

RAL

DESIGN & DISCOVERY

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RUTHERFORD APPLETON LABORATORY

SCIENCE AND ENGINEERING RESEARCH COUNCIL

TECHNOLOGY CHOICES

Integrated Circuits.

Standard products.

Commercial chips available from industry provide the most cost effective route to implement many functions. For certain types of device, eg memories, this is also the highest performance route because the manufacturers have made large investments in developing the products and optimising their fabrication facilities. Among the devices used in the division are processors such as the Motorola 68000 series, Transputers, digital signal processors, memories, bus drivers, fast ADCs and standard logic families.

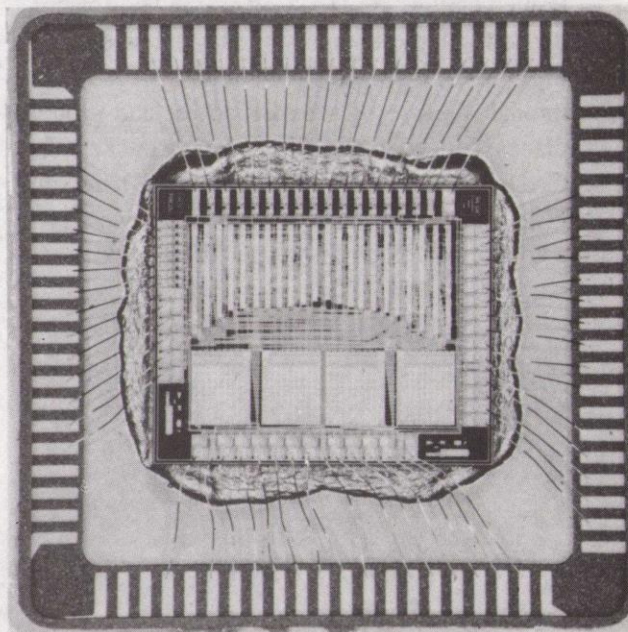
Programmable devices.

These devices include programmable memories and arrays of gates and latches with programmable interconnections. Storage technologies vary from once only fuse programming to electrical programming with ultra violet light erasing and devices such as Xilinx programmable gate arrays which download their programmes from external memories or other data sources. The division has programming support, both software and hardware, for the leading families of these devices.

Custom circuits.

Application specific integrated circuits (ASICs) offer the greatest flexibility in functional implementation and low unit production costs at the expense of greater investment in design

time and the cost in setting up fabrication runs, the non-recurrent expenditure (NRE). In the case of gate arrays the chip manufacturer supplies a predefined array of gates and the designer defines the final metal interconnection layer. This process offers the lowest NRE and fastest time to production but the least flexibility. For custom devices all the mask layers are defined by the designer giving complete freedom to design down to the transistor level at the expense of longer design times and higher NRE. The semi custom process is similar but with the addition of a library of predefined functions within the support software to speed up the design process. The division has CAD support and proven routes to manufacture for gate arrays, semi custom and full custom devices.



Board manufacture.

Wire Wrap.

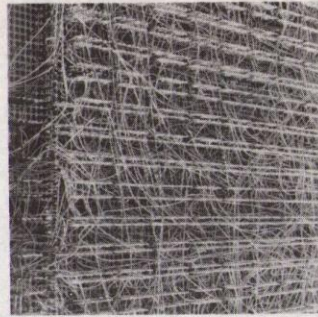
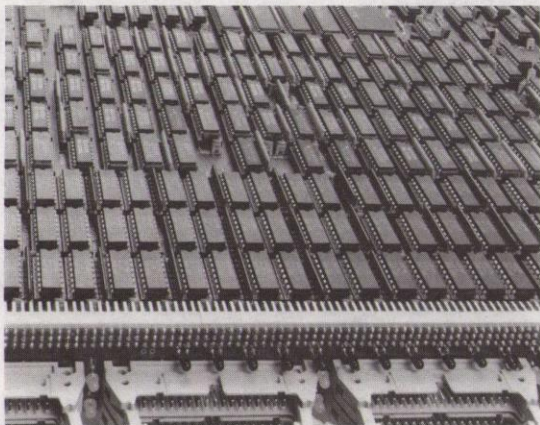
Wire wrap is a technique for making interconnections by wrapping wires onto the extended square pins of specially designed device sockets. The process produces a high reliability cold weld joint as the bare wire is wrapped under tension around the pin. The division has software support to provide computer readable wiring information directly from the CAD system data base and an in house facility for semi automatic wrapping. The technique is ideal for prototyping and low volume production as it provides a fast turnaround and is easily manually modified.

Multiwire.

Multiwire is a technique available from industry where interconnection wires are laid down and bonded onto a printed circuit board which carries the power and ground connections. Manufacturing information can be generated by the CAD system. Design costs are low but manufacturing costs are high making the process suitable for low volume production.

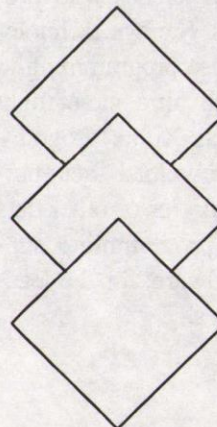
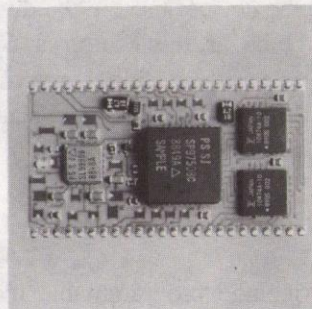
Printed circuits.

Printed circuits are the standard method for production volume boards. Multilayer boards offer high component density and performance through the use of separate power and ground planes and controlled impedance tracks. The CAD software and 'routing engine' hardware gives an in house design time of a few weeks for complex boards of several hundred devices and up to 10 layers.



Surface mount and hybrid circuits.

Surface mount techniques and hybrids utilise small leadless chip carriers to provide the highest available circuit density and offer the potential performance advantage of shorter track lengths. The surface mount process uses conventional printed circuit boards. These are silk screen printed with a solder paste which is reflowed after the components have been placed in position. Hybrids use a similar assembly technique but use ceramic substrates with resistors printed directly onto the substrate.



For further information, please contact Peter Sharp or Steve Quinton on 0235 446242 or 0235 445534.