



DuPont Printed Circuit Materials

A member of DuPont *i*Technologies

Avoiding Repetitive Lamination Defects

Technical Bulletin TB-0173

Introduction

Photoresist lamination must provide good resist conformation and adhesion to the copper surface. Cuts or debris on the laminating roll surface can cause defects in the lamination quality and problems in further processing. This technical bulletin describes the types of defects that can occur with damaged or contaminated rolls, and guidelines for identifying and correcting this problem.

Types of Roll Problems

Generally, there are two types of laminating roll problems that cause defective photoresist lamination:

- A pit, hole, or cut in the rubber roll material.
- A bump or nodule of foreign material (contamination).

The pit or hole causes inadequate lamination pressure which may cause an air void or low adhesion that will not survive the rest of the process. See Figure 1. Even very small pits that are difficult to see can cause defects.

Bumps or nodules on the roll are usually caused by resist contamination. They increase lamination pressure in those areas, causing thin spots that may not survive through processing. A thick bump with steep sidewalls may cause air voids or low adhesion around the edge of the bump as well as the thin resist area. See Figure 2.

Both types of roll defects will cause opens or nicks in etching applications, and shorts or excess copper in pattern-plate applications.

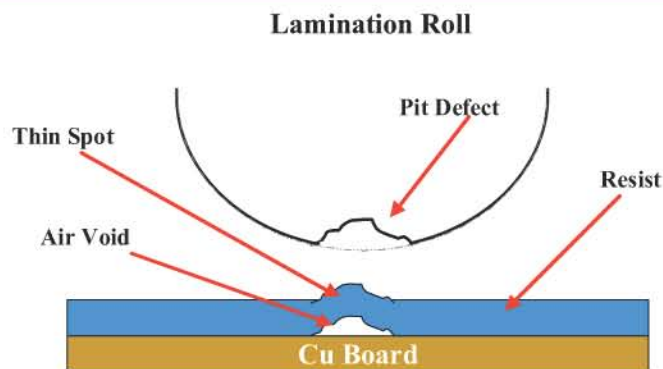


Figure 1. Defect Caused by Pitted Roll

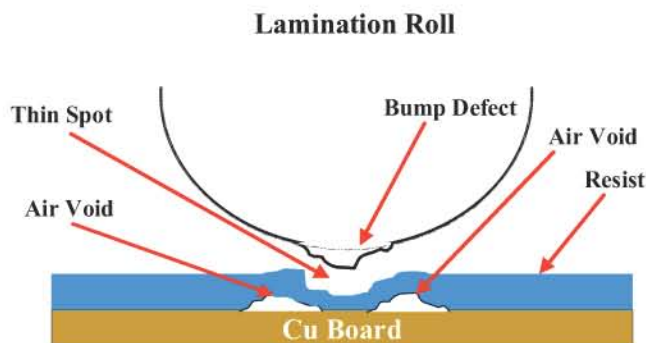


Figure 2. Defect Caused by Bump on Roll
(Air voids may not be present)

Identification

Repetitive lamination voids can be easily detected. Most appear as light spots on laminated boards because of the air under the resist. Thin spots without air voids are seen as dimples in the resist when observed at an angle.

All defects caused by the laminating rolls will repeat at a distance equal to the circumference of the roll.

Examples of Laminating Roll Circumferences

DuPont ASL-24 264mm (10.4in)

DuPont HRL-24 190mm (7.5in)

Note that, due to the spacing between boards, defects may not appear at the same location on each board.

Inspection

Operators should examine laminated boards regularly. If defects are found they should cease board lamination until the roll defect is located.

Bump and pit defects are different in appearance. Bump defects appear as thin spots; some may have light halo areas around the spots. Pit defects appear as uniform light areas; the defect shape will be similar to that of the defect on the roll.

Problem Correction

Bumps

Bumps caused by resist contamination can usually be removed by cleaning the rolls with isopropyl alcohol. Rolls should be inspected and cleaned daily as needed and as part of the regular preventive maintenance.

WARNING!

Isopropyl alcohol is flammable. Keep cleaning materials that are wet with isopropyl alcohol away from hot surfaces and electrical contacts such as switches.

Pits and Cuts

Problems caused by pits on the laminating rolls can be corrected permanently only by replacing the roll. Spare sets of rolls should be kept on hand so that the working rolls can be replaced as soon as problems are observed. Recovered rolls are available from several vendors as a less costly alternative to new rolls.

If replacement rolls are not immediately available, temporary repairs can be made to pits and cuts. Fill and smooth the area with G.E. RTV 106 High Temperature Silicone Adhesive Sealant. However, these repairs can fail within days because of thermal cycling. Repaired rolls should only be used until replacements are available.

The best method of resolving this problem is to prevent pits and scratches from occurring. They are usually caused by:

- Razors, knives, and other sharp objects used to trim resist or to scrape material off the rolls.
- Sharp board edges caused by poor edge preparation of multilayer boards.
- Rough handling of boards near the rolls.
- A high setting on the ASL-24 roll unclamp position counter.

*Written by: G. Sidney Cox and George Kovalick of
DuPont Printed Circuit Materials*

Contact Us

Americas

DuPont Printed Circuit Materials

14 T.W. Alexander Drive

Research Triangle Park

N.C. 27709-4425

E-Mail: americas.pcm@usa.dupont.com

Tel: Customer Service, 800-243-2143

Tel: 919-248-5000

Fax: 919-248-5550

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