

INSTITUTE OF CIRCUIT TECHNOLOGY



PRINTED CIRCUIT TECHNIQUES
SHORT COURSE

AT

DORSET INSTITUTE OF HIGHER EDUCATION
LANSDOWNE, BOURNEMOUTH

FROM

MONDAY 19TH NOVEMBER - FRIDAY 30TH NOVEMBER 1979

THE INSTITUTE OF CIRCUIT TECHNOLOGY
DORSET INSTITUTE OF HIGHER EDUCATION

Director: C. Brewington.

Course Organiser:- J.S. Brooks, BSc, F.Inst.C.T.

PRINTED CIRCUIT TECHNIQUES COURSE

A two-week full-time course on
Printed Circuit Techniques

Monday 19th November - Friday 30th November, 1979.

THE COURSE

The course will cover the whole range of techniques involved in printed circuit production starting with circuit diagram and ending with finished assembled board. Lectures will cover artwork layout and photography, laminate materials and their properties, photomechanical and screen printing processes, chemical processes (etching, plating and cleaning) mechanical processes (drilling, routing, cutting), assembly techniques, soldering, inspection, quality control, production planning and some aspects of cost effective production.

There will be demonstrations and practical work, together with films, and a visit to a factory. There will also be ample opportunity for discussions within the group and with the lecturers.

There will be one three-hour theory examination set by the course lecturers and assessed by The Institute of Circuit Technology, who will give a Special Certificate to successful students. Course Fee £60.00.

NOTES

1. The course is sponsored by the Institute of Circuit Technology and has the approval of the Printed Circuit Group of the Institute of Metal Finishing.
2. The Lodgings Officer of the Dorset Institute will be able to assist in finding suitable accommodation at student rates if required.
3. The course has been approved for refund of course expenses under the general grant scheme for technician training where appropriate.

The lecturers will be drawn from experienced members of the P.C. industry, both from the manufacturers and the materials suppliers as appropriate. All the lecturers are experienced in use of the most up-to-date methods and materials.

ENTRY REQUIREMENTS

The course is intended for staff already engaged in some branch of the industries using these techniques who will gain from a broader view of the scope and developments of the processes involved, from design and art-work through to finished products.

An academic level of about four appropriate G.C.E. Ordinary levels is expected.

Applicants from design, planning, inspection, production with photography, etching, plating etc., are expected to enrol.

Enrolment Form

To: Mr. J.S. Brooks, BSc. F.Inst.C.T., Course Organiser,
Faculty of Science & Technology, Dorset Institute of Higher
Education, Lansdowne, Bournemouth, BH1 3JJ, Tel: 0202 20844 ex.57.

Please enrol the following/send further information on Printed
Circuit Techniques Course.

Name(s) _____

Employer _____

Position(s) held _____

Qualifications _____

Address for reply _____

Tel.No./ext. _____

Is accommodation required YES/NO

Fee Enclosed £60.00 Cheque/Money Order

*Cheques to be made payable to Dorset County Council.

DORSET INSTITUTE OF HIGHER EDUCATION

In Conjunction with

INSTITUTE OF CIRCUIT TECHNOLOGY

BASIC PRINTED CIRCUIT TECHNIQUES

Examination (November 1979)

Attempt SIX Questions

Date: Friday, 30th November, 1979.

Time: 9.30 - 12.30

- ~~1.~~ Describe the production and use of Copper Foil in the process of Laminate manufacture.
- ~~2.~~ State and explain FOUR important factors which will influence your choice of type of artwork to produce (single or double-sided, T.H.P. etc.). Outline FOUR methods of artwork generation available, commenting on their advantages and disadvantages. Explain why the artwork is so important.
3. a) Explain why a general purpose large format camera and lens is normally unsuitable for precision line work for printed circuit photographic images.
b) State and explain what essential film and developer characteristics you would require for copying black and white originals.
- ~~4.~~ Describe a low pressure lamination procedure and explain the meanings of the following terms:-
i) press plates, ii) release film, iii) pre-preg or 'B' stage,
iv) GEL time, v) measling, vi) Padstock, vii) Kiss-Pressure.
5. a) Explain the importance of a clean copper surface prior to lamination.
b) What do you understand by ORGANIC soils?
c) How do we know when exposure levels are too high or too low?
d) Name the four factors which can influence the developing process.
6. Describe and explain the process steps and reasons for using:
a) acid copper and b) tin-lead electrodeposits.
- ~~7.~~ Define the quality control activities that you would anticipate seeing at the following stages of Multilayer printed circuit manufacture. Indicate where any formal specifications are involved by their reference, (but do not attempt to give detail).
(a) Raw material receipt (g) Pattern plate
(b) Artwork production (h) Second drill and profile
(c) Print and etch layers (j) Final Inspection
(d) Laminate layers (i.e. press) (k) Repair
(e) Drill and back etch (l) P.C. Test Lab.
(f) Through hole plate

8.
 - (a) What is the scope of the Health and Safety Act at work?
 - (b) What are the employees duties?
 - (c) What are the manufacturer and suppliers duties under the Health and Safety Act?
 - (d) What are the employers duties under the Health and Safety Act?

9.
 - (a) What are the Specifications (numbers only) that a manufacturer should purchase if he wishes to market boards of Assessed Quality for double-sided, plated through holes on flame retardant epoxy glass fabric material?
 - (b) What, in broad terms is a 'Customer Detail Specification' (BS 9760) series and name the typical items included.
 - (c) What is 'PD 9002' BS9000?
 - (d) What is a manufacturer required to define as his 'Capability' under the BS 9760 system?

- ✓ 10.
 - (a) State the three main types of material used in manufacture of screen fabrics and discuss the reasons why they are or are not used in the printed circuit industry.
 - (b) Direct and indirect photostencils are important methods used to obtain the desired pattern on a mesh. Discuss the techniques employed in their use indicating mesh preparation, adhesion to fabric and exposure. Discuss the considerations that are involved in choosing between the two methods.

- ✓ 11. Describe and explain the structure and use in P.C.B. manufacture of
a) Press-tools and b) Drills.
Outline the problems likely to arise when tools are imperfect.

12. You are asked to produce a P.C.B. which is to have tracks of 10 thou width (250 microns) and of 3 thou depth (75 microns). What thickness of base copper would you use and how would you prevent the mushroom effect on plating.
(Tin-Lead Phase Diagram)
Use given phase diagram of the tin-lead couple to explain briefly the importance of alloy composition in the fusing of tin-lead plated boards and define the terms 'fusing' and 're flow'.

- ✓ 13. Draw a diagram of a 'typical family tree' showing the importance of who reports to who with relevance to each job function.

Sketch of Tin-Lead couple Phase Diagram

