

TRAINING THE KEY TO CAD/CAM

The CAD/CAM Clinic at CAD/CAM 90 was the busiest yet. Amongst the consultants and systems managers, available to answer questions, was Roger Billsdon of ADE Analysis and Design Engineering Ltd. In this article, he examines some of the questions raised, and focuses on the key facets of effective CAD/CAM training.

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More questions on training than ever before were asked at this year's CAD/CAM Clinic, a feature of the recent CAD/CAM 90 Exhibition and Conference at the NEC in Birmingham. The Clinic was staffed by myself and eleven other CAD/CAM consultants and system managers (with 120 years' experience of the subject between us), and visitors had the chance to discuss their CAD/CAM problems with us on a one to one basis.

A recent report published by the EITB ('Making more of CAD'), found that British companies were willing to spend a lot on CAD/CAM, but little on training. Judging by the questions asked at the Clinic however, there is an increasing appreciation that training is a vital ingredient for obtaining the

maximum benefits from complex and expensive CAD/CAM systems. This article takes some of the questions raised during the Clinic and highlights the key issues in four areas: awareness training, management training, system supervisor training and operator training.

Particular emphasis is placed on the need to train managers and others indirectly involved in CAD/CAM as well as the actual operators. As the *Financial Times* reported in December last year in an article titled 'Managers are the Luddites': "... early resistance to CAD among unions and workers has died away while managers remain suspicious and ignorant of it... In other words, managers' security and obstinacy prevented proper use of the equipment they had bought".

Awareness training

Awareness of CAD/CAM technology and the strategic reasons for installing it in a company is vital to encourage commitment and to reduce fear of the unknown. Before a system is even installed, awareness should be built up so as to prompt managers to consider the strategic importance of CAD/CAM and how it may be further extended beyond simple 2D draughting and used to cut across traditional departmental boundaries. Could drawing data entered by draughtsmen be used elsewhere? For instance, could parts list data be transferred to production control or costing systems; could graphic data be transferred to NC programming systems, or design analysis systems such as finite element analysis; or could parametric design programs be linked to process planning systems, for families of similar parts, and so reduce design variety and production costs?

Once CAD/CAM is installed, awareness is best promoted by a combination of seminars and system demonstrations. During the early novelty stage, it is surprising how much time can be wasted by giving ad hoc demonstrations to interested staff who are just walking by. You should capitalise on this interest and, by providing a more formal and planned response, you will save time and make a more professional job of building awareness in your company.

The seminars should explain the reasons for installing CAD/CAM, how it will be used in the short and long term, and who will use it. Demonstrations of the system should be relevant to your work, rather than just the pretty picture you get from the system suppliers, but they should not try to over-sell the technology. Some mention should be made of the limitations of the technology, as a belief that the computer can do anything is just as bad as believing that it is all a white elephant.

Management training

First line design, drawing office or production engineering managers with staff who use CAD/CAM systems will be selecting work to be put on the system, deciding who will be trained and making a whole host of other decisions vital to the system's success. For them to make effective and informed judgements they must have a clear understanding of the strengths and weaknesses of CAD/CAM. For this I believe that they need hands-on training. Full and detailed operator training details is clearly unnecessary.

As events like the CAD/CAM Clinic show, management training is the aspect of training which most often gets neglected. For many engineering managers who have worked their way up through the ranks of their company, CAD/CAM could be the first technology they have been asked to manage which is outside the scope of their own first hand training and experience. Attending a few demonstrations at system suppliers or at exhibitions is no substitute for actual hands-on training and the sales hype may only serve to increase anxiety levels.



Grappling with the intricacies of the new CAD/CAM system

During the early 1980s, I was involved in running hands-on training courses on behalf of the new defunct Department of Trade and Industry Practical Experience Centre in Cambridge. Over 200 managers who were either considering buying a CAD/CAM system or who already had one attended these courses and most had hardly ever touched a computer, much less a complex CAD/CAM system. The encouraging result was that within two or three days all but one of the 200 plus managers were able to produce simple 2D transfers to NC systems. (The one failure was a styling designer who had no training in basic geometry or draughting). No-one would claim that they would be able to earn their living as CAD/CAM operators, but as managers they were in a much more confident position in dealings with their staff and the system suppliers.

System supervisor training

The system supervisor plays a vital role in ensuring the success of CAD/CAM and unfortunately all too often they are poached by other users, or even more insulting, by the system vendor! A ready trained and experienced system supervisor is a valuable asset to any company about to install a system as their experience can considerably reduce the time needed to get the system up and running. You should therefore choose your supervisor carefully and then you should try to ensure that you offer adequate levels of motivation and reward.

The system supervisors are the supermen (or women) who need to be trained in the CAD/CAM application software, ie operator training. A detailed operational knowledge of the system is needed so that the supervisor can support the operators and liaise effectively with the supplier when problems arise. That level of knowledge includes being able to use facilities like the text editor, be able to copy files around the disc and to and from tape, adding new user accounts, creating and maintaining security access controls, install-

ing new software and interfacing and customising facilities provided by the system.

The system supervisor need not be an expert in these areas, but he or she should have an appreciation of the capabilities so that they can specify and manage software development projects aimed at extending and enhancing the use of CAD/CAM for your own company's specific requirements.

CAD/CAM vendors often limit themselves to operator training or they may prove a bit inept at more advanced or company-specific training programmes. Therefore it's useful to consider other sources like consultancies, colleges and polytechnics or computer hardware manufacturers for supervisor and other management training courses.

Operator training

Operator training is the most well developed area of CAD/CAM training. Nevertheless, the following keypoints learnt from others' experiences may help you to develop effective operator training plans.

The first batch of operators should be selected very carefully and they should be trained off-site and usually by the vendor. Other operators are often more effectively trained in-house by these trained colleagues. Alternatively, if time or circumstances prevents this, other sources of training should be considered. If you have one of the more widely used systems, such as AutoCad, Cadds4X, Dogs, Medusa or GDS, you may be lucky enough to find a college or a CAD/CAM bureau in your area which runs training courses of them. Colleges are often much better at training operators than vendors; they are after all professionals in education, not computer sales.

Following each training course, it is important to allow operators time to practice and consolidate their newly acquired knowledge. As a minimum, three times the duration of the course should be allowed for this, therefore a typical one week 2D

draughting course should be followed by at least three weeks during which the operators are allowed to use the system for a substantial proportion of the working day.

During this time real work should be attempted; simply playing with the system is rarely very useful. However, urgent work should not be attempted as time should be allowed to experiment with alternative methods. There are nearly always several alternatives which can be used and these may vary greatly in the time required and in the quality of the results achieved.

Operator training needs to be phased carefully. With most CAD/CAM systems 2D draughting is pre-requisite for the other more specialist application modules. Some of your operators may then be trained in 3D modelling for example, while others may take a course in parametric design as an alternative.

One of the more commonly asked questions at the CAD/CAM 90 Clinic was, 'How many operators should I train?' The answer depends a lot on your particular circumstances, methods of working and CAD/CAM applications. A rule of thumb is to allow two operators per workstation, plus an allowance for staff turnover, plus 10% to allow for those who do not take to the technology, plus the system supervisor.

To train fewer may result in a low utilisation of the system, while to train more may mean that some operators do not get enough time on the system to practice and maintain their skills.

Based on these simple guidelines and assuming that external courses cost £150 per person per day; that £150 per person per day is needed to cover lost production time; that 10 days of formal training is needed per operator and that during the consolidation period each operator is only 50% effective then the training budget for a four workstation system should be £46 000 plus the cost of workstation time lost to production.

Training is expensive and time consuming and those you train may then be poached by other users or by CAD/CAM vendors. Nevertheless, if you cut corners on training you will certainly find that CAD/CAM is not being exploited to the full because there is still a fear of the unknown and the capabilities and potential of CAD/CAM are still not appreciated.

In addition to the obvious requirement for operator training there is still the very real and usually forgotten need for awareness training of managers and hands-on training for first line engineering managers. ME

Making More of CAD: Available from EITB Publications, PO Box 75, Stockport SKA 1PH. Price £70.