

TECHNICAL NOTE 1021

Guidance on the use of MixSim concrete data in place of laboratory trial mix data in existing company computer systems.

Most ready mixed concrete companies have computer systems for generating batch books, pricing data, strength lists, mix data sheets etc. These systems rely upon input of data from laboratory trial mixes which are processed in the computer using curve smoothing techniques to allow interpolation for all mixtures within the range of data from the trials.

Users of MixSim have the options of:-

- A. Immediate use of comprehensive Output data from MixSim for mix selection, costing and production purposes;
- B. Transferring any selected data from MixSim into '*comma separated*' format or MS Excel format for further processing automatically or manually within specialised company systems;
- C. As (B) but specifically making only a very limited selection of MixSim data as direct substitutes for Laboratory trial mix data.

This note is concerned primarily with Option C, which has the advantage of enabling users of sophisticated and well established systems to continue to use them with minimal visible disruption, while benefitting from the speed and accuracy of MixSim compared with laboratory trial mixes.

Method

1. Use MixSim to generate the full range of 17 designs for the particular materials, their properties and construction conditions particularly cohesion factor, air content and slump (**See Figure 1**).
2. Transfer the required section(s) of the MixSim Results Table to an MS Excel Spreadsheet (See **Figure 2**). This is achieved by placing the cursor within the Table and right-clicking to display the menu from which Export Data is selected and the instructions followed to create and save the comma separated file. The file may then be opened in MS Excel spreadsheet format from the Export data file under MixSim. The file should then be Saved As an Excel file of the appropriate type before editing.
3. Edit the spreadsheet as necessary to suit the normal input sequence to the company system. Select a number of rows of data, max 17, min normally 5 to cover the required range of cement content, usually 100 - 500 kg/m³, in approximately equal increments (See **Figure 2**).
4. Check whether the materials conditions and the units are as required to be reported for laboratory trial mix data in the company system. If not they will need to be amended in the MS Excel spreadsheet before introducing into the company system. For MixSim the conditions and units are

Cement and additions	(kg/m ³)
Water is <u>free</u> water	(kg/m ³) = (l/m ³)

Aggregates are in SSD condition (kg/m³)
 Admixtures (l/m³) ≡ (kg/m³).

Pt	Cem + Add	PC Kemp	Water	Hey sand	10SS Cam	20 SS Cam	Density	Per Cent Fines	w/c	a/c	7 Day Strength N/mm ²	28 Day Strength N/mm ²	56 Day Strength N/mm ²	PC Kemp	Hey sand
A	0	0	288	628	421	782	2119	34.29			0	0	0	0.00	3.77
	31	31	270	701	404	750	2157	37.78	8.61	59.20	0	0	0	1.72	4.21
	72	72	251	772	386	717	2198	41.17	3.50	26.15	0	0	0	3.94	4.63
B	122	122	230	841	367	682	2243	44.49	1.89	15.51	1	3	4	6.70	5.05
	183	183	209	907	347	645	2291	47.75	1.14	10.40	10	14	18	10.04	5.44
	209	209	205	878	353	656	2301	46.51	0.98	9.01	15	20	25	11.52	5.27
C	236	236	201	849	359	667	2312	45.26	0.85	7.95	20	27	32	12.97	5.09
	262	262	197	820	365	678	2322	44.00	0.75	7.12	26	33	39	14.40	4.92
	287	287	193	791	371	689	2332	42.72	0.67	6.45	32	40	46	15.80	4.75
D	340	340	192	714	383	711	2341	39.50	0.56	5.31	42	50	57	18.72	4.28
	389	389	191	640	395	733	2348	36.23	0.49	4.54	50	59	66	21.41	3.84
	431	431	195	561	406	755	2348	32.58	0.45	3.99	56	65	71	23.71	3.37
E	467	467	198	487	418	777	2347	28.95	0.42	3.60	60	69	75	25.71	2.92
	571	571	212	340	426	791	2340	21.82	0.37	2.73	66	75	81	31.39	2.04
	656	656	225	210	434	806	2331	14.50	0.34	2.21	69	77	83	36.06	1.26
F	723	723	238	97	441	819	2319	7.16	0.33	1.88	70	78	84	39.77	0.58
	774	774	251	0	448	833	2306	0.00	0.32	1.66	70	78	84	42.56	0.00

Figure 1 Example of a MixSim Results Table showing 17 mixtures

Pt	Cem + Add	PC Kemp	Water	Hey sand	10SS Cam	20 SS Cam	Density	Per Cent Fir	w/c	a/c	7 Day Stren	28 Day Stre	56 Day Strength N/mm ²
A	0	0	288	628	421	782	2119	34.29			0	0	0
A	31	31	270	701	404	750	2157	37.78	8.61	59.2	0	0	0
	72	72	251	772	386	717	2198	41.17	3.5	26.15	0	0	0
	122	122	230	841	367	682	2243	44.49	1.89	15.51	1	3	4
B	183	183	209	907	347	645	2291	47.75	1.14	10.4	10	14	18
	209	209	205	878	353	656	2301	46.51	0.98	9.01	15	20	25
	236	236	201	849	359	667	2312	45.26	0.85	7.95	20	27	32
C	262	262	197	820	365	678	2322	44	0.75	7.12	26	33	39
	287	287	193	791	371	689	2332	42.72	0.67	6.45	32	40	46
	340	340	192	714	383	711	2341	39.5	0.56	5.31	42	50	57
D	389	389	191	640	395	733	2348	36.23	0.49	4.54	50	59	66
	431	431	195	561	406	755	2348	32.58	0.45	3.99	56	65	71
	467	467	198	487	418	777	2347	28.95	0.42	3.6	60	69	75
E	571	571	212	340	426	791	2340	21.82	0.37	2.73	66	75	81
	656	656	225	210	434	806	2331	14.5	0.34	2.21	69	77	83
	723	723	238	97	441	819	2319	7.16	0.33	1.88	70	78	84
F	774	774	251	0	448	833	2306	0	0.32	1.66	70	78	84

Selected mixes													
Pt	Cem + Add	PC Kemp	Water	Hey sand	10SS Cam	20 SS Cam	Density	% Fines	w/c	a/c	7 Day Str	28 Day Str	56 Day Str
	122	122	230	841	367	682	2243	44.49	1.89	15.51	1	3	4
	236	236	201	849	359	667	2312	45.26	0.85	7.95	20	27	32
	340	340	192	714	383	711	2341	39.50	0.56	5.31	42	50	57
E	467	467	198	487	418	777	2347	28.95	0.42	3.60	60	69	75
	571	571	212	340	426	791	2340	21.82	0.37	2.73	66	75	81

Figure 2 MS Excel Spreadsheet for the 17 sets of Mixsim results with a selection below of 5 sets of results for use in company systems.