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## Report on the Use of Computers in 1986

### Rapport sur l'utilisation des ordinateurs en 1986

### Bericht über Verwendung des Computers im Jahre 1986

prepared by      **Working Commission VI of IABSE**  
                      «Informatics in Structural Engineering»  
coordinated by    **Aksel G. FRANDSEN**  
                      Chairman WC VI  
                      Cowiconsult  
                      Virum, Denmark

#### SUMMARY

An investigation was carried out in 1986 in order to find out more about the utilization of computers by members of the IABSE. Answers came from over 40 countries, mainly from representatives of consulting engineering firms and university institutes. The microcomputer was already in use by 80% of those who replied. Computers are employed in all sectors (administration, budgets, infographics, word processing, etc.) but obviously in 90% of the cases, they are used in design and analysis. The investigation revealed that there were as many of those persons having replied using «in-house» software as there were using software obtained externally. Lastly, the investigation revealed the type of information that members of the IABSE expect from the Working Commission «Informatics in Structural Engineering».

#### RÉSUMÉ

Une enquête a été réalisée en 1986 afin de mieux connaître l'utilisation des ordinateurs par les membres de l'AIPC. Les réponses proviennent de plus de quarante pays, essentiellement de représentants de bureaux d'ingénieurs et d'instituts universitaires. Le micro-ordinateur avait déjà fait son apparition chez 80% de ceux ayant répondu à l'enquête. L'ordinateur est utilisé dans tous les domaines (administration, budget, infographique, traitement de texte, etc.) mais il est utilisé évidemment dans 90% des cas pour le calcul du projet. L'enquête montre qu'autant de personnes ayant répondu font usage d'un logiciel «maison» que d'un logiciel acquis à l'extérieur. L'enquête montre enfin le genre d'information que les membres de l'AIPC attendent de la Commission de Travail «Informatique et constructions de génie civil».

#### ZUSAMMENFASSUNG

1986 wurde bei den IVBH-Mitgliedern eine Untersuchung über die Verwendung des Computers durchgeführt. Aus mehr als 40 Ländern wurden Antworten erhalten, vorwiegend von Vertretern von Ingenieurbureaus und Universitätsinstituten. Bei 80% derjenigen, die antworteten, wird der Mikro-Computer bereits benutzt. Computer werden in allen Sektoren verwendet (Administration, Budgetierung, Infographik, Textverarbeitung usw.), das Schwergewicht der Anwendung (90%) liegt jedoch auf den Gebieten der Berechnung und Bemessung. Die Untersuchung ergab, dass von den Anwendern hauseigene Software wie auch fremde Software verwendet wird. Schliesslich zeigt die Untersuchung die Art der Information auf, welche die IVBH-Mitglieder vom Arbeitsausschuss «Informatik im konstruktiven Ingenieurbau» erwarten.



### Introduction

The aim of IABSE Working Commission VI is, in brief, to make information on development and research within the field "Informatics in Structural Engineering" - irrespective of the source - available to the average IABSE member.

However, as the field is extensive and under rapid development and change, the efforts of the W.C. could easily be less fruitful if areas that lie outside the interest of the average IABSE member are addressed.

The actual needs of the average IABSE members are, unfortunately, not very well known to the members of the W.C.

The Working Commission therefore decided at its meetings in Luxembourg, September 1985, to try to gain a better basis for its future work by improving its knowledge regarding computer usage amongst IABSE members.

A questionnaire was composed and sent out to all IABSE members in December 1985 together with a covering letter explaining the background for the investigation. A total number of about 3000 questionnaires were sent out and 332 completed forms were received, most of them within the scheduled time.

Considering that the questionnaire appealed more to firms and institutions of a certain size rather than to single members - the number of completed forms received must be regarded as satisfactory.

In order to facilitate the analysis of the answers to the different questions, a database containing the answers was created using "INFORMATION" on the PRIME 850 computer at disposal in the editor's firm, Cowiconsult, Denmark.

The present report shows the results of the analyses, chosen by the editor and it is hoped that these analyses illustrate the situation of computer usage amongst IABSE members.

Results

The distribution of answers on countries is shown in Table 1. 43 different countries are represented from all parts of the world. 10 answers did not indicate country. The only major area missing in the list seems to be the USSR.

COUNTRY	No of answers	COUNTRY	No of answers
ARGENTINA	2	LUXEMBOURG	2
AUSTRALIA	8	MOROCCO	1
AUSTRIA	20	THE NETHERLANDS	5
BELGIUM	6	NORWAY	4
BRAZIL	4	PAKISTAN	1
CANADA	14	PERU	1
CHINA	2	POLAND	2
COLOMBIA	1	PORTUGAL	2
COSTA RICA	1	SAUDI ARABIA	1
DENMARK	13	SOUTH AFRICA	11
EGYPT	2	SPAIN	15
FINLAND	7	SRI LANKA	1
FRANCE	7	SWEDEN	11
GERMANY	34	SWITZERLAND	41
GREECE	5	SYRIA	1
HONG KONG	2	TAIWAN	1
INDIA	9	THAILAND	2
INDONESIA	2	UK	25
ISLAND	1	USA	26
ISRAEL	2	VENEZUELA	2
ITALY	11	YUGOSLAVIA	4
JAPAN	12		

Table 1. Distribution on countries

In order to facilitate the presentation of the results, each field in the questionnaire has been given a field number, F11 to F78. The field numbers are shown in a copy of the form, see Appendix I, and the relevant field numbers are indicated for each table of results.

Table 2 shows the distribution of answers on the different types of memberships and on the different sizes of the institutions or firms.

The answers not indicating type of membership are listed in the column marked NIL. It is seen that most of the answers are presented by individual members, though generally on behalf of larger organizations.

The information on junior/ordinary/senior degree is not complete, but it is remarkable that the number of junior answers is very small and at the same time that quite a number of seniors seem to maintain an interest in computer usage.



## Relevant fields:

F11 = Individual member  
 F12 = Junior  
 F13 = Ordinary  
 F14 = Senior  
 F15 = Collective

Size of firm	!	F11	!	F12	!	F13	!	F14	!	F15	!	NIL	!	
Not indicated	!	8	!	1	!	4	!	1	!	1	!	1	!	
1	!	9	!	0	!	4	!	3	!	0	!	0	!	
2 to 10	!	49	!	0	!	36	!	3	!	2	!	1	!	
11 to 50	!	83	!	1	!	58	!	8	!	11	!	2	!	
51 to 250	!	58	!	2	!	39	!	5	!	21	!	2	!	
251 to 1000	!	39	!	0	!	24	!	8	!	20	!	2	!	
More than 1000	!	10	!	0	!	4	!	0	!	11	!	2	!	
	total	!	256	!	4	!	169	!	28	!	66	!	10	!

Table 2. Type of membership

Table 3 shows correspondingly the distribution of answers on the different types of institutions or firms, and also on the different size categories. The dominant group here consists of consulting engineers, although scientific and educational institutes also form strong groups. Group F29, indicating those that do not feel they belong to the listed types of institutes or firms, is rather small, and a closer look on the indicated "other types" has convinced the editor that most of the answers under F29 could have been placed under the listed types.

## Relevant fields:

F21 = Scientific institute  
 F22 = Educational institute  
 F23 = Library  
 F24 = Public service  
 F25 = Contractor  
 F26 = Consulting Engineer  
 F27 = Softwarehouse  
 F28 = Computer Service Bureau  
 F29 = Other

Size of firm	!	F21	!	F22	!	F23	!	F24	!	F25	!	F26	!	F27	!	F28	!	F29	!	NIL	!	
Not indicated	!	1	!	2	!	0	!	0	!	0	!	5	!	0	!	0	!	1	!	1	!	
1	!	0	!	0	!	0	!	0	!	0	!	9	!	0	!	0	!	1	!	0	!	
2 to 10	!	7	!	7	!	0	!	0	!	0	!	38	!	4	!	0	!	4	!	1	!	
11 to 50	!	13	!	11	!	0	!	3	!	4	!	69	!	5	!	3	!	5	!	0	!	
51 to 250	!	8	!	12	!	2	!	7	!	9	!	47	!	1	!	0	!	5	!	1	!	
251 to 1000	!	8	!	16	!	0	!	9	!	8	!	24	!	2	!	0	!	5	!	0	!	
More than 1000	!	3	!	3	!	0	!	5	!	8	!	4	!	0	!	0	!	3	!	0	!	
	total	!	40	!	51	!	2	!	24	!	29	!	196	!	12	!	3	!	24	!	3	!

Table 3. Type of institution

Table 4 shows the distribution of the different computer types on the sizes of the institutions and firms. It may be seen that 78% use PC/Micros, 50% use Minis, 37.5% have a main frame at their disposal, 27.4% use CAD, and 26.5% use Service Bureaus. It should be noted, however, that the distinctions made between minis and main frames are not clear and some overlapping occurs (some minis are placed in the main frame field). The information given on type and operating system is reproduced in raw lists in Appendices II to V.

Relevant fields:

F42 = PC/Micro

F43 = Minicomputers

F44 = Main frame

F45 = CAD-system

F46 = Access to Service Bureau(s)

Size of firm	!	F42	!	F43	!	F44	!	F45	!	F46	!	NIL	!
Not indicated	!	9	!	3	!	6	!	3	!	2	!	1	!
1	!	4	!	1	!	1	!	0	!	3	!	2	!
2 to 10	!	10	!	40	!	17	!	11	!	3	!	14	!
11 to 50	!	50	!	64	!	44	!	28	!	21	!	22	!
51 to 250	!	250	!	71	!	41	!	28	!	19	!	24	!
251 to 1000	!	1000	!	52	!	43	!	35	!	32	!	17	!
More than 1000	!	19	!	17	!	16	!	13	!	6	!	0	!
<hr/>													
total ! 259 ! 166 ! 125 ! 91 ! 88 ! 7 !													
<hr/>													

Table 4. Type of computers used

Table 5 shows the number of terminals as the minimum, the maximum, and the average number for the different sizes of firms or institutions.

Size of firm	!	Min	!	Max	!	Average	!
1	!	0	!	1	!	0	!
2 to 10	!	0	!	31	!	3	!
11 to 50	!	0	!	40	!	6	!
51 to 250	!	0	!	250	!	18	!
251 to 1000	!	0	!	550	!	90	!
More than 1000	!	0	!	2000	!	230	!

Table 5. Number of terminals



Table 6 shows the distribution of the different types of work carried out on computers. Here the predominant type is calculations, but all types of work are well represented. However, the editor finds that the use of information retrieval is rather low. The fields indicated in connection with F58, other applications, are reproduced in the listing in Appendix VI.

Relevant fields:

- F51 = Administration  
F52 = Budgetting  
F53 = Planning & Steering  
F54 = Calculation  
F55 = Word processing  
F56 = Production of drawings  
F57 = Information retrieval  
F58 = Other

Size of firm	F51	F52	F53	F54	F55	F56	F57	F58	NIL
Not indicated	6	5	1	9	7	6	5	0	1
1	1	1	0	5	3	0	1	1	3
2 to 10	13	7	6	46	26	8	5	6	1
11 to 50	51	21	15	91	60	31	16	12	1
51 to 250	60	36	31	74	59	28	26	13	0
251 to 1000	39	34	30	58	50	35	35	18	2
More than 1000	18	20	17	21	18	16	17	5	0
total	188	124	100	304	223	124	105	55	8

Table 6. Type of work made on computers

Table 7 shows the distribution of answers to the questions on software usage. Most answers indicate use of both in house developed programs as well as commercial packages. The areas dealt with are listed in Appendix VII.

#### Relevant fields:

- F61 = In house developed programs  
F62 = Commercial packages

Size of firm	F61	F62	NIL
Not indicated	8	9	1
1	5	3	3
2 to 10	38	37	2
11 to 50	81	75	2
51 to 250	71	68	4
251 to 1000	58	51	2
More than 1000	21	20	0
total	282	263	14

Table 7. Software usage

Table 8 shows the distribution of answers to questions concerning type of information wanted from W.C. VI. The main interests seem to be:

Collected Lists of New Programmes  
Reports on New Computer Applications  
State of the Art Reports

while:

Reports on Ongoing R & D  
Symposium on Structural CAE

also attract some interest.

Relevant fields:

F71 = state of the art reports  
F72 = short reports on ongoing R&D  
F73 = collected lists of new programmes  
F74 = reports on new computer application  
F75 = specialized symposia on subareas  
F76 = symposium on whole area of structural CAE  
F77 = theme on structural CAE at IABSE congress  
F78 = other information

Size of firm	! F71 !	F72 !	F73 !	F74 !	F75 !	F76 !	F77 !	F78 !	NIL !	
Not indicated	!	9 !	6 !	6 !	8 !	4 !	5 !	2 !	1 !	1 !
1	!	3 !	2 !	3 !	3 !	1 !	2 !	0 !	0 !	4 !
2 to 10	!	22 !	12 !	33 !	26 !	12 !	7 !	11 !	3 !	5 !
11 to 50	!	58 !	36 !	64 !	50 !	20 !	27 !	13 !	6 !	5 !
51 to 250	!	49 !	31 !	49 !	52 !	15 !	27 !	11 !	3 !	2 !
251 to 1000	!	36 !	26 !	42 !	46 !	11 !	24 !	20 !	5 !	2 !
More than 1000	!	15 !	10 !	14 !	15 !	3 !	6 !	7 !	4 !	0 !
<hr/>										
total ! 192 ! 123 ! 211 ! 200 ! 66 ! 98 ! 64 ! 22 ! 19 !										
<hr/>										

Table 8. Type of information wanted

The areas indicated for specialized symposia are listed in Appendix VIII.

The indicated themes suggested for structural CAE at an IABSE congress are listed in Appendix IX. Finally Appendix X contains a list of the other types of information wanted from W.C. VI.



### Conclusions

Taking the answers to the questionnaire as a true expression for the status of computer usage among the "clients" of W.C. VI - i.e. those members of IABSE interested in this field - the W.C. now has a much better basis for structuring its future work.

However, the indicated priorities raise serious problems for W.C. VI in so far as the most wanted types of information are volatile and therefore very difficult to produce and publish in a reliable up to date form.

Copenhagen July 1986, revised January 1987

Aksel G. Frandsen

**Appendix I. Questionnaire**

International Association for Bridge and Structural Engineering  
Association Internationale des Ponts et Charpentes  
Internationale Vereinigung für Brückenbau und Hochbau



IABSE  
AIPC  
IVBH

IABSE Working Commission VI: Informatics in Structural Engineering

**Questionnaire on Computer Usage****1) IABSE Membership:**

Country: ..... F12 F13 F14  
F11 Individual Member  Indicate type: Junior  Ordinary  Senior   
F15 Collective Member

**2) Type of firm or institution:**

F21  Scientific institute  
F22  Educational insititute  
F23  Library  
F24  Public service  
F25  Contractor  
F26  Consulting Engineer  
F27  Softwarehouse  
F28  Computer Service Bureau  
F29  Other (indicate type) .....  
.....  
.....

**3) Size of organization**

x = numbers of employees:  
F31  x = 1  
F32  1 < x ≤ 10  
F33  10 < x ≤ 50  
F34  50 < x ≤ 250  
F35  250 < x ≤ 1000

NB: The following points 4 - 7 should preferably be answered by one person only per organization.

**4) Edp-equipment**

F41 Does your organization use computers in its professional work: Yes  or No

In the affirmative, which type of computers do you use:

F42  PC/Micro Type:....., Operating system:..... F42OS  
F43  Minicomputers Type:....., Operating system:..... F43OS  
F44  Main frame Type:....., Operating system:..... F44OS  
F45  CAD-system Type:..... F45TYPE  
F46  Access to Service Bureau(s)

To describe the level of usage please indicate approximate total number  
of terminals for all systems ..... F4TERM

p.t.o.



## 5) Which type of work do you use computers for:

- F51  Administration  
F52  Budgetting  
F53  Planning & Steering  
F54  Calculation  
F55  Word processing  
F56  Production of drawings  
F57  Information retrieval  
F58  Other:.....  
.....

F58TYPE

## 6) Software usage:

- F61  Inhouse development of programmes  
Indicate area .....  
F62  Commercial packages  
Indicate area .....

F62AREA

## 7) Which type of information do you want from W.C. VI?

- F71  state of the art reports  
F72  short reports on ongoing R&D  
F73  collected lists of new programs  
F74  reports on new computer applications  
F75  specialized symposia on subareas - indicate area: .....  
.....  
F76  symposium on whole area of structural CAE  
F77  theme on structural CAE at IABSE congress: .....  
.....  
F78  other information: .....  
.....  
.....

F75AREA

F77AREA

F78INF

If you want to elaborate on some of the points please give your comments  
on additional sheets.

Please return completed form to IABSE, Zürich before January 31, 1986.

## Appendix II. Types and operating systems for PC/Micros

Rec. no.	Type	Operating system	Rec. no.	Type	Operating system	Rec. no.	Type	Operating system	Rec. no.	Type	Operating system
70	VICTOR SIRIUS, IBM PC.	MS, DOS.	75	IBM XR, HP 150,	MAINLY MS-DOS.	80	EAGLE, HP		174	IBM-PC	MS/DOS
1	IBM			HP 1000.		199			86	COMMODORE	SINGLE USER
194	HP 9816		6	WANG	MS-DOS	105	IBM PC/XT	PC-DOS	186	IBM	
100	IBM/AT	MS-DOS	106	IBM AT		117	WANG	DOS	17	IBM XT	
107	IBM PC		118	APPLE/IBM	DOS & CPM	122	IBM XT, TEXAS PC	MS-DOS	291	IBM	MS-DOS
119	IBM XT, AT	MS-DOS	123	PC350 DIGITAL.	CP/M.	134	NEC 9801,	MS-DOS	298	IBM AT	PC-DOS 3.1
36	DEC RAINBOW	DOS	135	PC9800, N6500-	MSDOS, NTOS		IBM 5550		204	IBM AT	DOS 3
136	NEC, YMP.			M55.		46	IBM AT	MS DOS	228	IBM-PC/XT, FUJITSU 165,	DOS, CP/M.
141	APPLE, WANG, IBM		140	HP 150		146	IBM, SPERRY	MS-DOS		NEC APC-3,	
148	IBM, AE M16	MS-DOS, CPM, PC-DOS.	147	SPERRY	MS/DOS	151	IBM-PC	MS-DOS		APPLE II.	
			152	IBM XT		158	DEC RAINBOWS, OLIVETTI M24.	CPM, MS-DOS	233	HP	BASIC/DOS
153	IBM, APPLE, HP WANG	MS-DOS	159	HP 9816 + MACIN TOSH + IBM PC/ XT.	DOS ETC	163	HP 150B, IBM AT	DOS	245	APRICOT	MS-DOS
165			164	NEWBRAIN	CP/M-80	175	IBM PC	MS-DOS	52	IBM PC,	DOS 2.1
71	IBMXT/AT. HP9836		76	ALPHATRONIC, IBM	CPM/ DOS	187	CODATA	UNIX		APPLE II E	
170	HP-150, RAINBOW	DOS, PC/M	176	IBM DATA GEN.	DOS	192	IBM AT	VERSION 3	250	STC	HANDTURNED
177	WANG PC	MS-DOS		2.1/RDOS1.		192	IBM AT	DOS 3.0	257	DEC RAINBOW	DOS & CAM
182	METRIC/IBEX			9		12	IBM PC, HP 9845	DOS,	262	T.I. PROF.	MS-DOS
189	HP 200							HPBASIC	269	VICTOR	MS-DOS
2	IBM HP86B	MS-DOS	181	IBM	DOS 2.1	292	IBM XT	DOS	274	RAINBOW	MS-DOS
294	UNIVAC PC20&40.	MS-DOS	188	OLIVETTI	MS-DOS	299	IBM AT		87	COMMODORE	BASIC (DOS)
200	HP 11/41, SHARP 1500A.		7	IBM, NEC	DOS	210	HP 217	UNIX			
212	IBM AT 02	MS-DOS	293	OLIVETTI	MS-DOS	217	DEC, RAINBOW	CP/M-86/80	286	NEC PC 9801F, FUJITSU FM 7,	
219	CONVERGENT	UNIX	211	OLIVETTI, IBM	M-DOS-MS.D	222	HP 85, IBM AT	MS-DOS		FM 8, FM 16B.	
224	HP 86	HP-SYSTEM	218	OLIVETTI P6060		229	IBM	MS-DOS	18	IBM	
248	IBM, OLIVETTI	PC-DOS,	223	IBM AT 02	DOS 3.2	47	IBM/COMMODORE		304	IBM	MS-DOS
		MS-DOS	235	IBM, BBC, SIRIUS	MS-DOS, CPM	246	IBM COMPATIBLE	MS-DOS	328	IBM, MACINTOSH.	DOS/FINDER
253	DEC RAINBOW, IBM PC.	CP/M - MS-DOS.	42	OLIVETTI	MS-DOS	86	HP 9845, APRICOT	MS-DOS	333	IBM AT, XT	5.1.
		MS-DOS.	240	IBM	PC-DOS	258	IBM XT	DOS 2/CPM	53	MICRO-VAX 2, IBM	MS-DOS
265	PRO 350		247	ACT SIRIUS	CPM,	251	HP 86-B, 9845-A				MS-DOS
72	MICRO 3D	MSDOS	252	MANY	MS-DOS	275	NEC PC 9801	MS-DOS	88	IBM	MS-DOS
270	HP 87			CP/M,		287	MS-DOS		19	RUF-BEE	
282	IBM/CPT/OLIVETI	MS-DOS		MS-DOS,		13	IBM XT	DOS	54	IBM	MS-DOS
300	IBM AT, DEC RAINBOW.			UNIVAC.		305	IBM XT.	DOS	89	PDP 11/23	SHARE PLUS
307	CROMEMCO	CROMIX	259	ZENITH 89	CP/M	310	IBM PC	DOS	20	DG 10/SP	RDOS
312	IBM-PC/AT,	PC-DOS,	264	ZENITH, IBM,	DOS	317	SEVERAL		55	IBM-PC/XT	MS-DOS
		MS-DOS.	276	DEC.		329	OLIVETTI-M24	MS-DOS	197	HP	UNIX
	EAGLE-VICTOR 9000.		281	HP 86B, HP 9845A	DOS	48	IBM	MS/DOS	115	UPTRON 5-800.	MODIFIED CP/M
			288	NEC N5200 MODEL	PTOS	83					
324	IBM	HARD DISC.		05.		14	IBM 5550 ETC	MS DOS	120	IBM	
38	OLIVETTI	MS DOS	318	IBM/AT&T	MS-DOS	49	VAUVIN		127	DIGITAL PC 350	P/OS
336	VARIOUS	CP/M, MS-DO S, HP.	323	IBM AT	PC-DOS, P-S	15	APPLE II	DOS, CPM	132	NEX, IBM	MS-DOS
				YSTEM		50	IBM	DOS	144	IBMI, ATARI	MS-DOS
4	IBM XT	MS-DOS	43	HP-85	HP	16	IBM	MS-DOS	56	DEC+IBM	WPS
		3.10	78	WANG	MS-DOS	104	APPLE IIE	DOS, CP/M	156	IBM + OLIVETTI.	
74	IBM		9	CROMEMCO	UNIX	198	HP 150	MS-DOS	161	IBM	
5	IBM + VECTOR		44	APPLE II	DOS AND	128	HP 85	HP	168	HP-3000	MPE V
40	HP, WANG	DOS		CPM		133	UNIVAC UP10E		173	IBM PC XT	DOS
			79	TRIUMPH ADLER	CP11, DOS	145	IBM-AT	PC-DOS	185	DG	AOS/VS
			10	P1 + P3, IBM XT		51	IBM PC	DOS 3.1	91	IBM PC AT	MS-DOS
			45	CBM+IBM COMART	CPM+CPM	150	OLIVETTI P6060		190	VAX 750	VAX/VMS
				APPLE, HP85, PC		157	IBM		297	APRICOT, SIRIUS	CPM, MS-DOS
						162	HP 86 B				

Rec. no.	Type	Operating system	Rec. no.	Type	Operating system	Rec. no.	Type	Operating system
215	HP 86 B		28	HP 150	MS-DOS	337	IBM AT/ APPLE -	DOS
227	IBM COMPATIBLE		302	IBM AT	MS-DOS			3.1/UGSO
232	VICTOR, SIRIUS, APRICOT, IBM.	P-SYSTEM	309	IBM/OLIVETTI	MS-DOS	34	II	PASCAL.
239	IBM PC	PC-DOS	326	IBM COMPATIBLE.	DOS 2.1			
244	IBM PC	PC-DOS	331	IBM, TI, HP, ETC	UNIX, DOS	69	OLIVETTI CBM PC20,	MS/DOS, VMS
57	IBM XT,	PC-DOS, ZEBRA	338	HP 125/VECTRA	MS-DOS		MICRO VAX I	
	COMPUCORP		99	CBM,HP,OLIVETTI	DOS			
261	IBM	MS-DOS	30	IBM-PC AT,XT	DOS 3.0			
268	IBM COMPATIBLE	MS-DOS	65	IBM, OLIVETTI, SPERRY, HP.	MS-DOS			
273	IBM, METRIC	PC-DOS, ZEBRA	31	MITSUBISHI, IBM	MS-DOS			
285	IBM AT	DOS 3.0	195	IBM AT02	DOS 3.0			
92	IBM AT	DOS 3.0	101	SIRIUS 1, CBM	MS-DOS			
290	IBM	VISIOTEXTE	108	PC 10.				
23	HP	NATIVE		APRICOT, IBM PC	MS-DOS,			
303	IBM	DOS 2.1			PC-DOS,			
58	DEC PRO/350	VENIX (UNIX)			CP/M.			
			113		SPECTROS,M S-DOS			
93	HP 9836		125	IBM	PC-DOS			
59	IBM	DOS	130	APPLE IIE				
25	DIGITAL PC-350, IBM XT.	P/OS, DOS	137	NEX PC9800				
60	IBM/RAINBOW		142	TULIP	MS-DOS			
196	SUPERBRAIN		149	APPLE	BASIC			
114	CPU IS Z80	DOS/MOS	66	TELEVIDEO 803H	CPM			
131	PC 9801 & OTHER	MS-DOS	166	HP 9816	BASIC			
138	NEX PC 9801	MS-DOS	178	COMPIS ERICSSON	CP/M			
143	CD 110	CPM	183	MANY DIFF.				
155	HP & IBM	HBP, MS-DOS	32	IBM AT	MS DOS			
			295	CBM 8032, HP 41				
61	IBM	DOS	201	IBM-PC	PC-DOS			
160	HP 16	BASIC	208	DEC 350 PROFESS				
167			225	IBM COMPATIBLES	MS-DOS			
172	NCR 41	MS/DOS	230	APRICOT, IBM PC	MS-DOS			
184	ERICSSON PC, IBM PC, MACINTOSH, APPLE II.	MS-DOS	237	OLIVETTI M24SP	MS-DOS			
			242	IBM PC & COMPAQ, CROMEMCO,	MS-DOS, CROMIX,			
97	OLIVETTI M24	MS-DOS			CPM80, CONCUR-			
296	NOVA 4/X	RDOS			RENT CP/M.			
231	HP + OLIVETTI			INTERTEC SUPER-				
238	HP 200 SERIES	217		BRAIN, LSI OCTO				
243	IBM PC/XT, LSI	PC-DOS, LSI, OLIVETTI.		PUS.				
	M3, OLIVETTI		249	VARIOUS	VARIOUS			
	P6060		254	IBM AT,XT	DOS			
255	IBM		67	TELEVIDEO				
62	MICROVAX II	VMS	266	OSBORNE. IBM AT	CPM, MS-DOS.			
260	COMPAQ, OLIVETTI P6060, IBM	MS/DOS, OLIVETTI O.S.,	271	IBM AT, XT	DOS 3.1			
	PC/XT.	MS-DOS.	283	SHARP PC 1500	SHARP			
267	HP 9845T	BASIC HP	301	IBM AT	MS-DOS			
272			308	CROMEMCO, SVI	CP/M			
279	VICTOR	MS-DOS	313	OLIVETTI M24	MS-DOS			
			325	BURROUGHS				
			68					

## Appendix III. Types and Operating Systems for mini's

Rec. no.	Type	Operating system	Rec. no.	Type	Operating system	Rec. no.	Type	Operating system	Rec. no.	Type	Operating system
35	VAX 750	VSM 4.2	240	PRIME	PRIMOS	262	VAX 11/780	VMS	62	VAX 11/750	VMS
194	NCR 8430		252	PRIME	PRIMOS,	274	VAX 8600, VAX	VMS, TOPS 20	279	PRIME	PRIMOS
119	VAX 780	MS-DOS			PRIMIX.		11/780, DEC 2065.		284	HP-1000	RTX
124	OLIVETTI, SHARP	BASIC	264	DG, VAX, IBM	VARIOUS.	321	PRIME	PRIMOS	28	PRIME 550	PRIMOS
36	DEC PDP 11/24	RSX 11 M	77	HP 3000/48,	MPE,	328	PDP 11/73	TSX T	302	PRIME	PRIMOS
136	YHP				MICOS	88	VAX 11/780	VMS	314	WANG 2200C.	
141	HARRUS				PRIMOS.	90	OLIVETTI P6040	BASIC	331	VAX 750, MICRO-	UNIX
153	APOLLO, DOMAIN.	CAD-DRAUGH			PRIME 2250.	103	PRIME 2250.02	PRIMOS		VAX.	
	TING.		288	ACOS 410		127	DIGITALPDP11/23		63	VAX + DEC	VMS +
165	OLIVETTI-P-	BASIC	318	PRIME	PRIMOS	132	PRIME	PRIMOS			TOPS20
71	NIXDORF		323	DEC PDP 11/34.	RSTS-E.	144	VAX, GOULD	VMS, UNIX	338	HP 9000	UNIX
170	HP-9836	BASIC, PASCAL	9	DG-NOVA	RDOS	56	VAX+DEC	VMS+TOPS 20	29	HP 9000	BASIC-OS
177	WAMB		10	PRIME 550	PRIMOS	156	PRIME 2250,250	PRIMOS	99	HP	DOS
2	VAX (3)	VMS	80			161	HP		65	PD11, VAX11/750,	VMS
294	NORTH-STAR	CP-M & MS-DOS.	11	DIGITAL VAX 730	VMS	168	HP-1000	RTE A 1		SPERRY, HP-1000	
		199	IBM	23		173	NIXDORF 8860		31	VAX 750	VMS
219	PRIME	PRIMOS	110	PSI (IBM COMP.)	FLOPPY	185	DG	AOS/VS	101	PRIME	
241	DEC VAX 11/730	VAX/VMS	129	HP 9000-550	UNIX 5.0	190	PRIME 750	PRIMOS	108	VAX 11/750, VAX	VMS, AOS.
248	HARRIS H700	VOS	146	VAX, NORD	VMS,	197	DEC-10	TOPS-10		11/780 CLUSTER,	
253	DEC VAX 11/730	VMS V4.2			SINTRAN	220	VAX 11/750	VMS		DG MV 10000.	
265	VAX		151	VAX 11/780	VMS	227	CODATA	UNIX	125	VAX-11	
72	BULL MINI 6/74	DOS MOD	158	VAX 11/730	VMS	239	PRIME		142	VAX,P4500	VMS
		400	163	PRIME	PRIMOS	57	DEC VAX,HP 3000	VMS, MPE	66	MICROVAX I	VMS
277	PDP11,VAX11/750	RXS-11M,VA X/VMS	175	S/36 IBM	SPP	261	VAX		166	PDP-11/PRIME	RT
		12	PRIME 2250			268	VAX 750	VMS,		11,JJ/PRIM	
282	PRIME/NIXDORF	PRIMOS/8870	205	OLIVETTI P6066	F.DOS		VMS/16DS		171	HP-9826	BASIC 2.1
3	DATA GEN.EC.130	AOS	210	DG NOVA 4X	RDOS	285	HONEYWELL		178	NORD 100,500	SINTRAN
300	VAX/780		229	PRIME 9750	PRIMOS	290	PRIME 650	PRIMOS IV	183	MANY DIFF.	
307	PDP 11/34	RSX	234	HP 1000 XL	RTE/XL	315	PRIME 750	PRIMOS	32	PDP 11/45	PSX 11 M
		11M/3.0	246	VAX11750/PRIME	VMS/PRIMOS	327	HP 9816	BASIC	213	OLIVETTI,DICHI	N24,2000
312	PRIME 400 & 550	PRIMOS		750 & 9750.		58	PDP 11/23	XENIX (UNIX)	225	DEC VAX/DEC 10	VMS-TOPS-1
38	HP 1000	RTE 6	263	ALL TYPES					0		
73	HP 86B		82	OLIVETTI	MINI-BASIC	93	3000	MPE	230	PRIME,VAX	PRIMOS,VMS
39	SIEMENS PC-MX2	XENIX (SINIX)	13	HP-9000	UNIX	24	ECLIPSE	RDOS	249	DEC VAX	VMS
		48	PRIME 450	PRIMOS		94	DEC	TSX	67	VAX	
74	IBM		49	VAX		25	HP 9845B		278	DIGITAL PDP 11	RT 11
6	VAX 750		15	HP 3000		95	HP 41 CV		33	COUVERCENT TECK	UNIX
123	PDP 11/60, PDP 11/750.	RSX 11 M.	85	PRIME 250	FORTRAN	126	HP 9020		308	SVI	CP/M
			16	DEC PDP 11	BR11, RSX	131	VAX 11/750	VMS	69	VAX 11/780,	VMS
147	VAX/ND	VMS/SINTRAN	198	HP 217		138	FALCOMU-200	U-MOS			VAX 11/730 2
152	IBM 370		133	UNIVAC SYSTEM11		61	TI 990	DX10			PCS, PRIME 2250
159	HP 9000 MODEL 550.	UNIX	145	PRIME 550	PRIMOS	179	HP				
			169	HP 41 CX		184	VAX 11/750	VMS			
164	VAX (DIGITAL)	VMS	174	MV-4000.D.G.	AOS/VS	96	PDP-11/23,	V.4.1			
76	DATAGEN. MV4000	AOS/VS	186	PRIME			RSX-11, V.4.1				
193	HP/DATA		191	PRIME	PRIMOS	27	HP 9000	UNIX (HP-UX)			
7	VAX	UNIX	291	NORD, HP	SINTRAN,						
206	OLIVETTI	MS-DOS			RTEA	97	PCS-CADMUS	UNIX			
235	PRIME, VAX	PRIMOS, UNIX	298	PRIME 750	PRIMOS	296	VAX 855	VMS			
			204	HP 86B		202	OLIVETTI S6000	EMOS			
			228	NORSK DATA ND- 100/530/570.	SINTRON.	209	VAX 11/750	VMS			
			245	VAX, PRIME	VMS, PRIMOS	214	HP				
			250	DEC VAX 11/780	VMS						

**Appendix IV. Types and Operating Systems for mainframes**

Rec. no.	Type	Operating system	Rec. no.	Type	Operating system	Rec. no.	Type	Operating system
35	1100		.122	IBM S/38	CPF	256	VAX 751	VMS
1	IBM 4331	VU CMS	134	IBM 4341	VM	273	PRIME 550/850	PRIMOS
36	CYBER		146	UNIVAC	EXEC 8	320	ESER	OS/MVT
136	IBM 4341		151	DEC 10	TOPS 10	59	PRIME	
141	ICL		292	ODRA-1305 (ICL-	BEORGE-3, DOS/ 1900), RIAD-32	60	VAX8600/VAX780	VMS
165	DATA GENERAL- ECLIPSE S/200.			(IBM 360).	JS & OS/JS.	95	PRIME 550/II	
2	DEC 10	TOPS 10	210	DEC VAX 11/785	VMS	26	NAS	MVS
294	UNIVAC S/80	OS/3	229	IBM 3031-8	OS/VS1, DOS/VS1, MUSIC,	109	ICL 2988	VME
200	PDP 1144				VM,	114	DEC 2050	TOPS 20
207	NCR				VMS.	131	FACOM-M340S	FSPX8
224	UNIVAC, VAX 11/780.				UNIX	138	FALCOM M-382	OSIV/F4
265	AS 9000		246	SEQUENT 8000	1100/62	143	CDC	NOS 3.1
72	IBM 3081X	OS MVS	251	DEC 20	261	61	VAX-11/750	VMS
3	DATA GEN.EC.130	AOS	263	IBM 4083		179	IBM	
307	UNIVAC 1100	EXEC 8	280	UNIVAC	184	IBM 3081	MVS/TSO.	
38	IBM 3033, 4341	MVS/TSO, VM/CMS	310	IBM-3083J	MVS	27	CDC 170-720	NOS
336	SPERRY	OS 1100	329	IBM 4443 () .	CMS	97	CDC-CYBER	NOS 2
39	SIEMENS 7500		329	BURROUGHS 6700.	SEVERAL	296	CYBER 180-577	NOS
75	IBM 4361 MOD 3		49	HITAC M-240D	VOSI/ES	267	IBM 370	FORTRAN
6	CDC825, IBM3083	NOS/BE,MVS /XA	14	IBM	195	279	CYBER 175	NOS 2.2
111	IBM 370/155		16	DEC VAX, IBM	VMS, VM	331	DEC 20	TOPS
123	IBM 3081, HONEY	OS-VS, GERT2.	121	GOULD	UNIX	65	CYBER 180	NDS/VE
	WELL DPS/76.		133	UNIVAC 1100/71		195	VAX 11-780	VMS
135	IBM 3081	MVS	51	IBM 3130	VSPC, APL	101	IBM	
41	IBM 3081 X 2	MVS, XA	157	PRIME 350	PRIMOS	108	IBM 4361.	VM.
147	UNIVAC		174	IBM 4331	DOS/VSE	130	PRIME	
152	IBM 3033		204	IBM/36	SSP/36	142	SPERRY	EXEC 8
159	SPERRY UNIVAC	EXEC 8 +	221	OLIVETTI P 6060	BASIC	178	IBM	DOS
		UNIX	228	IBM 3031/3083.	CMS.	225	CDC CYBER	SCOPE
293	CDC, IBM	NOS, MVSSP	233	2903		283	DEC-10	TOPSIO
206	PRIME		245	DEC 10	TOPS 10	308	UNIVAC 1100,	
235	IBM 4381	CMS	250	IBM 3031	OS/VS1	313	DELTA, IBM, FACOM.	
42	SIEMENS	BS 2000	262	NAS/9160		313	PRIME 2250	PRIMOS
252	AMDAHL	VMS	269	SIEMENS	BS2000	68	HP 1000	19.3.7.
264	CDC 850, DEC 20	NOS, TOPS.	286	FACOM M360		337	IBM 3031	RTE-A
281	PDP 11	PX 11	18	CTM	BASIC			VM-CMS/DOS
288	XOA 650	ACOS-6/MVX	304	CDC, PRIME, ETC.	FORTRAN			
8	CDC, IBM		316	WANG VS 65	6.40			
306	CYBER 72, 172,	NOS/BE, NOS2.	321	DATA GENERAL	AOS			
			53	VAX-785	VAX-VMS			
	173. DEC 10.	TOPS-10.	88	IBM 3083/CRAY 1	VM/COS			
			54	VAX 11/780	VMS			
335			21	IBM 3081	VM/CMS			
78	CYBER	NOS	132	HITACHI, IBM	VOS 3			
9	IBM 4341	VMS	161	PRIME				
79	DATA GEN.MV4000	AOS/VS	168	IBM 4341	VM/SP CMS			
80			173	IBM 4341	MVS			
105	HONEYWELL BULL	GCOS 64 DPS-2.	190	CYBER 170-720	EMOS/SCOPE 3.4.1			
			22	PDP 11/05	RSX			
			203	VAX 11/750	VMS 3.			
			244	IBM 3084Q	MVS/XA			



## Appendix V. Types of CAD systems

Rec. no.	Type	Rec. no.	Type
1	SKOK	228	IBM 5080/5060 + NORSK DATA
100	HP 9836 C5		CADAM.
141	AUTOCAD	245	PERO CADRAW,
153	APOLLO, HP.		COMPUTERVISION,
165	CALCOMP 960		ARC-GDS.
182	GDS, PRIME	52	CALCOMP 25, UNIX
2	GDS		IBM AT, AUTOCAD.
219	SPEEDIKON	257	AUTOCAD
37	HP 9029	269	DOGS, EUCLID.
241	GIPSY'S-2D DRAFT	274	PRIME-MEDUSA.
248	PAFEC DOGS.	321	APOLLO
265		328	AUTOCAD
72	ASSIGRAPH	333	HP
277	DOGS	54	IBM-PC/XT
3	DATA GEN. EC. 130	55	CAPAM CALMA
300	INTERGRAPH	132	MICRO DUTCH
38	CADAM	144	EUCLID + DOGS
75	HP 1000	56	CEAOS/HP A900
123	AUTOTROLL.	156	GDS
135	IBM 3083 &	161	VAX
	CADAM.	173	MEDUSA/VAX
147	APOLLO-MICROVAX	203	FEAL GIPSY'S
235	COMPUTER VISION	239	INTERGRAPH
240	GIPSY'S	57	INTERGRAPH
252	PRIME	256	INTERGRAPH
264	UNIGRAPHICS,	268	INTERGRAPH/VAX
	CADAM, AUTOTROL,	273	TEKTRONIX 4109
	AUTOCAD,	290	CATIA, BDS, GDS,
	ETC.	60	EUCLID/DOGS
8		26	CDC
		102	IBM
306	VERSATEC	179	INTERGRAPH/VAX
78	ICEM/DDN	184	CADAM
9	CASCADE	260	AUTOCAD ON IBM
80			PC/XT.
134	CADAM	63	EUCLID + DOGS
146	CYBER 180-810	65	DAISY
163	PRIME	31	EUCLID MX-I
175	TEKTRONIX	195	MEDUSA
299	IBM-PC	108	DOGS (VAX),
205	PRIME		TECHNI CAD
229	MEDUSA		(TEKTRONIX),
246	GDS		EASYDRAF (HP),
263	MANY DIFF.		AUTOCAD (IBM-APRICOT).
13	MENTAT		DOGS (PAFEC)
14	IBM 4361 CADAM	142	DOGS
49		66	MEDUSA
16	DEC VAX	166	SOME DIFF.
198	SEVERAL SYSTEMS	183	BOCAD/DEC 11/
133	UNIVAC SS-3E	208	780 VAX.
145	REHACAD-		INTERGRAPH
186	AUTOTROL-APOLLO	230	GIPSY'S
	MEDUSA	249	VAX/DOGS/OWN.DE
		67	DOGS-2D
		69	

## Appendix VI. Other applications

Rec. no.	Other applications	Rec. no.	Other applications
36	ESTIMATING, QUANTITY AND COST SURVEYING, BILL OF QUANTITIES	274	CAD-TECHNIQUES.
136	LABORATORY AUTOMATION.	321	DESIGN
170	AUTOMATION OF STRUCT. TESTING AND DYNAMIC LOAD TESTING.	333	STRUCT ANALYSIS & DESIGN.
294	TOLL, APPRAISEMENT/CAPACITY EXPROPRIATIONS AND SURVEYS.	88	FINITE ELEMENT ANALYSIS, GRAPHICS.
207	EVALUATION AND ANALYSIS OF LABORATORY TESTING MATERIALS	21	HONE COUNTRY COORDINATOR (HONE=IBM INTERNATIONAL PRODUCTIVITY TOOL FOR TALES MEN AND SYSTEM ENGINEERS)
241	PHYSICAL LAND SURVEYS.	25	SCIENTIFIC RESEARCH
72	CIV. ENG.	131	LABORATORY AUTOMATION (CONTROL, DATA-GATHERING, MONITOTING & DATA-PROSESSING).
307	STRUCT. AND FLUID MECHANICS ANALYSIS.	155	PROJECT ANALYSIS-FEASIBILITY STUDIES.
312	SOFTWARE DEV, ACC.	184	PROG. DEV. COMPUTER CONFERENCE SYSTEM
324	DESIGN	27	SOFTWARE DEV.
40	CAT COMPUTER AIDED TESTING	97	SCIENTIFIC CALC. FOR STRUCT. DESIGN., STATISTICAL ANALYSIS OF DATA.
140	COLLECT DATA	284	RESEARCH, EDUCATION.
159	TEACHING, STRUCT. ANALYSIS + DESIGN, RESEARCH.	331	PRODUCTION AND RESEARCH OF EXPERT SYSTEMS
176	ACCOUNTING/DATABASE SURVEYING.	65	TENDER DOCUMENTS.
211	STATIC COMPUTATION, GEODETIC SURVEYING.	195	STRUCTURAL ANALYSIS, COMPUTATIONAL MECHANICS, INSTRUCTION.
235	SIMULATION	101	COMPUTER BASED EDUCATION (CAI), 3D MODELLING CAM
240	ACCOUNTANCY.	108	PRE AND POST-PROCESSING IN DESIGNING CONSTRUCTIONS.
252	TEACHING	171	INTERACTIVE DESIGN.
80	SCIENTIFIC WORK	225	PROGRAM DEV.
105	STRUCT. ENG.	308	STRUCT. DESIGN.
110	ENG. DESIGN OF STRUCTURES		
163	SPREAD SHEETS		
292	DEV. OF COMPUTER PROGS. FOR PROBLEMS OF NONLINEAR STRUCT. MECHANICS.		
210	TESTING IN THE LABORATORY.		
246	MATHEMATICAL MODELLING.		
263	CLIMATE CONTROL IN BUILDINGS, SECURITY, COMMUNICATIONS.		
310	I HAVE MOUNTED THE STRUDLE OF UPM FOR SCHOOL, CONTRIBUTED TO IMPLEMENTATION OF STRUCT. PROGRAM FOR XT FOR TEACHING, BROUGHT PROGS. FROM MY PRECEDENT RES, ROADS DESIGN, TOPOGRAPHY, PHOTOGRAVOMETRY, STUDIES LOCAL CADAM IMPL. INTENDED WITH UPM PROGRAMS.		
	EDUCATION		
	FINANCIAL PROGNOSSES.		
	ESTIMATION		
	HYDRAULIC PROCESSING, DATA RETRIEVAL FROM VARIOUS INSTRUMENTS.		
	ACCOUNTING, DATA ACQUISITION. (STUDENT) RESEARCH.		



## Appendix VII. Application Areas

Rec. no.	In house development	Commercial packages	Rec. no.	In house development	Commercial packages
35	LINEAR AND NONLINEAR FE.		282	DYNAMICS OF STRUCTURES/ CONTROLLING	
70	CONSTRUCTION COST MANAGEMENT	STRUCTURES COMPUTING	289	CALC.	WORD PROC.
1	WATER ENGINEERING	BUDGET, COSTING, PAY ROLL	3	STRUCTURAL ENGINEERING, GENERAL 3D GRAPHICS	LARGE SYSTEM SOLVERS. STRUCT. MECHANICS.
194	STRUCTURAL ENGINEERING		300	ALL	BRIDGE ANALYSIS/DESIGN.
100	ADMIN.	ADMIN./STATICS	307	STRUCT. AND FLUID MECHANICS ANALYSIS.	ADMINISTRATION & INFORMATION RETRIEVAL.
107	STRUCT. ANALYSIS & DESIGN	CAD, STATIC	312	BRIDGE/STRUCT. ANALYSIS/ DESIGN.	STRUCTURE ANALYSIS
112			319	ADMINISTRATION & INFORMATION RETRIEVAL.	ECONOMY, DEV. TOOLS.
119	TRANSMISSION LINES ETC.	FINITE ELEMENTS + MATHEM. ADMINISTRATION	324	STRUCT. - ROAD WORK.	
124	CALC.	VARIOUS	38	STRUCTURAL ANALYSIS	
36	VARIOUS	DEPENDING ON SPECIAL NEEDS.	336	ADMIN., BUDGETT., PLANNING & STEERING, CALC., WORD PROC., PROD. OF DRAWINGS, INFO. RETRIEVAL.	
136	STRUCT. ANALYSIS, INSTALLATI	ONS BUILDING PHYSICS.	73	STRUCT. CALC.	
141	ONS	WORD PROCESSING.	4	WORD PROCESSING, INTEGRATED PACKAGE (OPEN ACCESS)	
148	STRUCT. ENG., BRIDGE DESIGN.	STRUCT, HYDRAULICS, ROADS, SURVEYING, FILING/SORTING,	39	STRUCTURAL CALCULATIONS (SAP-NONSAP) (*)	
153	ENG. CALC. STRUCT.HYDRALICS.	FINANCIAL.		(*) WORD PROCESSING DATABASE	
165	STRUCT. AUTOPISTAS		74	TIMBER DESIGN	STRUCTURAL DESIGN
71			5	CALCULATION + CAT	WORD PROCESSING, TABULATORS, DATA-BASE
170	DATA ACQUISITION, CALC.	WORD PROCESSING, DATA BASE	40	STRUCT. ANALYSIS FOR STEEL CONSTRUCTION AND OFFSHORE STRUCTURES	
177	TENDERING, PROJECT MANAGING	DATA BASES, STATIC ANALYSIS.	75	STRUCT ANALYSIS, PSC DESIGN	
182	CALC. (TECHNICAL)		6	FOOHG DESIGN, BRIDGE INVENTORY	ANALYSIS OF COMPLEX STRUCTURES (F.E., FOLDED PLATE ETC.)
189		CUBUS-PROG. ZURICH.	106	DESIGN OF CONSTRUCTION OF CIV. ENG.	ACCOUNTS DEPARTM. OF BUREAU.
2	STRUCTURAL ANALYSIS & DESIGN. EXPERIMENTAL DATA PROCESSING.	STRUCTURAL ANALYSIS & DESIGN	111	ANALYSIS & DESIGN OF INDUSTRIAL STRUCTURES.	COMPUTER AIDED ANALYSIS, SAP IV, VI ETC.
294	ADMINISTRATION, BUDGETTING, TOLL, APPRAISEMENT, EXPROPRIATIONS AND SURVEYS.	WORD PROC., CALC, AND DESIGN	118	STRUCT.ANAL., THERMAL ANAL., HYDRODYNAMICS	MSC-NASTRAN (GEN. PURPOSE FEM).
200	STRUCT. ANALYSIS, HYDRAULICS	STRUCT. ANALYSIS.	123	SUMISAP (NONLINEAR FEM SYST.) ETC.	
207	TECHNICAL EVALUATION AND ANALYSIS OF LABORATORY TESTING OF MATERIALS.	ADMIN.	41	BRIDGE AND STRUCTURAL ENGINEERING	STRUCT. ANALYSIS - FEM - GRAPHICS.
212		PROJECT AND CONSTR. MANAGEM.	140	STRUCT. ANALYSIS - FEM	"ICES-STRUDEL", CAD
219	FINITE ELEMENT ANALYSIS (PROGRAM FLASH).	CAD.	147		SPREAD SHEETS, DATABASES, WORD PROC.
224		MARC,FLASH,STATIC,MAPPER, LOTUS	152	FINITE ELEMENT APPLICATIONS.	WORD PROC.
37		FORMWORKS AND REINFORCEMENT DRAWINGS WITH BILL OF QUANTITIES	159	STRUCT. ANALYSIS + DESIGN.	
236		NUMEROUS	164	PRESTRESSING CONCRETE BRIDGES	
241	ENG: ANALYSTICAL MODELLING	PAFEC "DOGS" (GRAPHIC), HENCO "INFO" (DATA BASE)			
248	MOST AREAS OF CIV. ENG.	ENG.,MIS,WORD PROC.			
253	ENG.	ALL			
265	ALL	10 M. BYTES.			
72	STRUCTURES.	20 M. BYTES.			
270					
277					

Rec. no.	In house development	Commercial packages	Rec. no.	In house development	Commercial packages
76 176	CALC. PROBLEM ORIENTATED DATA BASE	ALL ACCOUNTING/BUDGETTING/WORD PROC.	199 105 110 117 122 129 134 46 146 151 158 163 175 81 180 187 192 12 292 299 205 210 217 222 229 234 47 246	CALC. STRUCT., SURVEYING & ROAD DESIGN MATRIX (STIFFNESS) FOR SPACE FRAMES, ROAD EMBANK- MENT ETC. STRUCT. CALC. ON ROAD & BRIDGE ENG. (FOR INSTANCE: BENKELMAN BEAM ANALYSIS, STRESS CALCS, FOR HOLLOW CONCRETE COLUMNS (R.C.), SIMPLIFIED DYNAMIC ANALYSIS OF BRIDGE SUPERSTRUCTURES.) PLANNING-STORE CONTROL-COST TRACKS FINITE ELEMENT ANALYSIS STRUCT. ANALYSIS, MATERIAL TAKE-OFF. HYDRAULICS, FLOOD FLOWS, GUYED TOWERS COMPUTER AIDED LEARNING, FINITE ELEMENTS IN STRUCTURAL ENG.-LINEAR/NONLINEAR, DESIGN/DIMENSIONING OF REINF. CONCRETE STRUCT. ENG., HYDRAULICS, DAMS, ROADS, CONSTRUCTION. TECHNICAL PRGS. & CERTAIN ADMIN. PROGS. TRANSPORTATION, STRUCT. ADMIN. CIV. ENG.	ADMIN. WORD PROCESSING & DATA BASES
181 188 193 7 293 206 211 218 223 235 42 240 247 252 259 264 77 276 281 288 8 306 318 323 43 335 78 9 44 79 10 45 80 11	STRUCTURAL BEHAVIOUR RC, PC NONLINEAR FINITE ELEMENT ANALYSIS, GEN. ANALYSIS OF ENG. DATA.  SMALL PROGR., DESIGN, COM- PARISON OF BANKERS.  ALL IN 5. STRUCTURAL ANALYSIS  STRUCT. ANALYSIS.  CIVIL/STRUCT. ENG.  STRUCT. ANALYSIS, STRUCT. DE- SIGN, AI, ETC. STRUCT. DESIGN.  ENG., FEM, ES, NUM.ANAL., ETC. ALL AREAS REINFORCED CONCRETE COLUMNS. PROPERTIES OF AREAS, FINITE ELEMENTS (RECTANGULAR ELE- MENT, PLATE BENDING). STRUCT. ANALYSIS.  STRCT, ANA, & DESIGN STRUCT. ANALYSIS AND DESIGN.  FINANCIAL MANAGEMENT/BILLING /PAYROLL. ADMIN. (DATABASE), CIV. ENG.  CALC. AND ADMINISTRATION. CALCULATION STRUCTURAL ENGINEERING STRUCTURAL DESIGN - CALCULATION ADMINISTRATION, BUDGETTING  STRUCTURAL ENGINEERING  BUILDING SCIENCE,	WP, STRUCTURAL ANALYSIS MATHEMATICS, PLOTTING, STATIS- TICAL.  STRUCT., SURVEY, ADMIN., WORD PROC.  CIV.ENG., STRUCT. DESIGN, SOIL MECHANICS, ROAD PLANNING.  STRUCT. ANALYSIS, CLEARSOFT. ALL IN 5. NUMERICAL ALGORITHMS, STATIS- TICS. HIGHWAY DESIGN, COMPUTER- AIDED DRAFTING WORD PROCESSING/STRUCT. ANA- LYSIS. STRUCT. ANALYSIS, CAD, ETC.  WORDSTAR, SUPERCALC, CP/M, MBASIC. ENG., FEM, GRAPHICS. FINANCIAL PLANE FRAME   STRUCT. ANALYSIS, ACCOUNTING  CAD, WORD PROC. STRUCT. ANALYSIS AND DESIGN, MATH. ENG. STRUCT HIGHWAY, WORD PROC., STRUCTURES, ETC. ACCOUNTING. STRUCTURAL DESIGN STRUCT. ANALYSIS. CALCULATION, CAD, ADMINISTR. WORD PROCESSING, ETC WORD PROCESSING.  CALCULATION, WORD PROC.  WORD PROCESSING, ADMINISTR. BUDGET	STRUCT. ANALYSIS, MATERIAL TAKE-OFF. HYDRAULICS, FLOOD FLOWS, GUYED TOWERS COMPUTER AIDED LEARNING, FINITE ELEMENTS IN STRUCTURAL ENG.-LINEAR/NONLINEAR, DESIGN/DIMENSIONING OF REINF. CONCRETE STRUCT. ENG., HYDRAULICS, DAMS, ROADS, CONSTRUCTION. TECHNICAL PRGS. & CERTAIN ADMIN. PROGS. TRANSPORTATION, STRUCT. ADMIN. CIV. ENG.  ENGINEERING/CALCULATIONS CONTIXXXX MECHANICS, STATIC AND DYNAMIC FINITE ELEMENT, ANALYSIS OF STRUCT. (1, 2, 3-DIMENSIONAL) STRUCT. ANALYSIS AND DESIGN PROGRAMS.  STRUCT. ENG./RESEARCH/ TESTING. CALC., MATERIAL LISTS. STATICS, ACOUSTICS (NOISE REDUCTION). STRUCT. ANALYSIS & DESIGN STRUCT. CALC. MINOR STRUCTURAL. MATHEMATICAL MODELLING.	ADMINISTRATIVE NEEDS-STRUCT. ENG. F.E. - CAE STRUCT. ANALYSIS.  CADD, SCS HYDROGRAPH STUDY.  FEM.  IMSL, SSP, GKS.  ENG. DATABASE, WORD PROC.  CIV. ENG., STATIC. ENGINEERING/CALCULATIONS  SAP-4  ADMIN., CALC., WORD PROC., PRODUCTION OF DRAWING. WORD PROCESSING/ADMIN.  ADMIN. ADMIN., STATICS (E.G. FE), BUDGETTING.  STRUCT. CALC. STRUCTURAL. GDS, ADAS, VISION, INFO, PATRAN, STRESS, PIPS.	

Rec. no.	In house development	Commercial packages	Rec. no.	In house development	Commercial packages
251	STRUCT./CIV. ENG. ANALYSIS/ DESIGN.	BUSINESS SOFTWARE	174	ADMIN.-PLANNING & STEERING- CALC.	CALC. WORD PROC.
258	SAFETY & RELIABILITY/STRUCT.	ALL AREAS	86	SHELL ANALYSIS	STRUCT. ANALYSIS (CIV. ENG.)
263	ALL AREAS	PLANE FRAME	186	PLANNING, ESTIMATION	ALL OTHERS
275	REINFORCED CONCRETE COLUMNS, PROPERTIES OF AREAS, FINITE ELEMENTS (RECTANGULAR ELEMENT PLATE BENDING.).	ENG.	191	STATICS, DYNAMICS	STRUCT. ANALYSIS.
82	FEM PROGRAMMES, STRUCT. CALC., DATA BASE.	FEM PROGS., MATH. PROGS.	17	HYDRAULIC PROCESSING, DATA RETRIEVAL.	WORD PROC., SPREADSHEET, GRAPHICS, STRUCT. CALC.
280	SOIL, STRUCT., ACCOUNTING.	VISICALC, VISISCHEDULE, LOTUS, D-BASE, STRESS.	291	INFORMATION RETRIEVAL DATA ACQUISITION.	FINITE-ELEMENT ANALYSIS, SPREADSHEETS, ACCOUNTING.
305	SIMULATION (CONTROL OF QUALITY OF CONCRETE), STATISTICS (OTHERS), PLANNING OF EXPERIMENTS, MATHEMATICS.	NOT ME. SYSTEM FOR MANAGEMENT OF PUPILS RECORDS AND ADMINISTRATIVE, WITH UPM COMPUTER AT ETS AGRONOMOS.	204	SERVICE BUREAU	STATIC, ADMIN, COST PLANNING, INTERNAL ADMIN.
310	CIV. ENG.	ADMINISTRATION, C.E.	216	STATIC CALC.	SERVICE BUREAU
317	STRUCT. ENG.	STRUCT. ENG.	221	ALL ENG. FIELDS.	STATIC CALC.
322	HIGHWAY ENGINEERING	BUILDING ENG. & OFFICE. STRUCTURAL & MUNICIPAL ENG'G SURVEYING, BUDGETTING (SYMPHONY & LOTUS 123)	228	STEELWORK DESIGN AND CODE PREPARATION AND CALIBRATION.	ALL ENG. FIELDS.
329	CIVIL, ARCHITECT, ELECTRICAL ENGINEERING	MECHANICAL ENGINEERING	233	ADM., BUDGETTING, CALC., WORD PROC., PROD. OF DRAWINGS, INFO. RETRIEVAL.	CALC., WORD PROC., PROD. OF DRAWINGS, INFORMATION RETRIEVAL.
334	STRUCTURAL ENGINEERING, PROJECT MANAGEMENT	PC WORD PROC.	245	CONCRETE BEAM DESIGN, FRAME ANALYSIS, WIND, EARTHQUAKE ANALYSIS, CONCRETE COLUMN DESIGN.	CONCRETE SLAB DESIGN, LOTUS 1-2-3.
48	STRUCT. ANALYSIS ENG. CALC.	WORD PROCESSING, SPREADSHEET	52	STRUCT. ENG.	STEEL BEAM & COLUMN DESIGN, WORDSTAR.
83	STRUCT. ANALYSIS AND DESIGN, CAD SYSTEM.	SLAB, FRAME ANALYSIS, SLAB DESIGN FE-STRESS, FLASH, SAP IV, ETC	250	STRUCT. ANALYSIS, ACCOUNTING	COMPOSITE BEAM DESIGN, PEACH TEXT.
14	EDUCATIONAL	STATICS	257	EDUCATIONAL SOFTWARE-ANALYSIS AND DESIGN.	BUILDING STRUCTURES.
49	STRUCT. ENG./HEAT TRANSFER.	CAD/STATISTICS/TEXT EDITING.	262	HYDRAULIC ANALYSES, CONSTR. MANAGEMENT.	STRUCT. ANALYSIS, CAD, WORD- PROC., DATA BASE, MANG.
84	ENG.	F.E. PROGS.	274	STRUCT. (CIV.ENG., MECHA- NICAL, INFORMATICS, ETC.).	SPREADSHEETS, WORD PROC., COMPILERS, DATA-BASE MANAGE- MENT, FINITE ELEMENT ANALYSIS.
15	STRUCT. ANALYSIS	ENG. CALC.	87	STRUCT. ANALYSIS. (STATIC, DYNAMIC, LINEAR, NONLINEAR).	STATIC & DYNAMIC ANALYSES, PROJECT NETWORK ANALYSIS.
104	STRUCT. ANALYSIS ENG.	GENESYS (FINITE ELEMENTS).	286	INFORMATION SYSTEM	STRUCTICS FOR BUILDING
116	STRUCT. ANALYSIS ENG. CALC.	STRUCT. ANALYSIS.	18	STRUCT. ENG.	STATIC
121	STRUCT. ANALYSIS AND DESIGN, CAD SYSTEM.	STRSS, STRUDEL.	304	CALC.	STRUCT. & BRIDGE ENG., WORD PROC., ADMINISTRATION/
128	EDUCATIONAL	STRUCT. ANALYSIS,	316	STRUCT., DRAFTING.	ACCOUNTING.
133	STRUCTURAL ENG.	P.C., PC., STEEL DESIGN, SOLID MECHANICS	321	ENG., ADMIN.	ADMINISTRATION, BUDGETTING, WORD PROC.
145	STRUCTURAL ENG.	STRUCT. ANALYSIS.	328	STRUCTURES	STRUCTURES
51	STRUCTURAL ENG.	STRUCT. ANALYSIS.	333	ENG., ADMIN.	ENG., ADMIN.
150	STRUCT. ANALYSIS DESIGN OF REINFORCED CONCRETE.	STRUCT. ANALYSIS.	53	STRUCTURES, DATABASE, SPREADSHEET.	STRUCTURES, DATABASE, SPREADSHEET.
157	ROAD DESIGN, STRUCT. ENG., HYDRAULIC.	STRUCT. ANALYSIS.	88	CIVIL ENG.: STRUC. ANALYSIS, P.C., PC., STEEL DESIGN, SOLID MECHANICS	ADMINISTRATION
162	R.C. & PRESTRESS DESIGN.	STRUCT. ANALYSIS.	19	STRUCTURAL ANALYSIS.	
169	CALC. COOLING TOWERS & FENCING OFF-SHORE PLATFORMS.				

Rec. no.	In house development	Commercial packages	Rec. no.	In house development	Commercial packages
54	CONSTR. MANAGEMENT INFORMATION SYSTEM FEM	CONSTR. MANAGEMENT FEM, STRUCTURAL ANALYSIS. SPACE FRAME, FEM (STRUCTURAL) SAP5,AUTO CAD FOR DESIGN OF ARCHITECTURES AND STRUCT. STATIK,MASSIVBAU,STAHLBAU, HOLZBAU.	57	STRUCTURAL ANALYSIS, ROAD DESIGN, HYDRAULICS, ENVIRONMENTAL PLANNING, TRAFFIC PLANNING,GEOTECHNIC, RESSOURCE AND FINANCIAL PLANNING. HIGHWAY & BRIDGE DESIGN. SPECIALIZED ENG.	STRUCTURAL ANALYSIS, STATISTICAL ANALYSIS, FINANCIAL PLANNING
89		ADMIN., WORD PROC.	256	CIV., STRUCT., MECHANICAL, ELECTRICAL, CAD, INFORMATION MANAGEMENT.	WORD PROC., GEN. ENG.
20			261	STRUCT., CAE	ALL
55			268	STRUCT. CALC.	FEM PROGS., CAD
90			273	PLANNING & STEERING/BUDGETTING	ADMINISTRATION, WORD PROCESSING
21	SYSTEM CONFIGURATIONS, DESIGN TOOLS, OFFICE SYSTEMS,-- STRUCT. CALCULATIONS.	WORD PROCESSOR + SOME CALC. (SPACE FRAME F.I.) STRUCT ANALYSIS, ADMINISTRATION.	285	CAD	FEM, PERT, HIGHWAY, DESIGN.
197	STRUCTURAL ENG.	STATISTICAL PROCESSING, DRAWINGS, DATABASE CONTROL ETC.	290	STRUCTURAL ENGINEERING PRESTRESSING CALC.	STRUCT. ANALYSIS.
103	STRUCT. ENG.		303	STRUCT. ANALYSIS (CONCRETE, REINFORCEMENT, PRESTRESSED CONCRETE).	FINITE ELEMENTS, CAD, NETWORK ANALYSIS (CPM).
115			315	FINITE ELEMENT SOFTWARE. BRIDGES STRUCTURES.	STRUCTURAL ANALYSIS.
120	CALCULATION (18 PRGS.)		320	STRUCTURAL ANALYSIS ADMIN.	ALL OTHERS
127	STRUCT. ANALYSIS.		327	STRUCTURAL ENGINEERING	DATA BASES
132	STRUCT. ANALYSIS, OPERATIONS RESEARCH, BUDGETTING, ETC.		58	PLATES AND SHELLS, STRUCTURAL ANALYSIS	PLATES AND SHELLS, STRUCTURAL ANALYSIS.
139			93	STATICICS, PLANNING HYDRO-DYNAMICS	WORD PROCESSING.
144	TECHNICAL/CAD-CAM		94	FINITE ELEMENT METHOD	FINITE ELEMENT METHOD
56			95	LITTLE UP TO MEDIUM SIZE PROGRAMMES FOR CONSTRUCTION AND STATICAL COMPUTATIONS, USER ORIENTED	ADMINISTR., BUDGETTING, WORD PROCESSING, CAD, EXTENDED PROGR. FOR STATICAL COMPUT.
156	CIV./STRUCT. ENG.		196	ADMIN.	HIGHWAY ENG. & STRUCT.
161	STRUCT. ANALYSIS.		102	STRUCTURAL ENG.	GRAPHICS & STRUCT. ENG.
168	STRUCT. ANALYSIS		109	HIGHWAY ENG. & STRUCT.	ANALYSIS.
173	ALL		114	STRUCT. ENG. ANALYSIS.	ADMINISTRATION AREA
185			126	FEM STRUCT. ENG. ANALYSIS.	
91	STRUCTURAL ENG., TRAFFIC AND TRANSPORTATION, ADMINISTRATION.		131	SCIENTIFIC & TECHNOLOGICAL AREA	
190	NONLINEAR FE PROGRAMS		138	FEM COMPUTER GRAPHICS, GEOMETRICAL MODELLING.	
22	STATICS		143	DESIGN-STRUCT. STEELWORK.	
297	ENG. ANALYSIS.		155	CALCULATION, ADMINISTRATION.	
203			61	STRUCT. WORD PROX. ADMIN.	ADMINISTRATION, PLANNING & STEERING, CALCULATION, WORD PROCESSING.
215	PROD. OF MATERIAL LISTS ETC.		160	STRUCT. ANALYSIS, CAD.	WORD PROC., DATABASES.
220			167		
227	ADMIN.,STRUCT.ENG.,GEOTECHNICAL ENG.		172		
232	NATIONAL ROAD NETWORK PROGRESS REPORTS ON NEW CONSTR.				
239	ENG. & PROJECT MANAGEM.				
244	DESIGN AND ASSESSMENT OF STRUCT. COMPONENTS.				

Rec. no.	In house development	Commercial packages	Rec. no.	In house development	Commercial packages
179 184 96	TECHNICAL CALC. STRUCT. ANALYSIS, FEM METHODS ADAPTION OF COMMERCIAL PACKAGES TO OWN NEED AND/ OR SPECIFIC COMPUTER REQUIRE- MENTS.	FINITE ELEMENTS CAD/CAE, FEM-PROGRAMS. PRESTRESSED CONCRETE BRIDGES - 'FRAP/TROS' FEM (PLATES, FOL- DED STRUCTURES) - 'NE10', 'NE07', FEM (GEOM. & PHYSICA LLY NON-LINEAR BEAM STRUCT.) 'STAR 2', SOIL MECHANICS 'SPUBOL'	338	NON-LINEAR + LINEAR STRUCT. ANALYSIS ADMINISTRATION, DRAWING PROD.	WP/PROJECT MANAGEMENT/BUILDING SERVICES.
27	FINITE ELEMENTS, BOUNDARY ELEMENTS	FINITE ELEMENTS	29	ENGINEERING (STATIC)	WORD PROCESSING, PLANNING, BUDGETTING
97	STRUCT. ENG., FINITE ELEMENTS, CAD	TEXTPROCESSING (WORDSTAR)	99	CALCULATION, ADMINISTRATION	
296 202 209	SCIENTIFIC ADMIN. TECHNICAL, ADMIN.	ADMIN.	64	STATIC OF FRAMES, FINITE ELEMENTS	
214 226			65	DESIGN PROGRAMS FOR SAND- WICH-STRUCTURES ELASTO- PLASTIC COLUMN AND FRAME DE- SIGN OF HOLLOW CORE SLABS, FEM MODELS OF R.C. AND P.C. STRUCTURES, FIRE RESIS- TANCE OF CONCRETE STRUCTURES	STATISTICS, SIMULATION, GRAPHICS, LINEAR AND NON- LINEAR STRUCTURAL ANALYSIS (ADINA, PAFEC, ETC).
231	STRUCT. CALC. & ADMIN.	STRUCT. CALC. REINFORCEMENT DETAILING.	31	CAD, FINITE ELEMENTS	CONSTRUCTION PROJECT PLANNING AND CONTROL P.C.-PROGRAMS
238	TEMPORARY WORKS: FORMWORK: EARTH SUPPORT.	STRUCT. CONCRETE TO CP110, STEELWORK: STRUCT. ANALYSIS, STABILITY OF SLOPES.	195	STRUCT. ENG., DESIGN OF REINFORCED AND PRESTRESSED CONCRETE BEAMS.	CAD, FINITE ELEMENTS ADMIN., CALC., WORD PROC. PROD. OF DRAWINGS., TENDER DOCUMENTS.
243	STRUCT. & CIV. ENG. CALC. & ACCOUNTING.	STRUCT. & CIV. ENG. CALCS.	101	COMPUTATIONAL MECHANICS, STRUCTURAL ANALYSIS.	WORD PROCESSING
255 62	TECHNICAL AND ECONOMICAL CALCULATIONS, ADMINISTRATION, CAD	WORD PROCESSING, DATABASES.	108	ENG. ANALYSIS, IE, FINITE ELEMENT ANALYSIS, GRAPHICS, COMMERCIAL APPLICATIONS, CAI PACKAGES.	CAD/CAM, DATABASE, AGL, FINI- TE ELEMENTS ANALYSIS.
260	SMALL PROGS. FOR ENG. CALC.	ENG. CALC., SPREAD SHEET PRG., ACCOUNTING PROGS., WORD PROC. PRG., CAD PRG., INFOR- MATION RETRIEVAL PRG.	113	STRUCT. ENG., PROJECT CO-OR- DINATION.	PAYROLL, INVENTORY, FINANCI- AL ACCOUNTING.
267	STRUCT., WORD PROC., INFORMATION.	STRUCT.	125	STRUCT. ENG.	FINITE ELEMENT ANALYSIS.
272 279 284	STRUCT. ANALYSIS. ADMIN., CALC., INFO. RETRIE- VAL, STATISTICAL ANALYSIS.	FINITE ELEMENT PROGRAMS. PROGRAMMING TOOLS.	130	STRUCT. ELEMENTS VERIFICATION	DRAWING, WORD-PROCESSING, BUDGETTING.
28	PRODUCTION AND EVALUTION OF BIDS CONTRACT AWARD, ACCOUNT- ING FOR CONSTRUCTION WORK.	FEM, ROAD PLANNING	137	142	ICES-STRUDEL
98 302	STRUCT. (BRIDGE), GEOMETRY, HIGHWAY. CALC.	SPREADSHEETS, DB, WP.	149	ALL OF 5 EXCLUSIVE WORD PRO- CESSING, DRAWINGS, BUDGETTING	CAD, ROADS, STRUCT., WORD PROC.
309		ADMIN.	66	STRUCT. ENG.	CALC., WORD PROC.
314 326	DESIGN OF STRUCTURES, JOB COSTING.	STRUCT. DESIGN AND HYDROLOGY	166	STRUCT., ROADS, BUDGETTING.	FEM
331	DATABASES, EXPERT SYSTEMS.	FEM ANALYSIS, PROJECT PLAN- NING.	171	STRUCT. AND BRIDGES.	LOTUS 1-2-3
63			178	RESEARCH	ALL
			183	CALC. AND SO ON	ADMIN., CALC., WORD PROC., PROD. OF DRAWINGS.
			32	FINITE ELEMENT PROGRAM	HIGHWAY DESIGN, PROJECT MANA- GEMENT, BUILDING DESIGN.
			295	CALC.	STRUCT. FINITE ELEMENT.
			201	SEE F5.	WORD PROC., STRUCT. & SLIP CIRCLE ANALYSIS.
			208		SPREADSHEET ANALYSIS.
			213		
			225	STRUCT. ENG. (FEM MAINLY).	
			230	MAINLY FINITE ELEMENTS + HYDRODYNAMICS CODES.	
			237	STRUCT. GEOMETRY OF BRIDGES DECKS.	
			242	HARBOUR & GEN. CIV. ENG. & STANDARD. METHOD OF MEASUREMENT (CESSM)	

Rec. no.	In house development	Commercial packages
249	CAD, TRANSPORT PLANNING, ENG. ANALYSIS & DESIGN.	GROUNDMODELLING, VARIOUS ENG. PROGRAMS E.G. LUSAS (FINITE ELEMENTS). MANAGEMENT WORD PROCESSING, BUDGET. ADMINISTRATION, PROJECT STEERING, WORD PROCESSING. CAD-SYSTEM, BASIC FRAME CALC ADMIN., STRUCT. ANALYSIS. STRUCT. DESIGN ANALYSIS, CAD
254	CALC. (ENG. ANALYSIS)	
67	CALCULATION, PRODUCTION OF DRAWINGS.	
266	DETAIL ANALYSIS & CALCS.	
271	BUDGETTING	
278	STRUCT. DESIGN ANALYSIS.	
283	STRUCT.ENG.	
33		
301	BILLING	TECHNICAL, WORD PROC.
308	STRUCT. DESIGN, ROAD & HWDESIGN.	STRUCT.DESIGN, ICES STRUDL, STRESS, SAP, DRAIN, SDZA, SD 2B, TABX.
313		PLANNING, CALC.
325	STRUCT. ENG.	STRUCT. ENG.
68	CALCULATION	ADMINISTRATION, WORD PROCES- SING, CAD-SYSTEM.
337	STRUCT. DYNAMICS (FREQUENCY RESPONSE), STABILITY OF SHELLS (FINITE ELEMENTS)	STRUCT. ANALYSIS (ADINA, SAP ETC.)
34		
69	CALCULATION-, PLOTTER- PROGRAMMES.	ADMINISTRATION, WORD PROCES- SING, CALC.

**Appendix VIII. Area for specialized Symposia**

Rec. no.	Area	Rec. no.	Area
194	CAD/CAM FOR STRUCT. STEEL WORKS.	228	CAD/CAE
100	CAD	257	ANALYSIS, POST-TENSIONING, FINITE ELEMENTS.
153	CAD	274	DATA MODELLING IN STRUCT. ENG., DATA MODELLING IN GEN.
219	INTEGRATED COMPUTER AIDED PLANNING (ARCH-LUG-SPECIALISTS).	304	STRUCT. ENG., BRIDGE ENG.
307	NUMERICAL METHODS IN STRUCT. MECHANICS.	328	BRIDGE DESIGN, STRUCTURES, HYDRAULICS, HIGHWAY.
38	DEVELOPING INTEGRATED CAD SOFTWARE FOR CIVIL ENGINEERING (DESIGN, CALCULATION, PLANNING, PRODUCTION OF DRAWINGS, MANAGEMENT.)	333	CAD
39	BRIDGES-MAINTENANCE	54	STRUCTURAL ENG., CONSTR. MANAGEMENT
111	COMPUTER AIDED ANALYSIS, DESIGN & DRAFTING	55	SOFTWARE ON CAD OR COMPUTATION FOR ARCHITECTURES AND STRUCTURES
118		103	CAD
123		120	
140	OFFSHORE ENG. STRUCT.	168	
159	STRUCT. ANALYSIS, REINFORCED CONCRETE DESIGN.	190	MAN-COMPUTER INTERACTIVITY IN NONLINEAR COMPUTATIONS.
164	PC BRIDGES.	232	ROAD DESIGN, CONSTR. AND MANAGEMENT SYSTEMS
7		256	OPTIMIZATION IN BRIDGE DESIGN.
235	DEV. IN DATABASES AND EXPERT SYSTEMS IN STRUCT. ENG.	273	MATERIAL MODELLING, TIME DEP. EFFECTS, SOILS, CONCRETE COMPUTERIZED BRIDGE RATING.
240	INFORMATION RETRIEVAL.	285	STRUCT.
264	FEM, ES IN STRUCT. ENG.	303	
276	KNOWLEDGE BASED AND EXPERT SYSTEMS.	315	CAD FOR BRIDGE AND STRUCT. ENG.
43	STRUCTURAL DESIGN	327	STRUCTURES, BRIDGES.
129	SOIL STRUCT. INTERACTION	93	STRUCT. ENG.
146	REINF. AND PRESTRESSED CONC. STRUCT. MECHANICS, NONLINEAR ANALYSIS, FINITE ELEM. APPLICATIONS	25	STRUCTURAL ANALYSIS, FEM
		114	UNDERGROUND STRUCTURES AND LARGE SPAN STRUCTURES.
205	CALC. + CAD	126	STRUCT. ANSLYSIS FEM.
217	EUROPE.	155	STRUCT. STEEL DESIGN, & DETAILING
275	KNOWLEDGE BASED AND EXPERT SYSTEMS.	167	
329	STRUCTURES, NONLINEAR ANALYSES.	97	GEOMETRIC MODELLING, ACCURACY OF FINITE ELEMENTS, WORKSTATION CONCEPTS.
48	STRUCT. & BRIDGE ENG., MUNICIPAL (LAND DEV.)	30	CAD-CAM, USE OF PC-XT OR SIMILAR
49		65	STRUCT. ENG.
15	STRUCTURAL ENGINEERING PROJECT MANAGEMENT	125	OFFICE-AUTOMATION, CAD/CAE, EXPERT-SYSTEMS, FILING SYST.
128	CAD	142	
174		171	COMPUTER AIDED DRAFTING USING MICROS. STRUCT. ERRORS DUE TO THE USE OF COMPUTERS, & HOW TO PROTECT AGAINST THEM.
86	PROD. OF DRAWINGS.	237	CAD A.I. & EXPERT SYSTEMS. DYNAMICS, STABILITY NONLINEAR MATERIALS, NUMERICAL METHODS.
186	COORDINATION, CALCULATION PROGRAM-CAD-	308	
		337	

**Appendix IX. Congress Themes for structural CAE**

Rec. no.	Congress Themes for structural CAE	Rec. no.	Congress Themes for structural CAE
119		297	
71		57	
219		92	ALL TOPICS.
37		320	
307	NUMERCIAL METHODS	109	
73		155	ANYTHING RELATING TO THE DESIGN OF DETAILING OF STRUCT. STEEL.
39	BRIDGES-DESIGN WITH CAE	123	E.G. IN HELSINKI.
140		184	GEOMETRIC MODELLING, EDP-CONCEPTS : WORKSTATION LOCAL AR-NETW./PUBL.NETWORKS
176		97	
7		314	BENEFITS OF CA DRAWING & DESIGN SOFTWARE + PITFALLS
235	DEV. IN DATA BASES, EXPERT SYSTEMS, AND OTHER DESIGN AIDS.	338	CAD-CAM
240		30	COMPUTER AIDED STRUCT. ENG. (CAD/CAM)
264	BRIDGES, FEM IDEALIZATION.	65	USER-INTERFACE AND INTEGRATED USE OF AUTOMATED STRUCT. FUNCTIONS.
8	HOW DO WE STAY ON TOP OF CAE RATHER THAN THE REVERSE	142	
151		171	
163	INTERACTIVE COMPUTER AIDED STRUCT. DESIGN.	201	
205	CALC. + CAD	210	
210		208	
263		237	THE TRAINING OF ENG. FOR USE OF CAE.
13		308	
310		68	
48	BRIDGE DESIGN	337	
49		16	
116		116	
121	INFLUENCE OF CAE ON THE RELIABILITY OF THE DESIGN PROCESS.	121	
150		228	
174		245	
191	IMPACT ON EDUCATION AND PRODUCTIVITY.	274	
291		333	
228		53	
245		54	
274		55	
333		120	
53		161	
19	COMPUTER CHAIN : CAE CAD CAM	168	
		91	STRUCT. ANALYSIS
		190	RESULT VERIFICATION CAE DESIGN PROCESS.

**Appendix X. Other information wanted**

Rec. no.	Other information wanted	Rec. no.	Other information wanted
112	WE WOULD LIKE TO INITIATE COMPUTER USE IN ORGANISATION BUT AWAIT FUNDS ACUMULATION FOR SAME	245	DATA BASES & THEIR HANDLING & HOW THEY SHOULD BE FUNDED. -PARTICULARLY "STRUCT. FAILURES" & "GEOTECHNICAL"
36	USAGE OF PC ON CONSTRUCTION SITES	55	ADVERTISES ON COMPUTER AND SOFTWARE.
148	WE ARE INTERESTED TO HAVE DETAILS OF NONLINEAR ANALYSIS PROGRAMMS PARTICULARLY IN CABLE STAYED BRIDGES.	244	VERIFICATION OF COMMERCIALY DEVELOPED PROGRAMS.
39	COLLECTED LISTS OF THE DATA-BASES (UNIVERSITIES, LIBRARIES ABOUT STRUCTURAL (BRIDGES) CALCULATION	23	REPORTS ABOUT NEW HARD AND SOFTWARE IN THE TECHNICAL FIELD
135	SUPER-MICRO SYSTEM OF 32 BIT MPU OR EWS (LIKE APOLLO DOMAIN SYSTEM) IS UPDATED IN JAPAN. THE COMPUTER SYSTEM WILL BE CHANGED IN THE NEAR FUTURE INSTEAD OF DUMB TERMINAL & MAIN FRAME SYSTEM	138	MANAGEMENT OF SOFTWARE MAKING. MANAGEMENT OF DATABASE CREATION. STANDARDIZATION RELATED INFORMATICS.
206	TREND ON USAGE OF COMPUTERS IN GENERAL IN THE FIELD OF CONSULT ENG.	184	EXCHANGE OF INFORMATION AND EXPERIENCE CONCERNING USE OF COMMERCIAL CAE-PROG. PACKAGES LIKE FEM-PACKAGES. PRE- AND POSTPROCESSORS ETC.
9	A) INFLUENCE THE OTHER COMMISSIONS/WORKING GROUPS ETC TO WRITE THEIR RECON/ MODEL CODES ETC IN A WAY ADAPTED TO COMPUTER PROGRAMMING. B) PUBLISH BASIC ANALYSIS/CALCULATIONS ALGORITHM/ PROCEDURES. C) ESTABLISH TEST PROCEDURES FOR APPROVAL OF PROGRAMS.	284	FINANCE, COST EFFECTIVENESS, LIABILITY OF SOFTWARE PRODUCERS, MAINTENANCE OF SOFTWARE.
105	DIRECTORY OF PROGRAMS ABOUT STRUCT. SURVEYING & ROAD/ RAIL ROAD DESIGN AVAILABLE FOR THE IBM PC SERIES.	65	STANDARDS, TECHNICAL REGULATIONS AND CERTIFICATION.
110	VARIOUS APPLICATIONS OF MINI COMPUTERS IN STRUCT. ENG. - FROM ANALYSIS, DESIGN THROUGH EXECUTION SPECIAL INTEREST - BRIDGE APPLICATIONS - AS PREVALENT IN OTHER MEMBER COUNTRIES OF IABSE.	337	THE INFORMATION CONCERNS THE ACTIVITY AT THE DIVISION OF BUILDING TECHNOLOGY AND COMMUNITY DEV./TECHNICAL RESEARCH CENTRE OF FINLAND.
280	APPLICATION OF CAD PROGRAMMS IN CIV.ENG.		
128	WE NEED DEV. OF CAD SYSTEMS.		
291	SYSTEMS FOR CONTROL, INSPECTION OF STRUCT. INTEGRITY. COMP. APPLICATIONS FOR MEASURING VARIOUS STRUCT. PROPERTIES.		

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