A YEAR'S EXPERIENCE WITH CATIA AND CADAM

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ABSTRACT

In June 1985 Liverpool University obtained the CAD packages CATIA and CADAM to run on its IBM 4341 mainframe. The following is a brief description of the investigations which have taken place in the first year of their implementation to gauge the usefulness of these packages, principally as CAAD teaching aids. Neither CATIA nor CADAM were initially developed as architectural design aids so a matter of initial concern was their appropriateness for teaching (and possibly research) in an architectural environment.

RECENT HISTORICAL BACKGROUND

A primary function of the Computer Laboratory at Liverpool University is to manage and provide support for the University's three mainframes which are accessed via datacentres spread throughout the campus. Many departments additionally fund their own independent departmental computing facilities.

One of the mainframes, a DEC VAX principally serves a teaching role. The other two mainframes, an IBM 4341 and (until last year) an ICL 1906S were used mainly for research applications but also supported some limited undergraduate work. It was decided that, in 1985, the ageing 1906S should be replaced and after consultation with all of the departments in the University the Computer Laboratory decided on the tactics for the mainframe upgrade. An IBM 3083 was purchased to provide the research support hither to provided by both the IBM 4341 and the ICL 1906S, and the IBM 4341 became dedicated solely to CAD.

The next part of the story is one which contains elements which are probably familiar to others involved in CAAD teaching. Because the departments of Electrical and Mechanical Engineering at Liverpool are large and powerful, with a track record of heavy use of computing facilities, they were particularly influential in making the choice of obtaining CATTA and CADAM for the IBM 4341. CADAM is a 2-D draughting/3D viewing package and CATIA can produce colour-rendered solid models with the possibility of animated "walk-throughs". Both were developed for the aerospace industries : CATIA for Dassault and CADAM for Lockheed. Consequently they are clearly more suited to teaching and research in Mechanical and Electrical Engineering than in Architecture.

The 4341 is a relatively small machine and only five Tektronix 5080 graphics terminals are at present hooked up to it. Only one of the terminals has a full hardware configuration of full colour screen with high speed local panning, zooming and colour control, keyboard, digitizer and valuator dial box. The other terminals have no dial box; some also have a smaller screen. Three of the terminals are housed in a special room in the Computer Laboratory and the two others are in the departments of Electrical and Mechanical Engineering. We are told that there is a physical limit to the length of wiring which can be run from the 4341 to a graphics terminal and that the Architecture building lies just outside this limit.

INITLAL EXPERIENCE OF USING CATIA AND CADAM

There have been two groups of students involved in the initial investigations into the usefulness and appropriateness of CATIA and CADAM as a CAAD teaching aid. A small group of final year B.A. students who chose computing as their Special Study Option have been used as guinea pigs for the graphics element of a proposed CAAD course. Certain members of this group have been concentrating, in particular, on CATIA and CADAM. The second line of investigation has come via a graduate from Architecture who has gone on to take a Masters Degree in Civic Design. This degree is a mixture of

taught course and an element of individual research, for which the student in question has chosen CADAM and CATIA. Neither group of students involved with CATIA and CADAM have had a structured course in either CAAD or CATIA-CADAM running in tandem with their work. They were simply given a couple of introductory tutorials and then left to find their own way, seeking help when it was needed.

A number of problems and limitations have become clear as a result of the first period of investigation of CATIA and CADAM, some of which are inherent in the software and some specific to Liverpool University's computing hardware and management.

The IBM 4341 has relatively limited storage facilities. Consequently even with only five terminals supported it is significantly slower than a larger configuration running on an IBM 3083, particularly when manipulating models with CATIA. When models become reasonably (i.e. realistically) complicated the machine's limited storage capacity also causes problems. For instance the building shown in Figs. 1 and 2 could not be stored as a single model. The mast head detail was drawn and stored independently of the complete building model. The method of storage of repeated elements is a major contributory factor to this situation. At present when an object is repeated the full set of information describing it is repeated. An upgrade due shortly rectifies this by storing only location references for a repeated element.

There are four instruction manuals for CADAM [1,2,3,4] and the same number for CATIA [5,6,7,8]. In each case the four are: the University's own guide; a training or self-teach manual; two official manuals. Stacked together they represent a daunting mountain of literature, a significant proportion of which is irrelevant for the majority of architectural applications. Sifting through this information, much of which is aimed at the Mechanical Engineer, is a very time consuming process. It also prolongs the initial stage of gaining familiarity with the system. The Masters

student felt that at the end of his first 24 hours with CATIA he had made little progress.

The IBM sales pitch describing CATIA and CADAM as "very user-friendly menu-driven packages which prompt you and lead you through a task" is a questionable claim. Our departmental Macintosh machines have graphics packages which are admittedly less powerful but are operated by a menu system which is considerably friendlier than that associated with CADAM and CATIA. Again, improvements in the pipeline are promised. The operating functions are being reassembled in a more logical fashion with the intention of making the user interface smoother. Further significant improvements to the system are expected to be implemented in the near future.

The review of CATIA and CADAM has so far been somewhat negative so to redress the balance here, briefly, are a few positive aspects expressed by users. Firstly CADAM is relatively easy (certainly compared with CATIA) to become reasonably competent with. It is generally well-liked and considered to be a good draughting system (Figs. 3 and 4). CATIA is particularly good when manipulating primary solids, and has associated with it a well-managed library handling facility.

CONCLUSIONS AND FUTURE PLANS

Ideally we would like to have a colour-rendered solid modelling system available for all, or at least a reasonably large group, of our students. It does appear that this kind of tool can aid a student in the development of his or her design abilities [9].

I intend to draft instruction manuals for CADAM and CATIA which will be aimed at the Architect and Building Engineer. This will involve the sifting out of relevant information from the existing manuals, edited to take advantage of the experience gained so far, and the development of self-teach and demonstration exercises. These exercises will be focused on building models such as those shown in

Figs. 5 and 6 which are now loaded onto our system. However, even with these manuals and exercises a number of problems probably prevent us from using CATIA as a student design aid. These problems are principally: the small number of terminals shared between a large number of potential users; the fact that we cannot afford to have a member of staff who has a significant proportion of their time keeping up to date and giving advice and help with CATIA; the knowledge that CATIA still shows the hallmarks of a mechanical engineering rather than architectural design aid.

Thus until we reach the stage where we have a departmental facility supporting CABLE or a similar system CATIA and CADAI are likely to fill the role of demonstration packages in the CAAD course, to illustrate the capabilities of powerful drafting and modelling packages in architecture. For most students hands-on experience will be gained at the departmental micros.

REFERENCES

1. Morgan, J.S. - Introduction to CADAM on the IBM 4341, CAD Graphics Interface Unit, Univ. of Liverpool.

2. CADAM Inc. - CADAM User Reference Manual, Burbank, Calif.

3. I.B.M. - Training Course Manual for CADAM.

4. CADAM Inc. - The CADAM User's Manual, Vol. 1 and 2, Burbank, Calif.

5. Morgan, J.S. - Introduction to CATIA on the IBM 4341, CAD Graphics Interface Unit, Univ. of Liverpool.

6. DASSAULT SYSTEMES CATIA User's Manual, Suresnes, France.

7. DASSAULT SYSTEMES - Reference Manuals
(a) Basic 3D design module
(b) Vm/cms

8. IBM - Guide to CATIA.

9. Lawson, B. - Ten years of teaching graphics at Sheffield University, presentation to Schools of Architecture Computer Conference, Leicester, April 1986.

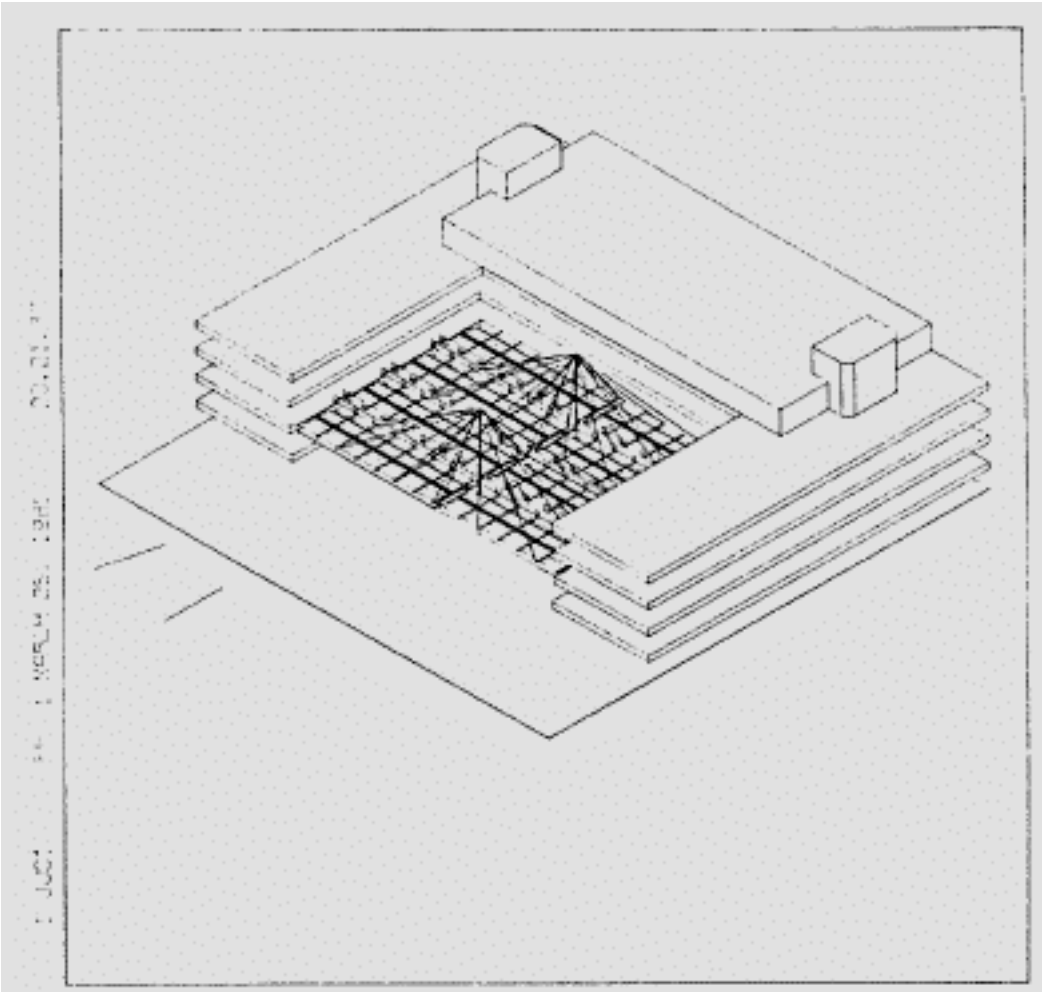

Fig.1 Pen plot of tension assisted structure produced from CATIA (courtesy M.K. Rodwell).

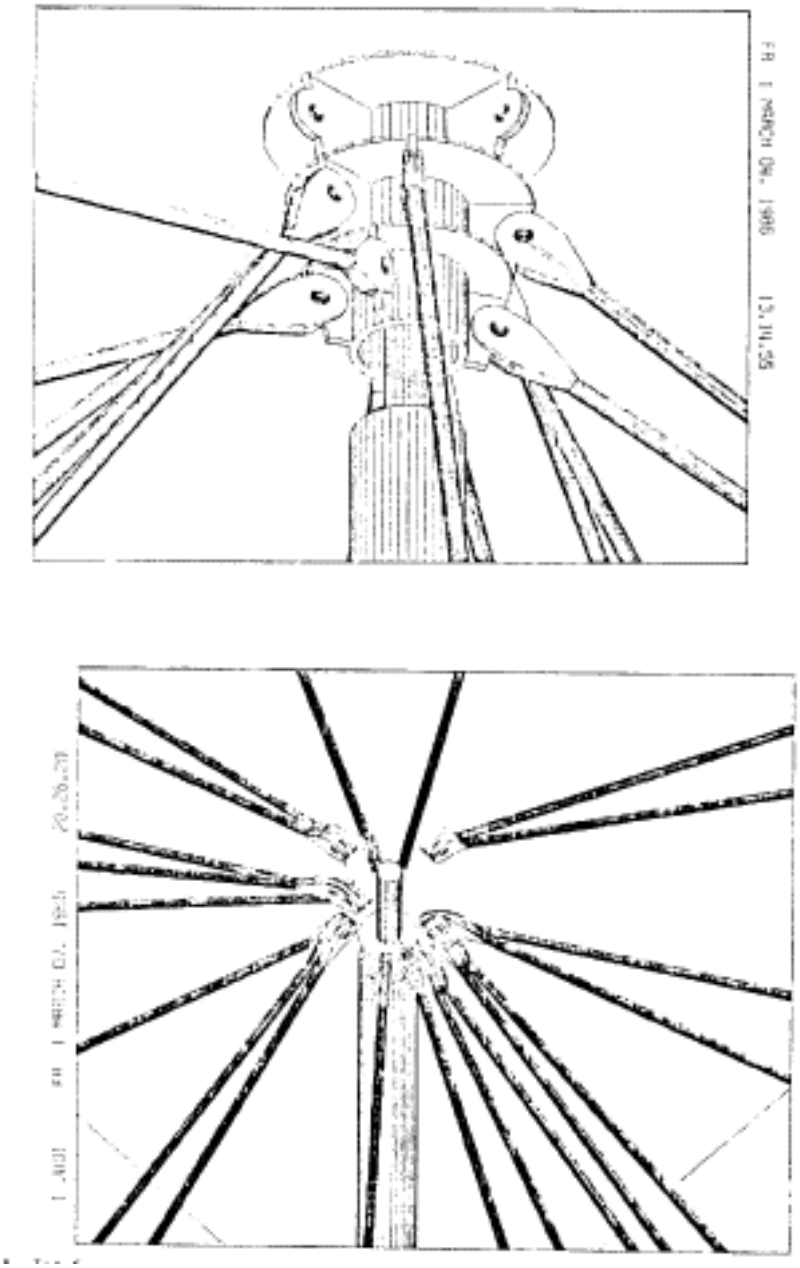

Fig.2 Detail of Mast Head of building shown
in Fig.1. (electrostatic plot).

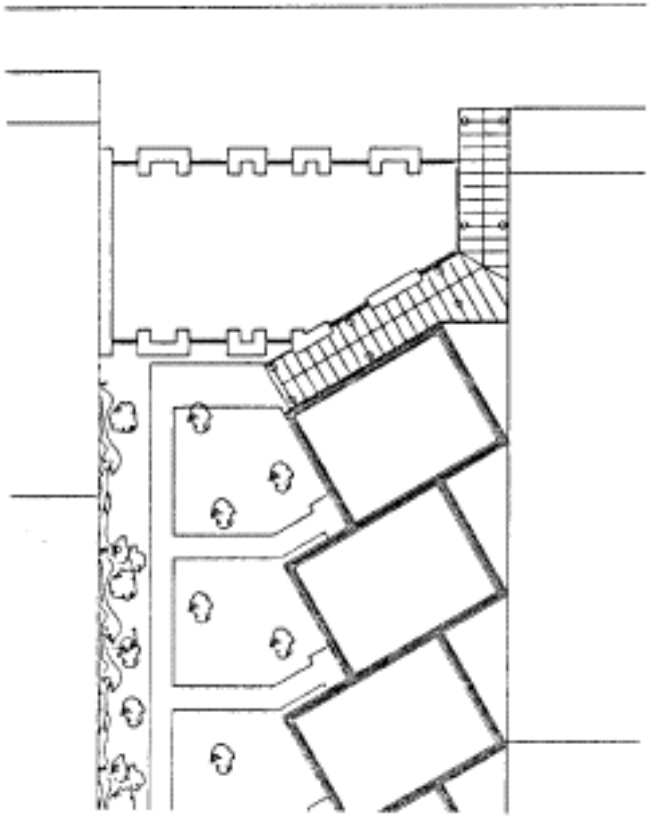

Fig.3 Site plan produced from CADAM.

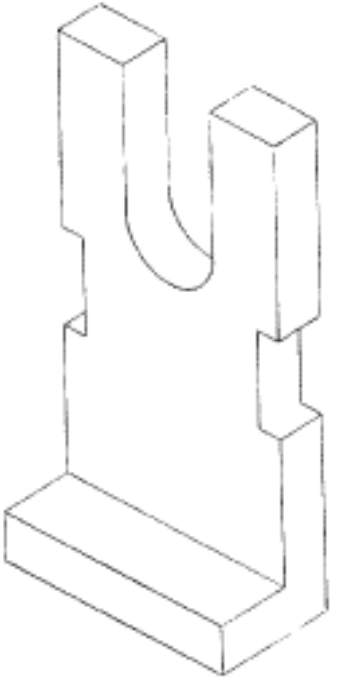

Fig.4 Isometric produced from CADAM.

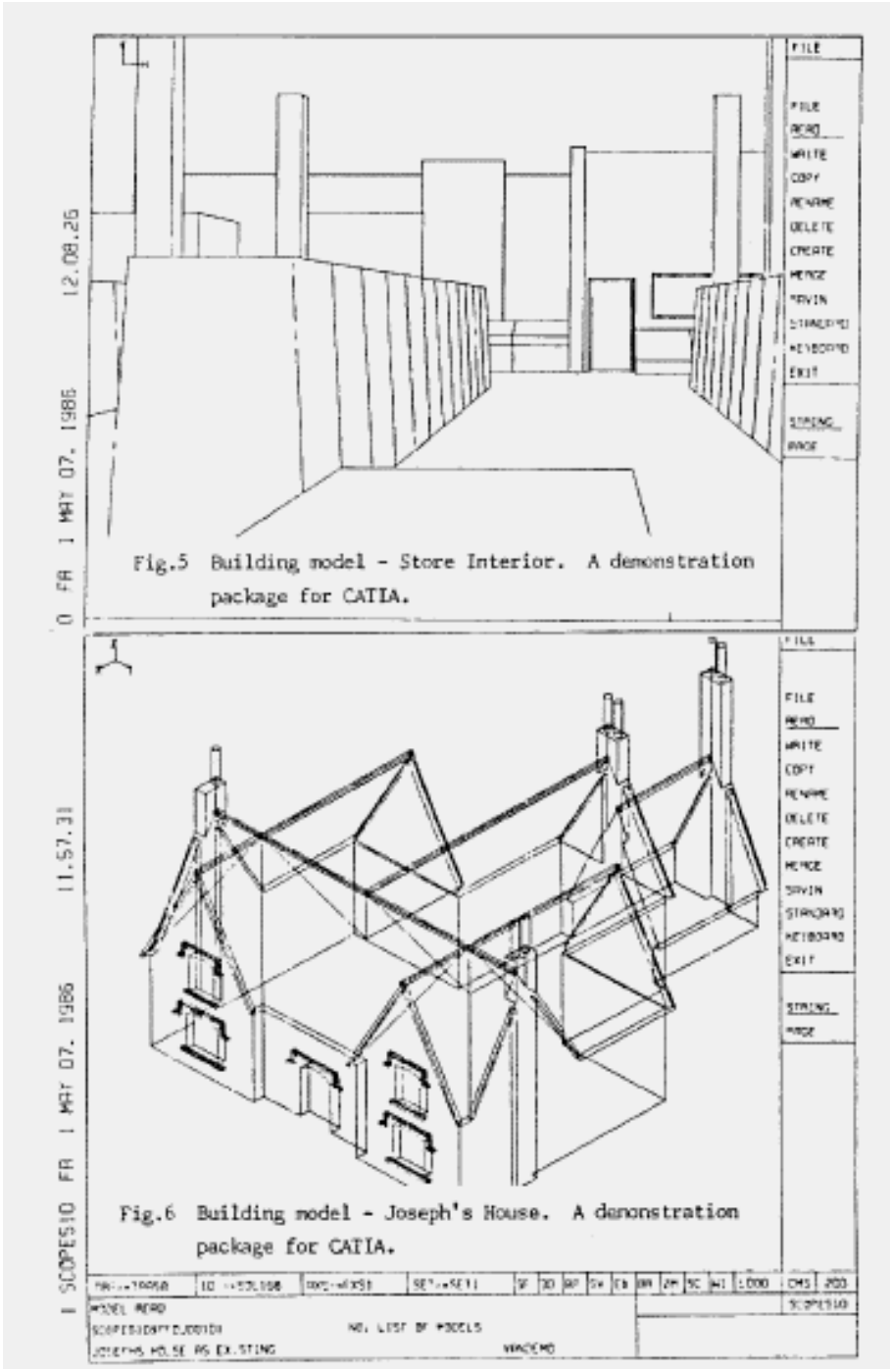

Fig.5 Building model - Store Interior. A demonstration package for CATIA.

Fig.6 Building model - Joseph's House. A demonstration package for CATIA.