D.1 OPERATIONAL INFORMATION REQUIREMENTS

These descriptions apply to aircraft which are brought in for paint stripping or sanding followed by repainting of the exterior surface. No exterior maintenance is carried out on the aircraft.

The numbering system below refers to corresponding process figures attached.

MAIN PAINT HANGAR
[Note: in the following process descriptions, certain steps may be performed in parallel in order to minimise overall processing time.]

Pre-Stripping/Sanding (A)

1, 2, 3, 4 Once the aircraft arrives the hangar doors are opened and the aircraft is brought inside. The doors are closed and docking is positioned around the aircraft to permit access to all areas during the operations. This is referred to as docking the aircraft.

The aircraft is electrically earthed by connecting the "earthing point" on the fuselage to earthing points in the hangar. This is referred to as bonding the aircraft. The purpose of this is to prevent static charges building up on the aircraft and thereby eliminate fire risks associated with sparking. Bonding the aircraft is also crucial to the efficient application of paint.

5 Heating is switched on once the doors are closed. This is to bring the aircraft and hangar up to the temperature required (minimum 18 degrees Celsius). This depends on outside air temperature.

6 Paint materials and chemical strippers to be used during operations are also brought from the stores 2 days in advance of use. This is to ensure that they reach the required temperature. In order to minimise risks of spillage, larger quantities of materials are stored in the bunded store rooms and brought to the main building in quantities necessary for each aircraft only. Strippers and acetone/toluene are provided in 200lt drums, other paint materials are supplied in 5lt to 25lt tins.

7 The removal of galleys, lavatories, seats and other interior workings for inspection and servicing in the workshops. Currently this step is not carried out in Lufthansa Technik Painting Shannon.

Chemical Stripping (B1)

8 Prior to applying chemical stripper to the aircraft, composite areas are masked using a combination of craft paper, masking tape, aluminium foil and polythene sheeting.
9 In order to collect paint and stripper during the stripping process, polythene sheets are laid out under the aircraft fuselage.

10 Ventilation is switched on.

11 Stripper is applied to the surface where stripper is required. Stripper pumps spray the stripper on. Generally, this begins at the tail, proceeds to the fuselage and then the wings. However, in many cases only parts of these areas are chemically stripped. In particular, wings are often sanded rather than chemically stripped. Composite areas must only be sanded. Masking is used to prevent stripper accidentally reaching such areas. Strippers containing formic acid are used. In the past, methylene chloride strippers were used however this type of stripper is now banned in Lufthansa Technik Painting Shannon.

12 The stripper is allowed to soak into the paint for some time. Depending on the number of coats previously applied and a number of other factors affecting the adhesion of the paint to the metal, the duration of the time required for the stripper to be effective can vary significantly. Repeated applications may be necessary to some or all of the areas. Stripper and paint flakes fall to the polythene sheeting on to the floor below.

13 During this “soak time” the opportunity is taken to sand some of the areas such as wings or composite areas. Sanding is performed by means of hand held portable sanders with in line vacuum. Particulates generated in this way and filtered and collected down the line. Abrasive discs are attached to the portable sanders.

14 Once the stripper has acted, the remaining stripper and paint flakes are removed using rubber squeegees. The residue is collected in the polythene sheets which are then gathered.

15 The liquid component of the waste is placed in 200lt open top drums and the plastic is set aside for compacting later on during clean up of the hangar.

16 Turco Jet Clean C (detergent) is wiped onto the stripped surfaces and the plastic is set aside for compacting later on during clean-up of the hangar.

17 A “wet” wash is then required. Hand held pneumatic rotary tools with water attachments are used. “Scotch bright” pads are attached and water trickles through the devices.

18 Ventilation is switched off.

19 The pumps, lances and associated hoses are then cleaned by running a mixture of acetone and toluene through them. This is supplied in closed top 200lt drums and the waste acetone/toluene is also fed into a closed top 200lt drum.
20 Sanding of the remaining composite areas is carried out as per step number 13.

**Post-Stripping Treatment (B2)**

21 Old sealer damaged by the stripper is removed from the aircraft joints by hand using a Teflon scraper. The waste sealer (~2kg) is disposed of along with the waste stripper.

22 The joints are then wiped with cleaning solvent C28/15 to prepare them for new sealer application.

23 Masking tape is applied along the side of the joints and the joints are resealed with the appropriate sealer by means of a special pneumatic application gun. Sealer is supplied in tubes in which the components are mixed immediately prior to use.

24 In preparation for painting, the aircraft is re-masked as per step number 8 above. Earlier masking that is no longer required is removed. Windows and certain areas not be painted with a particular colour are covered. The quantity of masking waste depends on the number of colours and the complexity of the colour schemes.

25 If necessary, rust inhibitors (Alochrome 1200, Turco Metal Glo 6) may be applied to localised areas of the aircraft surface. Ventilation is switched on prior to commencing this operation. The rust inhibitor is applied by hand using brushes and reacts with the surface of the metal to prevent corrosion. Up to 50 litres of material may be supplied.

26 Ventilation is switched on.

27 The entire surface area of the aircraft to be painted is cleaned with panel wipe solvent. This is applied with rags ("Tack rags") soaked in the solvent.

28 Aircraft which have been chemically stripped require a coat of primer containing corrosion inhibitors (FCR Primer). This primer is mixed with FCR hardener and thinner.

29 The primer is applied to the aircraft using paint spray guns. This begins at the tails, proceeds to the fuselage and then the wings.

30 The primer coat is then left for a period to dry.

**Sanding (C)**

31 In the case of aircraft which are to be sanded the aircraft is masked as above. Slightly less masking is required as composite areas do not need to be protected from stripper.
32 Ventilation is switched on.

33 As described in step number 13 all other areas of the aircraft are sanded.

34 The aircraft is power washed with high pressure water nozzles. No detergents are used during the wash.

35 Unnecessary masking is removed.

36 The entire aircraft is degreased as described in step number 27.

**Painting (D)**

37 All aircraft whether stripped chemically or sanded require a coat of chromate free primer (CF Primer). This is mixed with thinner and hardener.

38 As in step 29 the primer is applied using paint spray guns.

39 The CF Primer coat is then allowed to dry.

40 Paint guns are cleaned using the acetone/toluene mixture similar to the process for cleaning stripper lances and pumps (step 19).

41 Paint is mixed with hardener and thinner.

42 As for the primers each coat is applied using paint spray guns. Depending on the colour scheme required by the customer not all areas may be painted a particular colour. Generally the fuselage is first to be painted as it is the largest area. Smaller areas of a particular colour are painted later.

43 The coat of paint is left for approximately one hour to dry.

44 Steps 42, 43, and 44 are usually repeated for 3 coats. The final coat of each colour is allowed 8 to 10 hours dry before the next colour begins.

45 As in step 24 the aircraft is re-masked in preparation for the next colour. Steps 40 to 45 are repeated for each colour. A number of colours may be painted at the same time if their areas are sufficiently far apart not to interfere with each other.

46 Logos may be painted on or applied to the aircraft as labels. The process is similar to steps 40, 41, 42 and 44. Masking or stencils are used as necessary.

47 .

48 .

49 .

50 Logos may be affixed as vinyl labels.
Clear Coat (E)
51 In some cases a clear coat is required as per customer specifications. Application of a clear coat is a very rare occurrence. Paint spray guns are cleaned as in step 40.

52 The clear coat varnish is mixed with hardener and thinner similar to that for paint.

53 Just one coat of clear coat is sprayed onto the entire aircraft. Masking is only required for areas such as windows.

54 This is then allowed to dry over a period of 8 to 10 hours.

55 All masking is removed from the aircraft. Solvent (C28/15) may be used to dissolve gum from the masking tape and aluminium foil.

56 Technical markings ("Teck marks") such as registration numbers are then painted on by hand using stencils.

57 Paint spray guns are given a final cleaning using acetone/toluene for a duration of 2 to 3 hours.

58 Heating and ventilation is switched off.

Edge Sealing (F)
59 If a clear coat is not required the paint edges of logos and around windows are sealed. The aircraft is fully de-masked before this.

60 Technical markings ("Teck marks") such as registration numbers are painted on by hand using stencils.

61 Paint spray guns are given a final cleaning using acetone/toluene for a duration of 2 to 3 hours.

62 Special edge sealing paint is applied by hand to the edges of logos, around windows and anywhere the paint meets the bare surface.

63 Heating and ventilation is switched off.

Hangar Clean-up (G)
64 Docking is removed from around the aircraft and the earthing connection to the aircraft is disconnected.

65 The hangar's doors are opened.

66 The aircraft is removed from the hangar.
67 Hangar doors are closed.

68 All remaining waste in the hangar is cleaned away. The hangar floor is swept.

69 The plastic sheeting from chemical stripping is put into 200lt barrels and is compacted using a heavy weight in order to minimise the number of waste barrels necessary.

70 All barrels of waste paint sludge, waste acetone/toluene, stripper waste are removed to the bunded waste store.

71 The water collected in the sump is pumped into IBC's and stored in the bunded waste store. Water is also collected by tanker truck and sent directly to licenced waste contractors for treatment.

INTERIOR WORKSHOP

Workshops – Sidewall Panel Recovery (H)

72 Components to be maintained by Lufthansa Technik Painting Shannon will be stripped of existing decorative laminate, where applicable by hand using a heat gun and scraper, or in the HLM lamboack machine. Components are washed to remove any trace of glue.

73 Components are then prepared for recovery. The preparation work typically includes filling and sanding of surface imperfections and performance of resin and fibreglass repairs to damaged panel. Panels will have vacuum holes drilled in this section to pull décor onto contour areas of the panel in the next stage.

74 The components then undergo a recovery process – which typically includes the application of an adhesive primer (where applicable) to the panel surface and the application of the required decorative laminate. Décor will be hand-tacked onto the component and finished off in the HLM vacuum machine.

75 The components are then reassembled and finished. This usually includes the application of an adhesive primer to the area of the panel to be finished/wrapped and to the decorative laminate.
PRE STRIPING/SANDING PROCESS FLOW - HANGAR

1. Doors Opened
2. Aircraft Into Hangar
3. Doors Closed
4. Aircraft Docked & Bonded (Earthed)
5. Heating Switched On
6. Painting/Stripping kits brought into Hangar or Workshops
7. Interiors (Galleys, Lavs, Seats) removed from aircraft to workshops (see workshops flowchart)
8. Interior Not Removed

Duration
5-30mins
1-2 days

IPC LICENCE APPLICATION
Duration
6-8 hrs.
6-8 hrs.
0.5-1 hr.
1-1.5 hrs.
4-12 hrs.
3-4 hrs.
6-8 hrs.
1-2 hrs.
8 hrs.

Chemical Stripping Process Flow - Hangar

1. Aircraft Masking
2. Polythene Sheets Placed Under Aircraft
3. Ventilation Switched On
4. Stripper Applied to Tail, Fuselage & Wings
5. Soak Time
6. Some Sanding of Composites While Waiting
7. Repeat as Necessary
8. Remaining Paint & Stripper Removed using Squeegees
10. Power Wash
11. Wet Wash
12. Ventilation off
13. Pumps, Lances & Hoses Cleaned
14. Remaining Sanding of Composite Areas
POST STRIP TREATMENT PROCESS FLOW - HANGAR

1. **Duration**
   - 8-10 hrs.
   - 1-2 hr.
   - 8-10 hrs.
   - 2-4 hrs.
   - 10 mins - 8 hrs.
   - 3-4 hrs.
   - 10-30 mins.
   - 1-2 hrs.
   - 1-2 hrs.

2. **Flowchart**
   - 21. Remove Sealer & Clean between Joints
   - 22. Joints Wiped With Solvent
   - 23. Joints Lined Out & Resealed
   - 24. Aircraft Remasked in Preparation for Painting
   - 25. Metal Treatment (localised)
   - 26. Ventilation Switched on
   - 27. Degreasing with "Tac" Rags and Solvents
   - 28. F.C.R Primes Mixed Ready for Use
   - 29. F.C.R Primer applied to Tail, Fuselage & Wings
   - 30. Coat Dries

3. **IPC LICENCE APPLICATION**
SANDING PROCESS FLOW - HANGAR

IPC LICENCE APPLICATION

Duration

6-8 hrs.

2-3 days

3-5 hrs.

2-4 hrs.

3-4 hrs.

A

31 Aircraft Masked

32 Ventilation Switched on

33 Paint Removed Using Hand Held Sanding Machines

34 Power Wash

35 Removal of some Maskings

36 Degreasing with the Bags and solvents

For any reproduction, except for purposes of review, consent of copyright owner required for any other use.
Duration
10-30 mins
1-2hrs
1-2hrs
10-30 mins
0.5-1 hr
30-45 mins
1-2hrs
8-10 hrs
2-4 hrs
10-30 mins
0.5-1 hr
1-2hrs
8-10 hrs

(N.B. Ventilation remains switched on from process)

37 CF Primer Mixed
38 CF Primer Applied
39 Coat Dries
40 Paint Guns Cleaned

41 Paint Mixed

42 Paint Applied Where Required On Fusilage, Wings & Tail
43 Drying Time
44 Wait For Final Coat to Dry
45 Masking For Next Colour

46 Paint Guns Cleaned
47 Paint Mixed
48 Logos Painted
49 Wait to Dry
50 Logos Affixed As Labels

PAINTING PROCESS FLOW - HANGAR

IPC LICENCE APPLICATION
CLEAR COAT PROCESS FLOW - HANGAR

Duration

0-30 mins

0.5-1hr

30-45mins

8-10hrs

2-3hrs

5-6hrs

2-3hrs

Paint Guns Cleaned

Paint Mixed

(Ventilation on)

1 Coat Applied to Whole of Aircraft

(Ventilation off)

Wait for Coat to Dry

Full Demasking of Aircraft

"Teck Marks" Applied By Hand

Paint Guns Cleaned

Heat Off
Duration

0.5-1hr

1-2days

2-3days

CLEAN-UP PROCESS FLOW - HANGAR

IPC LICENCE APPLICATION

- Aircraft de-docked & de-bonded
- Doors Opened
- Aircraft Removed from Hangar
- Doors Closed
- Hangar Idled
- Stripper & Plastic Barreled & Compacted
- Barrels Removed to Waste Store
- Sump emptied
Hangar Materials Flow Chart

1. Doors Opened
2. Aircraft into Hangar
3. Doors Closed
4. Heating Switched On
5. Aircraft Docked & Bonded (Parked)
6. Painting & Stripping Kits Brought into Hangar or Workshop
7. Aircraft (outside) - Seals Removed from Aircraft in Workshop; See Workshop Flowchart
8. Craftpaper, Plastic Sheeting, Aluminium Foil, Masking Tape
9. Polythene Sheets Placed Under Aircraft
10. Ventilation Switched On
11. Stripper Applied to Tail Fuselage & Wings
12. Soak Time
13. Some Sanding of Composites While Waiting

Hangar Materials Flow Chart

IPC Licence Application
14 Remaining Paint & Stripper Removed using Squeegees

15 Plastic Stored for Barrelling Liquid Waste Immediately Collected in Drums

16 Power Wash

17 Wet Wash

18 Ventilation off

19 Pumps, Lances & Hoses Cleaned

20 Remaining Sanding of Composite Areas

21 Remove Sealer & Clean between Joints

22 Joints Lined Out & Resealed

23 Joints Wiped With Solvent

24 Aircraft Remasked In Preparation for Painting

25 Metal Treatment (localised) Ventilation on

26 Ventilation Switched on

27 Degreasing with "Taco" Rags and Solvents

Waste

Paint, Stripper

Rags

Power Wash

Waste

Scotchbrite pads

Water

Ventilation off

Air

Solvents (Acetone, Tolene)

Waste

Acetone Tolene

Abrasive discs

Noise

Air

Particles

Waste

Parties Abrasive discs

Sealer

Air

Solvents

Waste

Tins

Solvent

Masking tape, craft paper, polythene sheets, aluminium foil

Masking tape, craft paper, polythene sheets, aluminium foil

Waste

Metal Treatment (localised) Ventilation on

Air

Waste

Brushes, rags

Rags

Degreasing with "Taco" Rags and Solvents

Air

Solvents

Waste

Tins, rags

HANGAR MATERIALS FLOW CHART

IPC LICENCE APPLICATION