendix A1 for result comparison.

CONCLUSION

The Anest Iwata W400 Gravity Spray Gun complies with the requirements of the Environmental Protection Act 1990 Part 1 - 1997 Revision as detailed in PG6/34 (97) when used as detailed in this report achieving a Transfer efficiency (weight) of greater than 65%.

LIST OF APPENDICES

APPENDIX A1

SUMMARY OF RESULTS T.E.

Substrate	W400-122 Gun Spray Distance	W400-142 Gun Spray Distance		W400-162 Gun Spray Distance		W400-182 Gun Spray Distance	
	150mm	150mm	200mm	150mm	200mm	150mm	200mm
Primer - Foil						95.6	91.9
Primer - Steel							92.1
Direct Gloss - Foil		80.0	75.2	80.9	75.8		
Direct Gloss - Steel		76.9		79.6			
Base Ct. - Foil	74.0	81.5	73.5				
Base Ct. - Steel	68.0	76.4					
Clear Lac. - Foil		74.8	70.8	78.0	73.0		
Clear Lac- Steel		74.7		74.9			
Direct Gloss - Foil **RETEST**				83.8	74.1		
Clear Lac - Foil **RETEST**				76.7	73.3		

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’

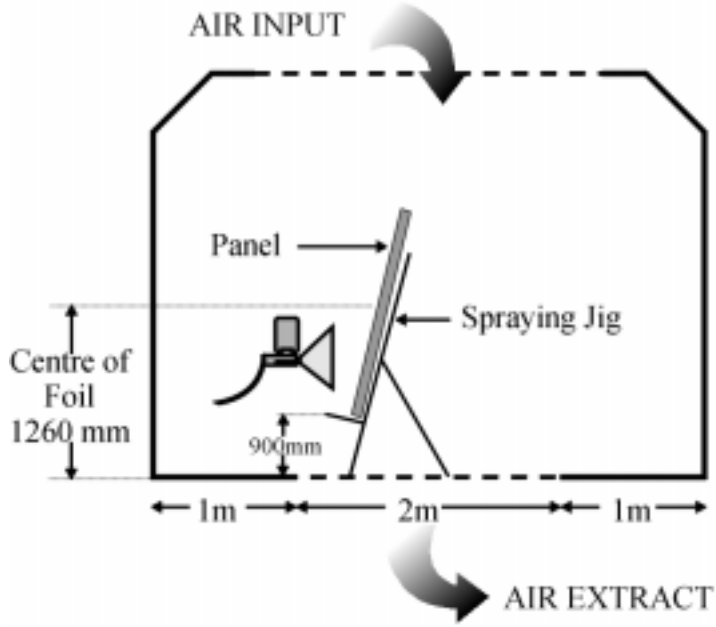
4. Wet Spray Material
   i.e. Gun weighed before and after application - weight difference.

5. Spray Solid = (4 x Av. Mat. Solids)

6. T.E.(weight) = (3 ÷ 5) x 100%

APPENDIX A3

a) POSITION OF TEST PANELS IN SPRAY BOOTH

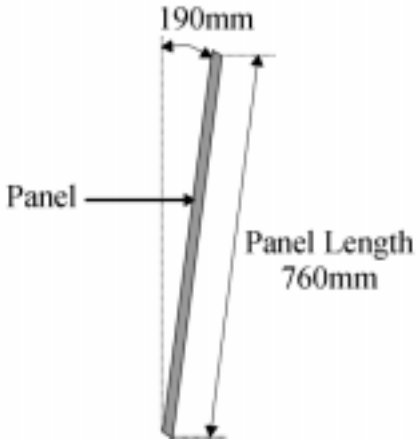


SPRAYBOOTH DETAILS

Volume 70 m3
Height 2.5 m
Width 4 m

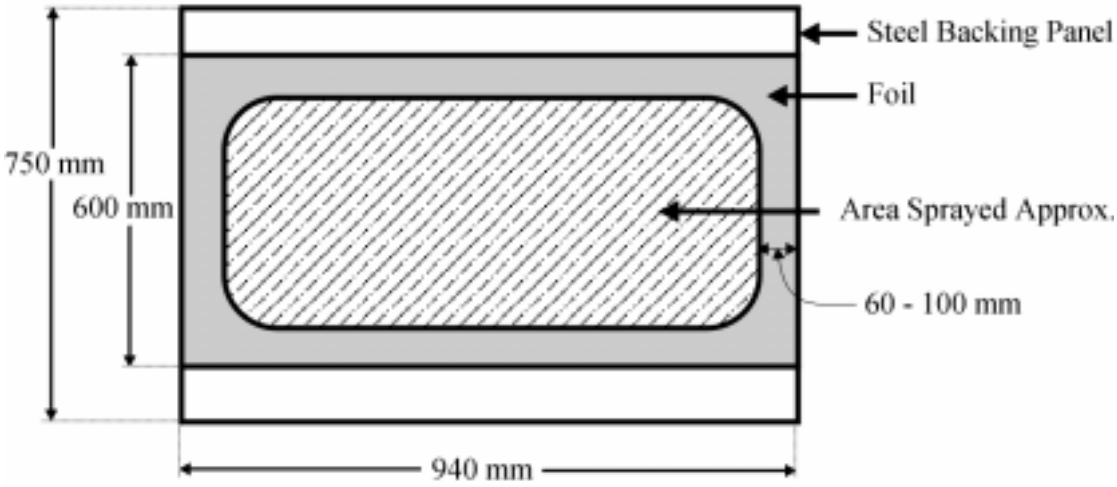
Down draft air movement
Velocity of Air } 0.35 m/sec
Over Test Panel } Downward
Air changes/min 6 1/2

PANEL IN UPRIGHT POSITION

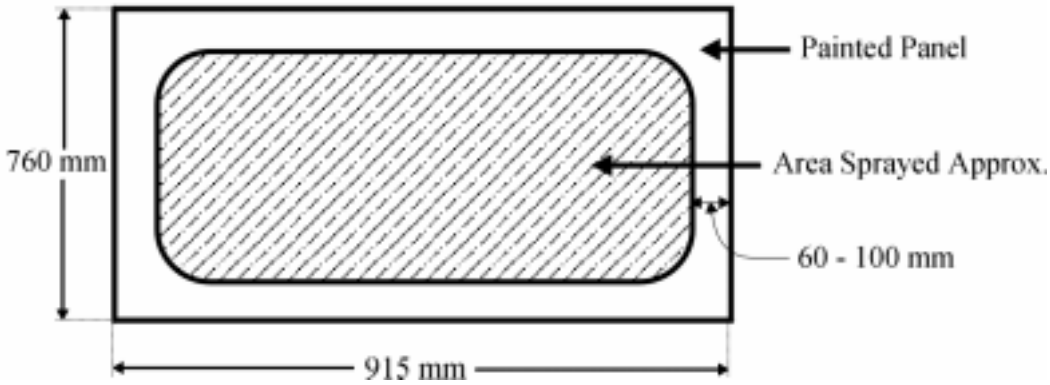


APPENDIX A3 contd.

b) FOIL TEST SAMPLE - SIZE AND AREA SPRAYED



c) STEEL PANEL TEST SAMPLE - SIZE AND AREA SPRAYED



APPENDIX B1

VARIABLES ASSESSED AND PANEL NUMBERS

ALUMINIUM FOIL

Spray Product	Gun	Spray Distance	Panel Position	Number of Foils
1) 2K HS Primer	W400-182 (1.8mm)	150 mm 200 mm	Upright “	Three Three
2) 2K HS Direct Gloss	W400-142 (1.4mm) W400-162 (1.6mm)	150mm 200mm 150mm 200mm	Upright “ Upright “	Three Three Three Three
3) Water Based Base Coat	W400-122 (1.2mm) W400-142 (1.4mm)	150mm 150mm 200mm	Upright Upright “	Three Three Three
4) 2K HS Clear Lacquer	W400-142 (1.4mm) W400-162 (1.6mm)	150mm 200mm 150mm 200mm	Upright “ Upright “	Three Three Three Three

STEEL PANELS

Spray Product	Substrate	Gun	Spray Distance	Panel Position	Number of Panels
1) 2K HS Primer	Etch Primer	W400-182	200mm	Upright	Two
2) 2K HS Direct Gloss	Etch Primer + 2K HS Primer	W400-142 W400-162	150mm 150mm	Upright “	Two Two
3) Water Based Base Coat	Etch Primer +2K HS Primer	W400-122 W400-142	150mm 150mm	Upright “	Two Two
4) 2K HS Clear Lacquer	Etch Primer +2K HS Primer + Water Based Base Coat	W400-142 W400-162	150mm 150mm	Upright “	Two 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 B6 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 760mm x 915mm.

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 W400 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. 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 - three 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 was continually monitored and maintained at 2.0 Bar with the gun pulling air.

After spraying, the panels/foils were placed in a further booth for stoving at the relevant schedules (See Appendix B6 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.

APPENDIX B5

PAINT THICKNESSES ON STEEL PANELS (MICRONS)

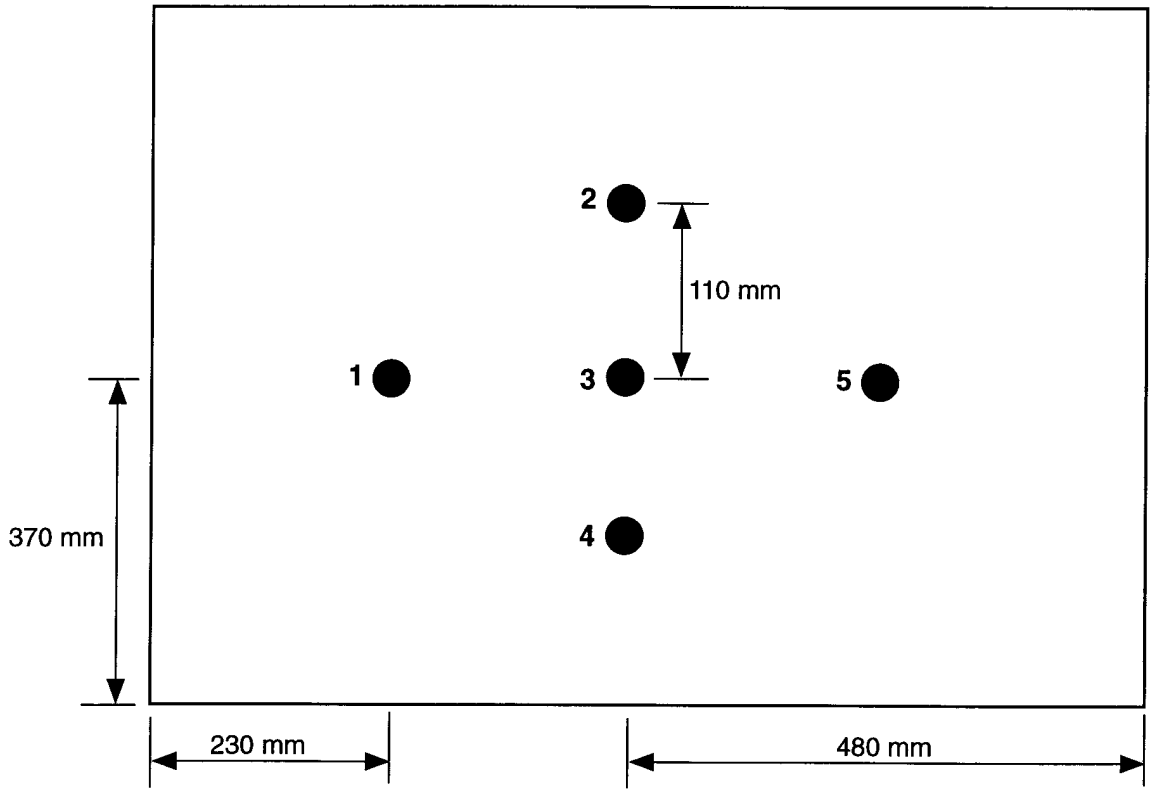
B = Thickness before spraying
A = Thickness after spraying and stoving
T= Thickness of paint applied

			Position 1			2			3			4			5			
Panel No.	Paint Substrate	Paint Applied	B	A	T	B	A	T	B	A	T	B	A	T	B	A	T	AV.
P1	Standox	Standox	18	-	-	16	-	-	13	-	-	18	-	-	18	-	-	-
P2	1K Full Primer	2K HS	19	145	126	24	170	146	18	162	144	18	134	116	20	105	85	123
P3		Primer	16	103	87	23	136	113	16	109	93	18	150	132	17	135	118	109
P4	Standox	Standox	81	-	-	49	-	-	63	-	-	49	-	-	68	-	-	-
P5	1K Full Primer	Water	60	70	10	58	69	11	60	74	14	52	69	17	66	76	10	12
P6	+ Standox	Based	61	74	13	55	69	14	55	67	12	51	62	11	56	68	12	12
P7	2K HS Primer	Base	69	84	15	60	74	14	56	72	16	67	84	17	65	78	13	15
P8	P500 Dry Flat	Coat	61	75	14	53	65	12	51	67	16	54	72	18	54	65	11	14
P14	Standox 1K Full		88	-	-	55	-	-	72	-	-	56	-	-	75	-	-	-
P15	Primer & Standox	Standox	75	117	42	74	107	33	72	102	30	67	98	31	71	106	35	34
P16	2K HS Primer	2K HS	86	127	41	76	119	43	75	112	37	86	125	39	82	129	47	41
P17	+ Standox Water	Clear	74	116	42	71	113	42	77	122	45	72	109	37	82	124	42	42
P18	Based Base Coat	Lacquer	78	122	44	68	113	45	68	110	42	74	118	44	67	111	44	44
P9	Standox 1K		70	-	-	60	-	-	64	-	-	58	-	-	84	-	-	-
P10	Full Primer	Standox	62	112	50	55	105	50	62	109	47	61	115	54	68	111	43	49
P11	+ Standox	2K HS Direct	62	122	60	57	115	58	52	107	55	61	126	65	51	109	58	59
P12	2K HS Primer	Gloss	74	131	57	57	110	53	68	127	59	51	105	54	67	118	51	55
P13	P500 Dry Flat		49	109	60	62	118	56	56	110	54	49	96	47	61	108	47	53

Panels P1, P4, P9 and P19 - for weight loss, no paint applied

APPENDIX B5 contd.

● Hole positions in paper sheet placed over painted steel panel through which paint thickness was measured.



RESULT SHEET 1 **Date: 13.1.1998**

1. Materials: Primer - Standox 2KHS Fuller (020 78325)
   Viscosity: 38S DIN 4 18°C
   Spray Temp. 20°C
   Spray Humidity 58%
   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
1.	6.77	12.16	14.54	7.77	0.6390	
2.	6.33	8.35	11.68	5.35	0.6407	0.6403
3.	7.34	13.16	15.78	8.44	0.6413	

3. Transfer Efficiency (TE) On Foil

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
39	W400 182	Fully Open	2.0 Bar	150mm	Up Right	3	100.6gm in 20S	24.91	66.62	41.71	67.8	43.412	96.1	95.6
41	"	"	"	"	"	3		24.86	63.69	38.83	63.8	40.851	95.1	
42	"	"	"	200mm	"	3		24.69	57.09	32.40	55.2	35.345	91.7	
43	"	"	"	"	"	3		24.83	57.78	32.95	56.1	35.920	91.7	91.9
44	"	"	"	"	"	3		26.20	62.24	36.04	60.9	38.994	92.4	

RESULT SHEET I (CONTINUED) **APPENDIX B6 (Cont'd)**

Materials: 2K HS Primer

For Steel Panels - Made up Fresh Primer
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
4.	6.98	9.91	13.34	6.36	.6418	
5.	8.51	9.26	14.45	5.94	.6415	0.6416
6.	6.00	14.90	15.56	9.56	.6416	

4. Transfer Efficiency (TE) On Steel Panel 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	Paint Thickness Applied
P1	W400 182	Contr	ol Panel	for	weight	loss			4923.2	4922.4	-0.8					
P2	"	Fully Open	2 .0 Bar	200mm	Upright	4	3 F/0 5 min	85gm 20S	4953.2	5052.7	*99.5 + 0.8 = 100.3	169.0	108.43	92.5	92.1	123.4
P3	"	"	"	"	"	4	3	"	4942.3	5036.8	*95.3	162.2	104.07	91.6		108.6

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

RESULT SHEET 2 **Date: 19.1.1998**

1. Materials: Direct Gloss Standox 2K HS Provence Green Ford 20567-600
   Viscosity: Start 45S DIN 4 17℃ End 58S DIN 4 17℃ Stoving Schedule: -Foil 70℃ for 90 minutes
   Spray Temp. 21℃ - Steel ---" ------
   Spray Humidity 36% RH Solids Temp/Time 130℃ for 120 minutes
   Spray Time 65 minutes approx
   Mix Ratio 2:1 (Mixed by wt. 1014.6 g D.G.: 500 gm Hard Kurtz)

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**
1.	5.37	7.99	9.90	4.53	0.5670	
2.	6.36	7.93	10.85	4.49	0.5662	0.5662
3.	4.91	5.50	8.02	3.11	0.5655	

3. Transfer Efficiency (TE) On Foil

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
57	W400	Fully	2.0 Bar	150mm	Up	4	40.7 gm	24.09	36.50	12.41	27.3	15.457	80.3	
58	142	Open	"	"	Right	4	in 20S	23.47	38.04	14.57	32.3	18.288	79.7	80.0
59	"	"	"	"	"	4		22.99	37.60	14.61	32.2	18.232	80.1	
60	W400	"	"	200mm	"	4		25.05	38.90	13.85	32.6	18.458	75.1	
61	142	"	"	"	"	4		22.87	37.97	15.10	35.6	20.156	74.9	75.2
62	"	"	"	"	"	4		23.03	37.65	14.62	34.1	19.307	75.7	

RESULT SHEET 2 (CONTINUED) **APPENDIX B6 (Cont'd)**

Materials: Direct Gloss

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
63	W400	Fully	2.0 Bar	150mm	Up	4	56.6gm	25.26	38.08	12.82	28.1	15.910	80.6	
64	162	Open	"	"	Right	4	in 20S	23.53	36.65	13.12	28.8	16.306	80.5	80.9
65	"	"	"	"	"	4		23.66	38.14	14.48	31.3	17.722	81.7	
66	W400	"	"	200mm	"	4		26.25	39.48	13.23	30.9	17.496	75.6	
67	162	"	"	"	"	4		24.94	36.78	11.84	27.6	15.627	75.8	75.8
68	"	"	"	"	"	4		24.26	36.77	12.51	29.1	16.476	75.9	

4. Transfer Efficiency (TE) On Steel Panel Substrate Etch Primer + 2K 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	Paint Thickness Applied
P9	W400		Control	Panel	for	weight	1oss		5039.7	5038.4	-1.3					
P10	142	Fully Open	2.0 Bar	150mm	Upright	5on½ct. 6 on full coat	1½cts No F/O	40.7 in 20S	4965.3	4986.7	*21.4 +1.3 =22.7	52.2	29.55	76.8	76.9	51
P11	"	"	"	"		"	"		4985.9	5008.2	*23.6	54.2	30.68	76.9		59
P12	W400	"	2.0 Bar	150mm	Upright	5on½ct.	1½cts	56.6	4969.0	4989.3	*21.6	47.5	26.89	80.3	79.6	55
P13	162	"				5 on full coat	No F/O	in 20S	4963.6	4983.3	*21.0	47.1	26.66	78.8		53

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

RESULT SHEET 2+ RE-TEST DUE TO HIGH VISCOSITY AT FINISH OF 19.1.98 TEST **Date: 20.1.1998**

1. Materials: Direct Gloss Standox 2K HS Provence Green Ford 20567-600
   Viscosity: Start 31S DIN 4 20°C End 40S DIN 4 19°C Stoving Schedule: -Foil 70°C for 90 minutes
   Spray Temp. 20°C
   Spray Humidity 35% RH Solids Temp/Time 130°C for 120 minutes
   Spray Time 20 minutes approx
   Mix Ratio 2:1 (Mixed by wt. 507.3g D.G : 250gm Hard Kurtz)

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
1.	5.43	5.24	8.28	2.86	.5439	
2.	5.56	8.74	10.34	4.78	.5469	.5460
3.	6.10	7.11	9.99	3.89	.5471	

3. Transfer Efficiency (TE) On Foil

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
81	W400	Fully	2.0 Bar	200mm	Up	3	59.3gm	23.49	36.83	13.34	33.3	18.182	73.4	
82	162	Open	"	"	Right	3	in 20S	23.60	37.43	13.83	33.7	18.400	75.2	74.1
83	"	"	"	"	"	3		24.35	36.73	12.38	30.8	16.817	73.6	
84	W400	"	"	150mm	"	4		23.58	42.11	18.53	40.3	22.004	84.2	
85	162	"	"	"	"	4		23.69	42.43	18.74	41.1	22.441	83.5	83.8
86	"	"	"	"	"	4		23.64	41.42	17.78	38.9	21.239	83.7	

APPENDIX B6 (Cont'd)

RESULT SHEET 3

Date: 14.1.1998

1. Materials: Water based Base Coat Standox Vauxhall Oriental Blue Met. 24L 97196-900

Viscosity: 26S DIN 4 20°C Stoving Schedule: -Foil 35°C for 20 minutes then 70°C for 45 minutes

Spray Temp. 20°C - Steel

---------- " ----------

Spray Humidity 38-40% RH Solids Temp/Time 40°C for 45 minutes, 130°C for 70 minutes

Spray Time 60 minutes approx

Mix Ratio 4:1 (Mixed by wt. 1528.1 g 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
1.	6.52	13.09	8.12	1.6	0.1222	
2.	5.79	7.90	6.78	0.99	0.1253	0.1235
3.	6.66	10.25	7.92	1.26	0.1229	

3. Transfer Efficiency (TE) On Foil -

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
48	"	"	"	150mm	"	4		24.32	27.84	3.52	38.3	4.730	74.4	
49	"	"	"	"	"	4		24.17	27.74	3.57	38.6	4.767	74.9	74.0
50	"	"	"	"	"	4		24.65	28.13	3.48	38.7	4.779	72.8	

RESULT SHEET 3 (CONTINUED) **APPRENDIX B6 (Cont'd)**

Materials: Water Based Base Coat

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
51	W400	Fully	2.0 Bar	150mm	Up	3	66.8gm	25.88	29.75	3.87	37.9	4.681	82.7	
52	142	Open	"	"	Right	3	in 20S	26.37	30.02	3.65	36.5	4.508	81.0	81.5
53	"	"	"	"	"	3		25.08	28.74	3.66	36.7	4.532	80.8	
54	W400	"	"	200mm	"	3	"	25.01	28.95	3.94	43.0	5.311	74.2	
55	142	"	"	"	"	3		24.40	28.24	3.84	42.3	5.224	73.5	73.5
56	"	"	"	"	"	3		24.38	27.97	3.59	39.9	4.928	72.8	

4. Transfer Efficiencey (TE) On Steel Panel Substrate Etch + 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	Paint Thickness Applied
P4	W400		Control	Panel	for	weight	loss		5034.3	5033.9	-0.4					
P5	122	Fully Open	2.0Bar	150mm	Upright	4	2 F/O Till Dry	55.1g in 20S	4992.8	4998.5	5.71+.* *=6.1	74.6	9.21	66.2	68.0	12.4
P6	"	"	"	"		4	"		5000.3	5006.2	*6.3	73.2	9.04	69.7		12.4
P7	W400	"	2.0 Bar	150mm	Upright	4	"	66.8	5005.1	5012.0	*7.3	75.7	9.35	78.1		15.0
P8	142	"				4	"	in 20S	4956.8	4963.2	*6.8	73.8	9.11	74.6	76.4	14.2

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

RESULT SHEET 4 **Date: 16.1.1998**

1. Materials: Standox 2K HS lacquer - 02082497
   Viscosity: 24S DIN 4 18℃
   Spray Temp. 20℃
   Spray Humidity 42 - 44% RH
   Spray Time 65 minutes approx
   Mix Ratio 2:1 (Mixed by wt. 990g Lacquer: 500gm Hardener)

   Stoving Schedule: -Foil 70℃ for 90 minutes
   -Steel ----------" ----------
   Solids Temp/Time 130℃ 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
C-1.	6.75	10.15	12.09	5.34	.5261	
C-2.	5.86	10.25	11.23	5.37	.5239	.5255
C-3.	5.98	10.81	11.67	5.69	.5264	

3. Transfer Efficiency (TE) On Foil

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
69	W400	Fully	2.0 Bar	150mm	Up	3	56.2g	24.3	35.57	11.27	28.9	15.187	74.2	
70	142	Open	"	"	Right	3	in 20S	23.9	37.27	13.37	33.5	17.604	75.9	74.8
71	"	"	"	"	"	3		23.49	36.67	13.18	33.7	17.709	74.4	
72	"	"	"	200mm	"	3		25.4	36.88	11.48	30.9	16.238	70.7	
73	"	"	"	"	"	3		23.19	35.98	12.79	34.3	18.025	71.0	70.8
74	"	"	"	"	"	3		23.53	37.11	13.58	36.5	19.181	70.8	

RESULT SHEET 4 (CONTINUED) **APPENDIX B6 (Cont'd)**

Materials: 2K HS Lacquer

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
75	W400	Fully	2.0 Bar	150mm	Up	3	58.5gm	25.19	37.3	12.11	29.8	15.66	77.3	
76	162	Open	"	"	Right	4	in 20S	23.81	39.58	15.77	38.4	20.19	78.2	78.0
77	"	"	"	"	"	4		23.36	39.64	16.28	39.5	20.757	78.4	
78	W400	"	"	200mm	"	3	"	25.13	36.39	11.26	29.6	15.555	72.4	
79	162	"	"	"	"	3		24.67	36.89	12.22	31.8	16.711	73.1	73.0
80	"	"	"	"	"	3		23.30	36.11	12.81	33.1	17.394	73.6	

4. Transfer Efficiency (TE) On Steel Panel Substrate Etch + 2K Primer + Base Coat

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	Paint Thickness Applied
P14	W400		Control	Panel	for	weight	loss		5041.3	5041.0	-0.3					
P15	142	Fully Open	2.0Bar	150mm	Upright	4	1½ct No F/O	56.2g in 20S	5010.4	5025.7	15.3+.3 *=15.6	39.9	20.97	74.4	74.7	34
P16	"	"	"	"		4	"		5016.3	5034.2	*18.2	46.2	24.28	75.0		41
P17	W400	"	2.0 Bar	150mm	Upright	4	"	58.59g	5003.0	5020.5	*17.8	45.4	23.86	74.6		42
P18	162	"				4	"	in 20S	4966.3	4982.1	*16.1	40.8	21.44	75.1	74.9	44

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

RESULT SHEET 4+ RETEST TO CHECK PREVIOUS WORK DUE TO POSSIBLE VISCOSITY RISE Date: 20.1.1998

1. Materials: Standox 2K HS Clear Lacquer
   Viscosity: Start 28S DIN 4 20°C End 28S DIN 4 20°C Stoving Schedule: -Foil 70°C for 90 minutes
   Spray Temp. 20°C
   Spray Humidity 35% RH Solids Temp/Time 130°C for 120 minutes
   Spray Time 20 minutes approx
   Mix Ratio 2:1 (Mixed by wt. 495g Lacquer: 250gm hardener Kurz)

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
C-1.	6.50	7.37	10.38	3.88	0.5265	
C-2.	5.62	7.96	9.91	4.29	0.5389	0.5335
C-3.	5.96	7.57	10.01	4.05	0.5350	

3. Transfer Efficiency (TE) On Foil

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
87	W400	Fully	2.0 Bar	200mm	Up	3	67.3g	25.25	39.53	14.28	36.6	19.526	73.1	
88	162	Open	"	"	Right	3	in 20S	24.96	38.87	13.91	35.5	18.939	73.4	73.3
89	"	"	"	"	"	3		24.69	37.42	12.73	32.5	17.339	73.4	
90	"	"	"	150mm	"	4		23.60	38.83	15.23	37.7	20.113	75.7	
91	"	"	"	"	"	4		23.72	39.54	15.82	38.8	20.700	76.4	76.7
91	"	"	"	"	"	4		24.30	40.59	16.29	39.2	20.913	77.9	