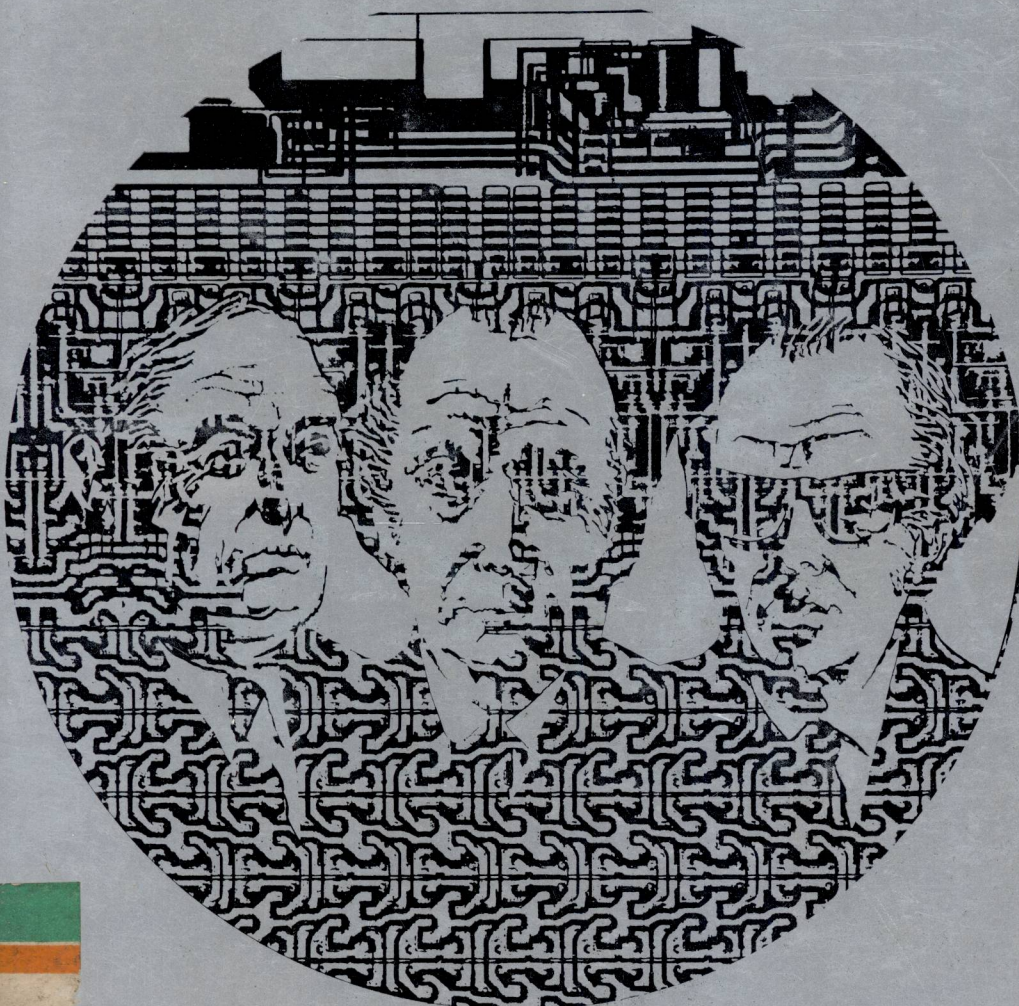


Computerguide 9: Production Control



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Computerguide 9: Production Control

This Computerguide, a companion volume to "Factfinder 13: Production Control Packages", is the result of a survey carried out by NCC at the request of the Department of Trade and Industry into the use of computers for production control in UK manufacturing industries, with emphasis on jobbing and batch manufacturing applications. The information contained in the guide is based on a questionnaire survey of 448 companies and visits to 80 companies in the UK using computer-aided production control systems.

The book, which is aimed at production and DP management, highlights the main problem areas of developing, implementing and operating computer-aided production control systems and serves as a guide to existing and potential users of such systems. In addition it examines criteria such as reductions in stock, reductions in queueing times, to establish whether or not relationships exist between those companies who have achieved some measurable benefits in these areas and their method of approach in applying computer systems to production control.

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COMPUTERS AND THE MANAGER



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Computerguide 9: Production Control

**Report to DTI on the
use of computers for
production control in UK
manufacturing industries**

by

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Introduction

Summary and List of Recommendations

At the request of the Department of Trade and Industry, in 1972 the NCC carried out a survey into the use of computers for production control in UK manufacturing industries, with emphasis on jobbing and batch manufacturing applications.

Initially some 672 companies were contacted and general information on their type of activity obtained from 448 of them. From these companies 134 provided detailed information by means of a comprehensive questionnaire and 80 of these were visited by NCC staff in order to make a first-hand appraisal. In addition, a wide variety of non-commercial organisations who were active, or had an interest in production control by computer were approached for their views.

It is apparent from the survey that the use of computers for production control applications throughout UK industry is still fairly limited. Only a small proportion of large and medium-sized companies use computers for production control in any really practical way, and in small companies the use is almost negligible. However, the 134 survey companies are generally convinced that using a computer is definitely beneficial, 83% of them strongly supporting this view. This is practical evidence of the considerable potential benefits, both tangible and intangible, which can be realised nationally if computer-aided production control is introduced effectively in the great majority of manufacturing companies which at present do not use these techniques. The rapid development of mini computers, bureau facilities and proven production control

applications packages will probably be the strongest influencing factors in enabling this potential to be realised.

The most significant problems and experiences of users have been:

- lack of effective education, particularly at senior and middle management levels
- lack of opportunities for interchanging information and experiences with other organisations
- difficulties in expressing the benefits of the systems to the company as a whole in precise financial terms
- lack of information about applications packages that can be readily understood by production management
- difficulties of collecting accurate data for setting up and maintaining master files.

The benefits most widely felt were through better and more rapidly available information and reduction of stocks and work-in-progress; stock control is in fact the most widely used production control sub-system, being operated in 80 % of the companies.

At a national level, the main problems are caused by difficulties of communication with non-users, and the wide variety of disciplines and techniques which the subject of production control embraces. Consequently no single specialist organisation exists which can fully provide effective, practical and impartial help to the user in the depth which is required. The situation is highly fragmented and no really effective focal point exists. To remedy this situation, to minimise the typical problems encountered by users and to promote greater manufacturing efficiency, a national Reference Centre for Production Control and associated systems is proposed, which would provide:

- (i) impartial practical advice and assistance — this would be achieved through a series of specialist units based on individual companies to give experience in different features of production control systems; and facilities for sponsoring important development work by individual companies to encourage more effective progress;
- (ii) co-ordination and dissemination of information and publicity, and the establishment of suitable standards;

- (iii) a bridge between the many organisations providing services and facilities to users.

In association with this it is proposed that the setting up and co-ordination of information services in production control should be examined initially, and the opportunities for development opened up by membership of the EEC investigated.

Development of the Study

The use of the computer, with its capacity for handling large volumes of complex data quickly and accurately, started to assume some significance for the control of manufacturing processes in the late 1950's, but it was not until the early 1960's that its impact became felt to any real degree in the control of production. Many of the earlier installations tended to create more problems than they solved and quite a few of the pioneering companies bought their experience very dearly. Many claims were made in favour of the new techniques and not many were substantiated to any real degree, but this was hardly surprising in that a new and rapidly developing technology was being harnessed to one of the most complex areas of human activity, manufacturing industry.

Since the early development years much experience has been gained and consolidated. Many companies have had nearly a decade of practical operating experience and their systems have become stabilised to a degree which probably for the first time allows a reasonably comprehensive assessment to be made of the effectiveness with which computers are now being used in this very important area throughout the whole of the UK.

In January 1971 a DTI Working Party on Production Control agreed that the situation was unsatisfactory in several respects and noted in particular that little factual information was available about the extent of computer usage or the problems and experiences of users. Consequently in mid 1971 the Department of Trade and Industry agreed that the National Computing Centre Ltd. should undertake a jointly financed study —

“to carry out a survey and prepare a report on the current use of computers for production control in the UK”.

The report is aimed at Production and DP management and recommends possible courses of action both at company and

national levels to improve the situation. The study is chiefly, but not exclusively, concerned with the general engineering, jobbing and batch production environment, being similar in many respects to the smaller exercise carried out by the NCC in 1967.*

The report highlights the main problem areas of developing, implementing and operating computer-aided production control systems and serves as a guide to existing and potential users of such systems. In addition it examines criteria such as reductions in stock, reductions in queueing times, etc., to establish whether or not relationships exist between those companies who have achieved some measurable benefits in these areas and their method of approach in applying computer systems to production control.

During the course of this study a parallel study of currently available major production control applications packages was also undertaken by the survey team and this is referred to in the relevant sections of this report. (See Factfinder 13: Production Control Packages, NCC Publications, May 1973.)

The Structure of Production Control

One of the main problems in any discussion of production control is the difficulty of definition, both of the term itself and of the many areas and techniques which it covers. Different aspects of production control receive different emphases, depending on such factors as the type of production, the type of industry, the size of company, etc. When the subject has to be considered in conjunction with the rapidly developing field of computers and data processing which in turn have their own problems of definition, then the difficulties are compounded.

Many definitions of production control exist and, as examples, four typical ones are quoted:

- (i) "Procedures and means by which manufacturing programmes and plans are determined, information issued for their execution and data collected and recorded to control manufacture in accordance with the plans" — BS 3138.
- (ii) "The function of ensuring, by issuing instructions, monitoring their execution, and correcting them if necessary, that work

*Computer-Aided Production Control — published by The National Computing Centre Ltd., August 1967.

station capacity and parts are available of the desired nature and quantity, at the desired place and time, for completion of a final product by the date required, having regard to technological constraints" — DTI Production Control Working Party Report 1971/2*.

- (iii) "The art of reconciling unrealistic delivery promises with inadequate manufacturing resources" — Lockyer.
- (iv) "The art of accepting the inevitable and managing to get the credit for it" — Anon.

Whatever the individual preferred definition may be, there is a recurring point that production control is still more of an art than an exact science, and that because of its central and fundamental role in the manufacturing process it ultimately involves all aspects of a company's operation, from basic product design and purchasing of raw material, through to sales analysis and forecasting, costing, accounting, budgetary control, etc. It seems that a precise definition of production control will inevitably be arbitrary, and depending on circumstances could be misleading. A more practical approach is to consider the total systems requirements of the company to enable it to control its operations, so that its principal objectives are achieved. In this context a better emphasis seems to be achieved by thinking in terms of "the control of production" rather than "production control".

This study covers a very wide range of manufacturing industry, the only notable exclusion being the construction industry. In order to make valid comparisons and ensure a reasonable degree of consistency a reference framework derived from the DTI Working Party Report of January 1971 was established, not with the intention of defining the subject *per se*, but to clarify its various inter-dependent areas, any one of which would be capable of significantly influencing the overall picture. This is shown in Table 1 (p. 14).

In the same way that "production control" receives different emphasis depending on the manufacturing environment, so do individual sections of it. In general terms, the main production

*The BSI has set up (Nov. 1972) a committee to prepare a draft British Standard of Production Control Terminology initially based on work carried out by this working party.

Table 1

Type of Industry	Type of Production	Type of Control System	Type of Individual Function	Type of Technique
Breakdown by Standard Industrial Classification (SIC, 1968) e.g:				
—	Job	Manual	1. Order Analysis	Statistical
Electrical	Batch	Manual-electrical	2. Purchasing Control	Predictive
Engineering Chemical & Allied Ind.	Flow	(Business machines)	3. Stock Control	Strategic
Mechanical Engineering Vehicles	Continuous	Computers:	4. Loading and Scheduling	e.g. Linear Programming
		a) intermittent	5. W.I.P. Control	Queueing and Sequencing
		b) batch	6. Sales Control	Network Analysis
		c) on line	7. Planning and Performance Analysis	Forecasting
		d) interactive	(See table below for further breakdown)	Simulation
Food, Drink & Tobacco, etc.				
1. ORDER ANALYSIS	— Order listing	4. LOADING & SCHEDULING	6. SALES CONTROL	— Ordering authority
— Parts listing	— Order breakdown (parts explosion)	— Long term planning of resources	7. PLANNING & PERFORMANCE ANALYSIS	— Sales analysis
— Raw material	— Raw parts	— Short term planning of resources		— Resource planning
— Subcontract work	— BO parts	— Scheduling		— Historical recording
— Factored items	— Progress control	— Total forward loading (blanket forward load)		— Labour utilisation
— Progress control	— Supplier performance	— Forward loading on individual resources		— Plant and machine utilisation and maintenance
— Supplier performance	— Raw material	— Progressing: by department, by resource, by product, Exception reporting	ASSOCIATED FUNCTIONS	— Product analysis
— BO parts	— Intermediate parts			— Quality analysis
— Finished goods	— Finished goods			— Cost Control
3. STOCK CONTROL				— Accounting
				— Budgetary Control
				— Payroll

control functions are taken to cover some, if not all, of the activities listed under Individual Functions in Table 1:

1. *Order Analysis*

The creation and maintenance of all the engineering information which is generated by the manufacturing and design engineers, e.g. items which go into a product or assembly, routing information, etc. This information is stored in files which are then used to break down orders into assemblies and components to determine the gross and net requirements for each.

2. *Purchasing Control*

Initiation of purchase orders and monitoring their progress from the time of requisitioning until received into stores, including order acknowledgement and quality control. Evaluation of supplier performance according to price, delivery and quality standards. (This activity is sometimes considered as a stock control function.)

3. *Stock Control*

Maintenance of stock item master files, by updating the records when goods are received or issued. Signalling when to re-order and the quantity required, through the use of forecasting techniques to project product demand, or from known outstanding items.

4. *Loading and Scheduling*

Establishing the long-term forward load and assessing the impact of alternative plans on plant capacity. Determining the short-term production requirements for assemblies, components and raw materials, and from a knowledge of the available capacity assessing the requirements for over-time, sub-contracting, etc. Assigning and issuing work to individual shop resources and re-adjusting the load in the light of the achieved performance.

5. *Work in Progress Control*

Providing the necessary documentation to accompany and progress work on the shop floor; feed back of shop floor information, issue of reports on the current location and status of all work in progress for loading and scheduling purposes. (This activity is sometimes considered as a loading and scheduling function.)