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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**
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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. Lastlly, 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 proveinnent 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 benützt. 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	40	17	11	3	14	1
11 to 50	64	44	28	21	22	1
51 to 250	71	41	28	19	24	0
251 to 1000	52	43	35	32	17	2
More than 1000	19	17	16	13	6	0
total	259	166	125	91	88	7

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
total	192	123	211	200	66	98	64	22	19

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: .....

F11 Individual Member ☐ Indicate type: Junior (F12) ☐ Ordinary (F13) ☐ Senior (F14) ☐

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) (F29TYPE) .....
.....

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: (F42TYPE) ....., Operating system: (F42OS) .....
F43 ☐ Minicomputers Type: (F43TYPE) ....., Operating system: (F43OS) .....
F44 ☐ Main frame Type: (F44TYPE) ....., 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 F61AREA .....

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: F75AREA .....
.....
F76 ☐ symposium on whole area of structural CAE
F77 ☐ theme on structural CAE at IABSE congress: F77AREA .....
.....
F78 ☐ other information: 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
70	VICTOR SIRIUS, IBM PC.	MS, DOS.
1	IBM	
194	HP 9816	
100	IBM/AT	MS-DOS
107	IBM PC	
119	IBM XT, AT	MS-DOS
36	DEC RAINBOW	DOS
136	NEC, YMP.	
141	APLLE, WANG,IBM	
148	IBM,AE M16	MS-DOS, CPM, PC-DOS.
153	IBM,APPLE,HP	MS-DOS
165	WANG	
71	IBMXT/AT.HP9836	
170	HP-150, RAINBOW	DOS, PC/M
177	WANG PC	MS-DOS
182	METRIC/IBEX	
189	HP 200	
2	IBM HP86B	MS-DOS
294	UNIVAC PC20&40.	MS-DOS
200	HP 11/41, SHARP 1500A.	
212	IBM AT 02	MS-DOS
219	CONVERGENT	UNIX
224	HP 86	HP-SYSTEM
248	IBM, OLIVETTI	PC-DOS, MS-DOS
253	DEC RAINBOW, IBM PC.	CP/M - MS-DOS, MS-DOS.
265	PRO 350	
72	MICRO 3D	MSDOS
270	HP 87	
282	IBM/CPT/OLIVETI	MS-DOS
300	IBM AT, DEC RAINBOW.	
307	CROMEMCO	CROMIX
312	IBM-PC/AT, EAGLE-VICTOR 9000.	PC-DOS, MS-DOS.
324	IBM	HARD DISC.
38	OLIVETTI	MS DOS
336	VARIOUS	CP/M,MS-DOS,HP.
4	IBM XT	MS-DOS 3.10
74	IBM	
5	IBM + VECTOR	
40	HP, WANG	DOS
75	IBM XR, HP 150, HP 1000.	MAINLY MS-DOS.
6	WANG	MS-DOS
106	IBM AT	
118	APPLE/IBM	DOS & CPM
123	PC350 DIGITAL.	CP/M.
135	PC9800, N6500-M55.	MSDOS,NTOS
140	HP 150	
147	SPERRY	MS/DOS
152	IBM XT	
159	HP 9816 + MACINTOSH + IBM PC/XT.	DOS ETC
164	NEWBRAIN	CP/M-80
76	ALPHATRONIC,IBM	CPM/ DOS
176	IBM DATA GEN.	DOS 2.1/RDOS1.9
181	IBM	DOS 2.1
188	OLIVETTI	MS-DOS
7	IBM, NEC	DOS
293	OLIVETTI	MS-DOS
211	OLIVETTI,IBM	M-DOS-MS.DOS.
218	OLIVETTI P6060	
223	IBM AT 02	DOS 3.2
235	IBM,BBC,SIRIUS	MS-DOS,CPM 86
42	OLIVETTI	MS-DOS
240	IBM	PC-DOS
247	ACT SIRIUS	CPM, MS-DOS
252	MANY	CP/M, MS-DOS, UNIVAC.
259	ZENITH 89	CP/M
264	ZENITH, IBM, DEC.	DOS
276	HP 86B,HP 9845A	
281	IBM AT 001	DOS
288	NEC N5200 MODEL 05.	PTOS
318	IBM/AT&T	MS-DOS
323	IBM AT	PC-DOS,P-SYSTEM
43	HP-85	HP
78	WANG	MS-DOS
9	CROMEMCO	UNIX
44	APPLE II	DOS AND CPM
79	TRIUMPH ADLER P1 + P3, IBM XT	CP11, DOS
10	CBM+IBM COMART	CPM+CPM
45	APPLE, HP85, PC	
80		
199	EAGLE, HP	
105	IBM PC/XT	PC-DOS 2.10
117	WANG	DOS
122	IBM XT,TEXAS PC	MS-DOS
134	NEC 9801, IBM 5550	MS-DOS
46	IBM AT	MS DOS
146	IBM, SPERRY	MS-DOS
151	IBM-PC	MS-DOS
158	DEC RAINBOWS, OLIVETTI M24.	CPM,MS-DOS
163	HP 150B, IBM AT	DOS
175	IBM PC	MS-DOS
187	CODATA	UNIX VERSION 3
192	IBM AT	DOS 3.0
12	IBM PC, HP 9845	DOS, HPBASIC
292	IBM XT	DOS
299	IBM AT	
210	HP 217	UNIX
217	DEC, RAINBOW	CP/M-86/80
222	HP 85, IBM AT	MS-DOS
229	IBM	MS-DOS
234	CBM & WORDPLXE	
47	IBM/COMMODORE	
246	IBM COMPATIBLE	MS-DOS
251	HP 9845,APRICOT	MS-DOS
258	IBM XT	DOS 2/CPM
263	ALL TYPES	
275	HP 86-B,9845-A	
287	NEC PC 9801	MS-DOS
13		MS-DOS
305	IBM XT	DOS
310	IBM XT.	DOS
317	IBM PC	DOS
329	IBM	SEVERAL
334	OLIVETTI-M24	MS-DOS
48	IBM	MS/DOS
83		
14	IBM 5550 ETC	MS DOS
49	VAUVIN	
15	APPLE II	DOS, CPM
50	IBM	DOS
16	IBM	MS-DOS
198	HP 150	MS-DOS
104	APPLE IIE	DOS, CP/M
128	HP 85	HP
133	UNIVAC UP10E	
145	IBM-AT	PC-DOS
51	IBM PC	DOS 3.1
150	OLIVETTI P6060	
157	IBM	
162	HP 86 B	
174	IBM-PC	MS/DOS
86	COMMODORE	SINGLE USER
186	IBM	
17	IBM XT	
291	IBM	MS-DOS
298	IBM AT	PC-DOS 3.1
204	IBM AT	DOS 3
228	IBM-PC/XT, FUJITSU 165, NEC APC-3, APPLE II.	DOS, CP/M.
233	HP	BASIC/DOS
245	APRICOT	MS-DOS
52	IBM PC, APPLE II E	DOS 2.1
250	STC	HANDTURNED
257	DEC RAINBOW	DOS & CAM
262	T.I. PROF.	MS-DOS
269	VICTOR	MS-DOS
274	RAINBOW	MS-DOS
87	COMMODORE	BASIC (DOS)
286	NEC PC 9801F, FUJITSU FM 7, FM 8, FM 16B.	
18	IBM	
304	IBM	MS-DOS
328	IBM, MACINTOSH.	DOS/FINDER 5.1.
333	IBM AT, XT	MS-DOS
53	MICRO-VAX 2,IBM	VAX-VMS, MS-DOS
88	IBM	MS-DOS
19	RUF-BEE	
54	IBM	MS-DOS
89	PDP 11/23	SHARE PLUS
20	DG 10/SP	RDOS
55	IBM-PC/XT	MS-DOS
197	HP	UNIX
115	UPTRON 5-800.	MODIFIED CP/M
120	IBM	
127	DIGITAL PC 350	P/OS
132	NEX, IBM	MS-DOS
144	IBM, ATARI	MS-DOS
56	DEC+IBM	WPS
156	IBM + OLIVETTI.	
161	IBM	
168	HP-3000	MPE V
173	IBM PC XT	DOS
185	DG	AOS/VS
91	IBM PC AT	MS-DOS
190	VAX 750	VAX/VMS
297	APRICOT, SIRIUS	CPM, MS-DOS

Rec. no.	Type	Operating system
215	HP 86 B	
227	IBM COMPATIBLE	
232	VICTOR, SIRIUS, APRICOT, IBM.	P-SYSTEM
239	IBM PC	PC-DOS
244	IBM PC	PC-DOS
57	IBM XT,	PC-DOS, ZEBRA
	COMPUCORP	
261	IBM	MS-DOS
268	IBM COMPATIBLE	MS-DOS
273	IBM, METRIC	PC-DOS, ZEBRA
285	IBM AT	DOS 3.0
92	IBM AT	DOS 3.0
290	IBM	VISIOTEXTE
23	HP	NATIVE
303	IBM	DOS 2.1
58	DEC PRO/350	VENIX (UNIX)
93	HP 9836	
59	IBM	DOS
25	DIGITAL PC-350, IBM XT.	P/OS, DOS
60	IBM/RAINBOW	
196	SUPERBRAIN	
114	CPU IS Z80	DOS/MOS
131	PC 9801 & OTHER	MS-DOS
138	NEX PC 9801	MS-DOS
143	CD 110	CPM
155	HP & IBM	HBP, MS-DOS
61	IBM	DOS
160	HP 16	BASIC
167		
172	NCR 41	MS/DOS
184	ERICSSON PC,IBM PC, MACINTOSH, APPLE II.	MS-DOS
97	OLIVETTI M24	MS-DOS
296	NOVA 4/X	RDOS
231	HP + OLIVETTI	
238	HP 200 SERIES	217
243	IBM PC/XT, LSI	PC-DOS, LSI,
	M3, OLIVETTI P6060	OLIVETTI.
255	IBM	
62	MICROVAX II	VMS
260	COMPAQ, OLIVET-TI P6060, IBM	MS/DOS, OLIVETTI O.S.,
	PC/XT.	MS-DOS.
267	HP 9845T	BASIC HP
272		
279	VICTOR	MS-DOS

Rec. no.	Type	Operating system
28	HP 150	MS-DOS
302	IBM AT	MS-DOS
309	IBM/OLIVETTI	MS-DOS
326	IBM COMPATIBLE.	DOS 2.1
331	IBM, TI, HP. ETC .	UNIX, DOS
338	HP 125/VECTRA	MS-DOS
99	CBM,HP,OLIVETTI	DOS
30	IBM-PC AT,XT	DOS 3.0
65	IBM, OLIVETTI, SPERRY, HP.	MS-DOS
31	MITSUBISHI, IBM	MS-DOS
195	IBM AT02	DOS 3.0
101	SIRIUS 1, CBM PC 10.	MS-DOS
108	APRICOT, IBM PC	MS-DOS, PC-DOS,
	, XT, AT, TEK-TRONIX 4170.	CP/M.
113		SPECTROS,MS-DOS
125	IBM	PC-DOS
130	APPLE IIE	
137	NEX PC9800	
142	TULIP	MS-DOS
149	APPLE	BASIC
66	TELEVIDEO 803H	CPM
166	HP 9816	BASIC
178	COMPIS ERICSSON	CP/M
183	MANY DIFF.	
32	IBM AT	MS DOS
295	CBM 8032, HP 41	
201	IBM-PC	PC-DOS
208	DEC 350 PROFESS	
225	IBM COMPATIBLES	MS-DOS
230	APRICOT,IBM PC	MS-DOS
237	OLIVETTI M24SP	MS-DOS
242	IBM PC & COMPAQ, CROMEMCO,	MS-DOS, CROMIX, CPM80,
	INTERTEC SUPER-BRAIN, LSI OCTO PUS.	CONCUR-RENT CP/M.
249	VARIOUS	VARIOUS
254	IBM AT,XT	DOS
67	TELEVIDEO	
266	OSBORNE. IBM AT	CPM, MS-DOS.
271	IBM AT, XT	DOS 3.1
283	SHARP PC 1500	SHARP
301	IBM AT	MS-DOS
308	CROMEMCO, SVI	CP/M
313	OLIVETTI M24	MS-DOS
325		
68	BURROUGHS	

Rec. no.	Type	Operating system
337	IBM AT/ APPLE - II	DOS 3.1/UGSO PASCAL.
34	OLIVETTI	
69	CBM PC20,	MS/DOS, VMS
	MICRO VAX I	

Appendix III. Types and Operating Systems for mini's

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

Appendix IV. Types and Operating Systems for mainframes

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

Appendix V. Types of CAD systems

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

Appendix VI. Other applications

Rec. no.	Other applications
36	ESTIMATING, QUANTITY AND COST SURVEYING, BILL OF QUANTITIES
136	LABORATORY AUTOMATION.
170	AUTOMATION OF STRUCT. TESTING AND DYNAMIC LOAD TESTING.
294	TOLL, APPRAISEMENT/CAPACITY EXPROPRIATIONS AND SURVEYS.
207	EVALUATION AND ANALYSIS OF LABORATORY TESTING MATERIALS
241	PHYSICAL LAND SURVEYS.
72	CIV. ENG.
307	STRUCT. AND FLUID MECHANICS ANALYSIS.
312	SOFTWARE DEV, ACC.
324	DESIGN
40	CAT COMPUTER AIDED TESTING
140	COLLECT DATA
152	TEACHING
159	TEACHING, STRUCT. ANALYSIS + DESIGN, RESEARCH.
176	ACCOUNTING/DATABASE
211	STATIC COMPUTATION, GEODETIC SURVEYING.
235	SIMULATION
240	ACCOUNTANCY.
252	TEACHING
80	SCIENTIFIC WORK
105	STRUCT. ENG.
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, PHOTOGRAMETRY, STUDIES LOCAL CADAM IMPL. INTENDED WITH UPM PROGRAMS.
145	EDUCATION
169	FINANCIAL PROGNOSES.
186	ESTIMATION
291	HYDRAULIC PROCESSING, DATA RETRIEVAL FROM VARIOUS INSTRUMENTS.
298	ACCOUNTING, DATA ACQUISITION.
228	(STUDENT) RESEARCH.
274	CAD-TECHNIQUES.
321	DESIGN
333	STRUCT ANALYSIS & DESIGN.
88	FINITE ELEMENT ANALYSIS, GRAPHICS.
21	HONE COUNTRY COORDINATOR (HONE=IBM INTERNATIONAL PRODUCTIVITY TOOL FOR TALESMEN AND SYSTEM ENGINEERS)
25	SCIENTIFIC RESEARCH
131	LABORATRY AUTOMATION (CONTROL, DATA-GATHERING, MONITOTING & DATA-PROSESSING).
155	PROJECT ANALYSIS-FEASIBILITY STUDIES.
184	PROG. DEV. COMPUTER CONFERENCE SYSTEM
27	SOFTWARE DEV.
97	SOFTWARE-DEV.
284	SCIENTIFIC CALC. FOR STRUCT. DESIGN., STATISTICAL ANALYSIS OF DATA.
331	RESEARCH, EDUCATION.
65	PRODUCTION AND RESEARCH OF EXPERT SYSTEMS
195	TENDER DOCUMENTS.
101	STRUCTURAL ANALYSIS, COMPUTATIONEL MECHANICS, INSTRUCTION.
108	COMPUTER BASED EDUCATION (CAI), 3D MODELLING CAM
142	PRE AND POST-PROCESSING IN DESIGNING CONSTRUCTIONS.
171	INTERACTIVE DESIGN.
225	PROGRAM DEV.
308	STRUCT. DESIGN.

Appendix VII. Application Areas

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

Rec. no.	In house development	Commercial packages
76	CALC. PROBLEM ORIENTATED	ALL
176	DATA BASE	ACCOUNTING/BUDGETTING/WORD PROC.
181		
188		
193		
7	STRUCTURALBEHAVIOUR RC, PC	WP, STRUCTURAL ANALYSIS
293	NONLINEAR FINITE ELEMENT ANALYSIS, GEN. ANALYSIS OF ENG. DATA.	MATHEMATICS, PLOTTING, STATISTICAL.
206		STRUCT., SURVEY, ADMIN., WORD PROC.
211		
218	SMALL PROGR., DESIGN, COMPARISON OF BANKERS.	CIV.ENG., STRUCT. DESIGN, SOIL MECHANICS, ROAD PLANNING.
223		STRUCT. ANALYSIS, CLEARSOFT.
235	ALL IN 5.	ALL IN 5.
42	STRUCTURAL ANALYSIS	NUMERICAL ALGORITHMS, STATISTICS.
240	STRUCT. ANALYSIS.	HIGHWAY DESIGN, COMPUTER-AIDED DRAFTING
247	CIVIL/STRUCT. ENG.	WORD PROCESSING/STRUCT. ANALYSIS.
252	STRUCT.ANALYSIS, STRUCT. DESIGN,AI,ETC.	STRUCT.ANALYSIS,CAD,ETC.
259	STRUCT. DESIGN.	WORDSTAR, SUPERCALC, CP/M, MBASIC.
264	ENG., FEM, ES, NUM.ANAL.,ETC.	ENG., FEM, GRAPHICS.
77	ALL AREAS	FINANCIAL
276	REINFORCED CONCRETE COLUMNS. PROPERTIES OF AREAS, FINITE ELEMENTS (RECTANGULAR ELEMENT, PLATE BENDING).	PLANE FRAME
281	STRUCT. ANALYSIS.	STRUCT. ANALYSIS, ACCOUNTING
288		
8	STRCT, ANA, & DESIGN	CAD, WORD PROC.
306	STRUCT. ANALYSIS AND DESIGN.	STRUCT. ANALYSIS AND DESIGN, MATH.
318	FINANCIAL MANAGEMENT/BILLING /PAYROLL.	ENG. STRUCT HIGHWAY, WORD PROC., STRUCTURES, ETC.
323	ADMIN. (DATABASE), CIV. ENG.	ACCOUNTING.
43		STRUCTURAL DESIGN
335	CALC. AND ADMINISTRATION.	STRUCT. ANALYSIS.
78	CALCULATION	CALCULATION, CAD, ADMINISTR.
9	STRUCTURAL ENGINEERING	WORD PROCESSING, ETC
44	STRUCTURAL DESIGN - CALCULATION	WORD PROCESSING.
79	ADMINISTRATION, BUDGETTING	CALCULATION, WORD PROC.
10		
45	STRUCTURAL ENGINEERING	WORD PROCESSING, ADMINISTR. BUDGET
80	BUILDING SCIENCE,	
11		

Rec. no.	In house development	Commercial packages
199	CALC.	ADMIN.
105	STRUCT., SURVEYING & ROAD DESIGN	WORD PROCESSING & DATA BASES
110	MATRIX (STIFFNESS) FOR SPACE FRAMES, ROAD EMBANKMENT ETC.	
117	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.)	
122	PLANNING-STORE CONTROL-COST TRACKS	ADMINISTRATIVE NEEDS-STRUCT. ENG.
129	FINITE ELEMENT ANALYSIS	F.E. - CAE
134	STRUCT. ANALYSIS, MATERIAL TAKE-OFF.	STRUCT. ANALYSIS.
46	HYDRAULICS, FLOOD FLOWS, GUYED TOWERS	CADD, SCS HYDROGRAPH STUDY.
146	COMPUTER AIDED LEARNING, FINITE ELEMENTS IN STRUCTURAL ENG.-LINEAR/NONLINEAR, DESIGN/DIMENSIONING OF REINF. CONCRETE	FEM.
151	STRUCT. ENG.,HYDRAULICS,DAMS, ROADS,CONSTRUCTION.	IMSL,SSP,GKS.
158	TECHNICAL PRGS. & CERTAIN ADMIN. PROGS.	
163	TRANSPORTATION, STRUCT.	ENG.
175	ADMIN. CIV. ENG.	DATABASE, WORD PROC.
81		
180		
187		
192		CIV. ENG., STATIC.
12	ENGINEERING/CALCULATIONS	ENGINEERING/CALCULATIONS
292	CONTIXXXX MECHANICS, STATIC AND DYNAMIC FINITE ELEMENT, ANALYSIS OF STRUCT. (1, 2, 3-DIMENSIONAL)	
299	STRUCT. ANALYSIS AND DESIGN PROGRAMS.	SAP-4
205		ADMIN., CALC., WORD PROC., PRODUCTION OF DRAWING.
210	STRUCT. ENG./RESEARCH/ TESTING.	WORD PROCESSING/ADMIN.
217	CALC., MATERIAL LISTS.	ADMIN.
222	STATICS, ACOUSTICS (NOISE REDUCTION).	ADMIN., STATICS (E.G. FE), BUDGETTING.
229	STRUCT. ANALYSIS & DESIGN	
234	STRUCT. CALC.	STRUCT. CALC.
47	MINOR STRUCTURAL.	STRUCTURAL.
246	MATHEMATICAL MODELLING.	GDS,ADAS,VISION,INFO,PATRAN, STRESS,PIPS.

Rec. no.	In house development	Commercial packages
251	STRUCT./CIV. ENG. ANALYSIS/ DESIGN.	BUSINESS SOFWARE
258	SAFETY & RELIABILITY/STRUCT.	
263	ALL AREAS	ALL AREAS
275	REINFORCED CONCRETE COLUMNS, PROPERTIES OF AREAS, FINITE ELEMENTS (RECTANGULAR ELEMENT PLATE BENDING.).	PLANE FRAME
82		ENG.
280	FEM PROGRAMMES,	FEM PROGS., MATH. PROGS.
287	STRUCT. CALC., DATA BASE.	
13		
305	SOIL, STRUCT., ACCOUNTING.	VISICALC, VISISCHEDULE, LOTUS, D-BASE, STRESS.
310	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.
317	CIV. ENG.	ADMINISTRATION, C.E.
322		
329	STRUCT. ENG.	STRUCT. ENG.
334		BUILDING ENG. & OFFICE.
48	HIGHWAY ENGINEERING	STRUCTURAL & MUNICIPAL ENG'G SURVEYING, BUDGETTING (SYMPHONY & LOTUS 123)
83		
14	CIVIL, ARCHITECT, ELECTRICAL ENGINEERING	MECHANICAL ENGINEERING
49		PC WORD PROC.
84		
15	STRUCTURAL ENGINEERING, PROJECT MANAGEMENT	WORD PROCESSING, SPREADSHEET
50		SLAB, FRAME ANALYSIS, SLAB DESIGN
85	STATICS	FE.STRESS, FLASH,SAP IV, ETC
16	ALL AREAS OF 51	STATICS
198	STRUCT. ENG./HEAT TRANSFER.	CAD/STATISTICS/TEXT EDITING.
104	ENG.	
116		
121	STRUCT. ANALYSIS	F.E. PROGS.
128	ENG. CALC.	ENG. CALC.
133	STRUCT. ANALYSIS AND DESIGN, CAD SYSTEM.	
145	EDUCATIONAL	GENESYS (FINITE ELEMENTS).
51	STRUCTURAL ENG.	
150	SMALL PRGS.-STRUCT. ANALYSIS DESIGN OF REINFORCED CONCRETE.	STRUCT. ANALYSIS.
157	ROAD DESIGN, STRUCT. ENG., HYDRAULIC.	STRSS, STRUDEL.
162	R.C. & PRESTRESS DESIGN.	STRUCT. ANALYSIS,
169	CALC. COOLING TOWERS & FENDERING OFF-SHORE PLATFORMS.	

Rec. no.	In house development	Commercial packages
174	ADMIN.-PLANNING & STEERING-CALC.	CALC. WORD PROC.
86	SHELL ANALYSIS	STRUCT. ANALYSIS (CIV. ENG.)
186	PLANNING, ESTIMATION	ALL OTHERS
191	STATICS, DYNAMICS	STRUCT. ANALYSIS.
17		
291	HYDRAULC PROCESSING, DATA RETRIEVAL.	WORD PROC., SPREADSHEET, GRAPHICS, STRUCT. CALC.
298	INFORMATION RETRIEVAL DATA ACQUISITION.	FINITE-ELEMENT ANALYSIS, SPREADSHEETS, ACCOUNTING.
204		STATIC, ADMIN, COST PLANNING, INTERNAL ADMIN.
216	SERVICE BUREAU	SERVICE BUREAU
221	STATIC CALC.	STATIC CALC.
228	ALL ENG. FIELDS.	ALL ENG. FIELDS.
233	STEELWORK DESIGN AND CODE PREPARATION AND CALIBRATION.	
245	ADM., BUDGETTING, CALC., WORD PROC., PROD. OF DRAWINGS, INFO. RETRIEVAL.	CALC., WORD PROC., PROD. OF DRAWINGS, INFORMATION RETRIEVAL.
52	CONCRETE BEAM DESIGN, FRAME ANALYSIS, WIND, EARTHQUAKE ANALYSIS, CONCRETE COLUMN DESIGN.	CONCRETE SLAB DESIGN, LOTUS 1-2-3. STEEL BEAM & COLUMN DESIGN, WORDSTAR. COMPOSITE BEAM DESIGN, PEACH TEXT.
250	STRUCT. ENG.	BUILDING STRUCTURES.
257	STRUCT. ANALYSIS, ACCOUNTING	STRUCT. ANALYSIS, CAD, WORD-PROC, DATA BASE, MANG.
262	EDUCATIONAL SOFTWARE-ANALYSIS AND DESIGN.	SPREADSHEETS, WORD PROC., COMPILERS, DATA-BASE MANAGEMENT, FINITE ELEMENT ANALYSIS.
269	HYDRAULIC ANALYSES, CONSTR. MANAGEMENT.	STATIC & DYNAMIC ANALYSES, PROJECT NETWORK ANALYSIS.
274	STRUCT. (CIV.ENG., MECHANICAL, INFORMATICS,ETC.).	
87		STATICS FOR BUILDING
286	STRUCT. ANALYSIS. (STATIC, DYNAMIC, LINEAR, NONLINEAR.	
18	INFORMATION SYSTEM	STATIC
304	STRUCT. ENG.	STRUCT. & BRIDGE ENG., WORD PROC., ADMINISTRATION/ ACCOUNTING.
316	CALC.	ADMINISTRATION, BUDGETTING, WORD PROC.
321	STRUCT., DRAFTING.	STRUCTURES
328	ENG., ADMIN.	ENG., ADMIN.
333		STRUCTURES, DATABASE, SPREADSHEET.
53	CIVIL ENG.: STRUC. ANALYSIS, P.C., PC., STEEL DESIGN, SOLID MECHANICS	
88	STRUCTURAL ANALYSIS.	
19		ADMINISTRATION

Rec. no.	In house development	Commercial packages
54	CONSTR. MANAGEMENT INFORMATI ON SYSTEM	CONSTR. MANAGEMENT
89	FEM	FEM, STRUCTURAL ANALYSIS.
20		SPACE FRAME, FEM (STRUCTURAL)
55		SAP5,AUTO CAD FOR DESIGN OF ARCHITECTURES AND STRUCT.
90		STATIK,MASSIVBAU,STAHLBAU, HOLZBAU.
21	SYSTEM CONFIGURATIONS, DESIGN TOOLS, OFFICE SYSTEMS,--	
197	STRUCT. CALCULATIONS.	ADMIN., WORD PROC.
103	STRUCTURAL ENG.	
115	STRUCT. ENG.	
120	CALCULATION (18 PRGS.)	WORD PROCESSOR + SOME CALC. (SPACE FRAME F.I.)
127	STRUCT. ANALYSIS.	STRUCT ANALYSIS, ADMINISTRA- TION.
132	STRUCT.ANALYSIS, OPERATIONS RESEARCH,BUDGETTING, ETC.	STATISTICAL PROCESSING, DRAWINGS, DATABASE CONTROL ETC.
139		
144	TECHNICAL/CAD-CAM	COMMERCIAL
56		ADMINISTRATION
156	CIV./STRUCT. ENG.	CIV./STRUCT. ENG.
161	STRUCT. ANALYSIS.	ANALYSIS + DESIGN PACKAGES, ADMIN. PACKAGES.
168	STRUCT. ANALYSIS	STRUCT. ANALYSIS.
173	ALL	PLANNING-CALC.-WORD PROC.
185		
91	STRUCTURAL ENG., TRAFFIC AND TRANSPORTATION, ADMINISTRATION.	FINACIAL STATMENTS, BALANCE SHEETS.
190	NONLINEAR FE PROGRAMS	NONLINEAR FE PROGRAMS
22	STATICS	
297	ENG. ANALYSIS.	WORD PROC.
203		CIV. ENG.
215	PROD. OF MATERIAL LISTS ETC.	STRUCT. DESIGN, BOOK KEEPING, WORD-PROC.
220		
227	ADMIN.,STRUCT.ENG.,GEOTECH- NICAL ENG.	ADMIN.,ENG.,CONSTRUCT. MANAGE- MENT.
232	NATIONAL ROAD NERWORK PRO- GRESS REPORTS ON NEW CONSTR.	1. SAS SYSTEM 2000 FOR COMPRE- HENSIVE NATIONAL ROAD NET- WORK DATABASE. 2. ALADIN DATABASE.
239	ENG. & PROJECT MANAGEM.	ENG. & ACCOUNTING.
244	DESIGN AND ASSESSMENT OF STRUCT. COMPONENTS.	ICES, MOSS

Rec. no.	In house development	Commercial packages
57	STRUCTURAL ANALYSIS, ROAD DESIGN, HYDRAULICS, ENVIRONMENTAL PLANNING, TRAFFIC PLANNING,GEOTECHNIC, RESSOURCE AND FINANCIAL PLAN- NING.	STRUCTURAL ANALYSIS, STATIS- TICAL ANALYSIS, FINANCIAL PLANNING
256	HIGHWAY & BRIDGE DESIGN.	
261	SPECIALIZED ENG.	WORD PROC., GEN. ENG.
268	CIV., STRUCT., MECHANICAL, ELECTRICAL, CAD, INFORMATION MANAGEMENT.	ALL
273	STRUCT., CAE	FEM PROGS., CAD
285	STRUCT. CALC.	
92	PLANNING & STEERING/BUDGETTING	ADMINISTRATION, WORD PROCES- SING
290	CAD	FEM, PERT, HIGHWAY, DESIGN.
23	STRUCTURAL ENGINEERING	
303	PRESTRESSING CALC.	STRUCT. ANALYSIS.
315	STRUCT. ANALYSIS (CONCRETE, REINFORCEMENT, PRESTRESSED CONCRETE).	FINITE ELEMENTS, CAD, NET- WORK ANALYSIS (CPM).
320	FINITE ELEMENT SOFTWARE.	
327	BRIDGES STRUCTURES.	
58	STRUCTURAL ANALYSIS ADMIN.	STRUCTURAL ANALYSIS.
93	STRUCTURAL ENGINEERING	ALL OTHERS
24		
59	STRUCTURES, ROADS	DATA BASES
94		
25	PLATES AND SHELLS, STRUCTU- RAL ANALYSIS	PLATES AND SHELLS, STRUCTU- RAL ANALYSIS.
60	STATICS, PLANNING HYDRO- DYNAMICS	WORD PROCESSING.
95	FINITE ELEMENT METHOD	FINITE ELEMENT METHOD
26	LITTLE UP TO MEDIUM SIZE PROGRAMMES FOR CONSTRUCTION AND STATICAL COMPUTATIONS, USER ORIENTED	ADMINISTR.,BUDGETTING, WORD PROCESSING, CAD, EXTENDED PROGR. FOR STATICAL COMPUT.
196	ADMIN.	
102	STRUCTURAL ENG.	
109	HIGHWAY ENG. & STRUCT.	HIGHWAY ENG. & STRUCT.
114	STRUCT. ENG. ANALYSIS.	GRAPHICS & STRUCT. ENG. ANALYSIS.
126	FEM STRUCT. ENG. ANALYSIS.	
131	SCIENTIFIC & TECHNOLOGICAL AREA	ADMINISTRATION AREA
138	FEM COMPUTER GRAPHICS, GEOMETRICAL MODELLING.	
143		
155	DESIGN-STRUCT. STEELWORK.	
61	CALCULATION, ADMINISTRATION.	ADMINISTRATION, PLANNING & STEERING, CALCULATION, WORD PROCESSING.
160	STRUCT. WORD PROX. ADMIN.	
167	STRUCT. ANALYSIS, CAD.	
172		WORD PROC., DATABASES.

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

Rec. no.	In house development	Commercial packages
249	CAD, TRANSPORT PLANNING, ENG. ANALYSIS & DESIGN.	GROUNDMODELLING, VARIOUS ENG. PROGRAMS E.G. LUSAS (FINITE ELEMETS). MANAGEMENT
254	CALC. (ENG. ANALYSIS)	WORD PROCESSING, BUDGET.
67	CALCULATION, PRODUCTION OF DRAWINGS.	ADMINISTRATION, PROJECT STEERING, WORD PROCESSING.
266	DETAIL ANALYSIS & CALCS.	CAD-SYSTEM, BASIC FRAME CALC
271	BUDGETTING	ADMIN., STRUCT. ANALYSIS.
278	STRUCT. DESIGN ANALYSIS.	STRUCT. DESIGN ANALYSIS, CAD
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 PROCESSING, CAD-SYSTEM.
337	STRUCT. DYNAMICS (FREQUENCY RESPONSE), STABILITY OF SHELLS (FINITE ELEMENTS)	STRUCT. ANALYSIS (ADINA, SAP ETC.)
34		
69	CALCULATION-, PLOTTER-PROGRAMMES.	ADMINISTRATION, WORD PROCESSING, CALC.

Appendix VIII. Area for specialized Symposia

Rec. no.	Area
194	CAD/CAM FOR STRUCT. STEEL WORKS.
100	CAD
153	CAD
219	INTEGRATED COMPUTER AIDED PLANNING (ARCH-LUG-SPECIALISTS).
307	NUMERICAL METHODS IN STRUCT. MECHANICS.
38	DEVELOPING INTEGRATED CAD SOFTWARE FOR CIVIL ENGINEERING (DESIGN, CALCULATION, PLANNING, PRODUCTION OF DRAWINGS, MANAGEMENT.)
39	BRIDGES-MAINTENANCE
111	COPUTER AIDED ANALYSIS, DESIGN & DRAFTING
118	
123	
140	OFFSHORE ENG. STRUCT.
159	STRUCT. ANALYSIS, REINFORCED CONCRETE DESIGN.
164	PC BRIDGES.
7	
235	DEV. IN DATABASES AND EXPERT SYSTEMS IN STRUCT. ENG.
240	INFORMATION RETRIEVAL.
264	FEM, ES IN STRUCT. ENG.
276	KNOWLEDGE BASED AND EXPERT SYSTEMS.
43	STRUCTURAL DESIGN
129	SOIL STRUCT. INTERACTION
146	REINF. AND PRESTRESSED CONCV STRUCT. MECHANICS, NONLINEAR ANALYSIS, FINITE ELEM. APPLICATIONS
205	CALC. + CAD
217	EUROPE.
275	KNOWLEDGE BASED AND EXPERT SYSTEMS.
329	STRUCTURES, NONLINEAR ANALYSES.
48	STRUCT. & BRIDGE ENG., MUNICIPAL (LAND DEV.)
49	
15	STRUCTURAL ENGINEERING PROJECT MANAGEMENT
128	CAD
174	
86	PROD. OF DRAWINGS.
186	COORDINATION, CALCULATION PROGRAM-CAD-

Rec. no.	Area
228	CAD/CAE
257	ANALYSIS, POST-TENSIONING, FINITE ELEMENTS.
274	DATA MODELLING IN STRUCT. ENG., DATA MODELLING IN GEN.
304	STRUCT. ENG., BRIDGE ENG.
328	BRIDGE DESIGN, STRUCTURES, HYDRAULICS, HIGHWAY.
333	CAD
54	STRUCTURAL ENG., CONSTR. MANAGEMENT
55	SOFTWARE ON CAD OR COMPUTATION FOR ARCHITECTURES AND STRUCTURES
103	CAD
120	
168	
190	MAN-COMPUTER INTERACTINITY IN NONLINEAR COMPUTATIONS.
232	ROAD DESIGN, CONSTR. AND MANAGEMENT SYSTEMS
256	OPTIMAZATION IN BRIDGE DESIGN.
273	MATERIAL MODELLING, TIME DEP. EFFECTS, SOILS,CONCRETE COMPUTERIZED BRIDGE RATING.
285	STRUCT.
303	
315	CAD FOR BRIDGE AND STRUCT. ENG.
327	STRUCTURES, BRIDGES.
93	STRUCT. ENG.
25	STRUCTURAL ANALYSIS, FEM
114	UNDERGROUND STRUCTURES AND LARGE SPAN STRUCTURES.
126	STRUCT. ANSLYSIS FEM.
155	STRUCT. STEEL DESIGN, & DETAILING
167	
97	GEOMETRIC MODELLING, ACCURACY OF FINITE ELEMENTS, WORKSTATION CONCEPTS.
30	CAD-CAM, USE OF PC-XT OR SIMILAR
65	
125	STRUCT. ENG.
142	OFFICE-AUTOMATION, CAD/CAE, EXPERT-SYSTEMS, FILING SYST.
171	
237	COMPUTER AIDED DRAFTING USING MICROS. STRUCT. ERRORS DUE TO THE USE OF COMPUTERS, & HOW TO PROTECT AGAINST THEM.
308	CAD A.I. & EXPERT SYSTEMS.
337	DYNAMICS, STABILITY NONLINEAR MATERIALS, NUMERICAL METHODS.

Appendix IX. Congress Themes for structural CAE

Rec. no.	Congress Themes for structural CAE
119	
71	
219	
37	
307	NUMERCIAL METHODS
73	
39	BRIDGES-DESIGN WITH CAE
123	
140	
176	
7	
235	DEV. IN DATA BASES, EXPERT SYSTEMS, AND OTHER DESIGN AIDS.
240	
264	BRIDGES, FEM IDEALIZATION.
8	HOW DO WE STAY ON TOP OF CAE RATHER THAN THE REVERSE
151	
163	INTERACTIVE COMPUTER AIDED STRUCT. DESIGN.
205	CALC. + CAD
210	
263	
13	
310	
48	BRIDGE DESIGN
49	
16	
116	
121	INFLUENCE OF CAE ON THE RELIABILITY OF THE DESIGN PROCESS.
150	
174	
191	IMPACT ON EDUCATION AND PRODUCTIVITY.
291	
228	
245	
274	
333	
53	
19	COMPUTER CHAIN : CAE CAD CAM
54	
55	
120	
161	
168	STRUCT. ANALYSIS
91	
190	RESULT VERIFICATION CAE DESIGN PROCESS.

Rec. no.	Congress Themes for structural CAE
297	
57	
92	ALL TOPICS.
320	
109	
155	ANYTHING RELATING TO THE DESIGN OF DETAILING OF STRUCT. STEEL.
184	E.G. IN HELSINKI.
97	GEOMETRIC MODELLING, EDP-CONCEPTS : WORKSTATION LOCAL AR-NETW./PUBL.NETWORKS
314	
338	BENEFITS OF CA DRAWING & DESIGN SOFTWARE + PITFALLS
30	CAD-CAM
65	COMPUTER AIDED STRUCT. ENG. (CAD/CAM)
142	USER-INTERFACE AND INTEGRATED USE OF AUTOMATED STRUCT. FUNCTIONS.
171	
201	
208	
237	THE TRAINING OF ENG. FOR USE OF CAE.
308	
68	
337	

Appendix X. Other information wanted

Rec. no.	Other information wanted
112	WE WOULD LIKE TO INITIATE COMPUTER USE IN ORGANISATION BUT AWAIT FUNDS ACUMULATION FOR SAME
36	USAGE OF PC ON CONSTRUCTION SITES
148	WE ARE INTERESTED TO HAVE DETAILS OF NONLINEAR ANALYSIS PROGRAMMS PARTICULARLY IN CABLE STAYED BRIDGES.
39	COLLECTED LISTS OF THE DATA-BASES (UNIVERSITIES, LIBRARIES ABOUT STRUCTURAL (BRIDGES) CALCULATION
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
206	TREND ON USAGE OF COMPUTERS IN GENERAL IN THE FIELD OF CONSLT ENG.
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 ALGORITH/ PROCEDURES. C) ESTABLISH TEST PROCEDURES FOR APPROVAL OF PROGRAMS.
105	DIRECTORY OF PROGRAMS ABOUT STRUCT. SURVEYING & ROAD/ RAIL ROAD DESIGN AVAILABLE FOR THE IBM PC SERIES.
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.
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.
245	DATA BASES & THEIR HANDLING & HOW THEY SHOULD BE FUNDED. -PARTICULARY "STRUCT. FAILURES" & "GEOTECHNICAL"
55	ADVERTISES ON COMPUTER AND SOFTWARE.
244	VERIFICATION OF COMMERCIALLY DEVELOPED PROGRAMS.
23	REPORTS ABOUT NEW HARD AND SOFTWARE IN THE TECHNICAL FIELD
138	MANAGEMENT OF SOFTWARE MAKING. MANAGEMENT OF DATABASE CREATION. STANDARDIZATION RELATED INFORMATICS.
184	EXCHANGE OF INFORMATION AND EXPERIENCE CONCERNING USE OF COMMERCIAL CAE-PROG. PACKAGES LIKE FEM-PACKAGES. PRE- AND POSTPROCESSORS ETC.
231	FINANCE, COST EFFECTIVINESS, LIABILITY OF SOFTWARE PRODUCERS, MAINTENANCE OF SOFTWARE.
284	STANDARDS, TECHNICAL REGULATIONS AND CERTIFICATION.
65	THE INFORMATION CONCERNS THE ACTIVITY AT THE DIVISION OF BUILDING TEHNOLOGY AND COMMUNITY DEV./TECHNICAL RESEARCH CENTRE OF FINLAND.
337	

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