

**Table 4: Hardened concrete properties**

	Control concrete	SCC
Compressive strength, MPa		
1-day	23.24	18.53
2-day	40.27	35.78
7-day	52.04	50.31
28-day	61.60	64.67
Flexural strength, MPa		
3-day	5.6	5.0
7-day	6.0	6.0
28-day	7.3	7.8
Split tensile strength, MPa		
7-day	2.49	2.55
28-day	2.72	2.89
RCPT values, coulombs (28-day)	15	17

concrete. The proportion of the ingredients used is given in Table 1.

The control parameters of the SCC mix and EFNARC Guide recommendations are given in Table 2. Table 3 gives the fresh concrete properties.

To study the relative costs of the materials used, the prices (as of October 2003) of the materials in the Thane region were considered. While Table 4 gives hardened concrete properties, the costs are given in Table 5.

It can be seen that the cost of materials for SCC is just 16.05 percent above the control.

Similarly, from Table 6, it can be seen that the cost of M40 grade SCC is higher by about 16.8 percent over the control.

A similar concern about cost had been prevailing in the UK. The cost scenario has been brought out interestingly in an article by Allan J. Dowson<sup>1</sup>. He states that "Raw material costs alone should not be considered the criteria for acceptance or

**Table 6 : Cost analysis of SCC and control concrete of approximately 40 MPa strengths**

Material	Control concrete		SCC		Differential
	Quantity	Rate, Rs	Quantity	Rate, Rs	
Cement, kg	395	3000/t	300	3000/t	-285
Fly ash, kg	130	1500/t	170	1500/t	+60
20 mm aggregate, kg	639	370/t	842	370/t	+ 75.11
10 mm aggregate, kg	462	370/t	0	370/t	-170.94
Crushed sand, kg	0	850/t	235	850/t	+ 199.75
Natural sand, kg	660	900/t	745	900/t	+ 76.5
Admixture PCE, l	-	140/l	4.23	140/l	+ 592.2
Admixture VMA, l	-	40/l	1.41	40/l	+ 56.4
Admixture SNF, l	5.25	33/l	-	33/l	-173.25
					+ 430.77
					Cost above control 16.8 per cent

rejection of the system. All costs should be included". An example of the overall costs for 1 m<sup>3</sup> of concrete and production are shown in Table 7.

The costs in Table 7 are for precast units production: For the same number of units produced, the cost savings are in the number of men employed to carry out the work. For normal production the number of operators would be two for assembly, four for casting, two for stripping and four for finishing. Self-compacting concrete requires only two operators for assembly and two for stripping and only one for placing concrete. There is no requirement for the finishes as the SCC concrete finish is good enough.

### Concluding remarks

From the above observations, a very promising picture emerges as given below.

- (i) SCC is comparable — in fact superior — to conventional concrete in respect of all properties.
- (ii) It should be the preferred choice when concreting conditions are difficult.

**Table 7: Cost comparison of SCC and standard concrete<sup>1</sup>**

Costing /m <sup>3</sup>	Standard concrete, £	SCC, £
Concrete	36.90	38.53
Admixture	3.53	8.38
Mould and assembly	5.04	5.04
Casting and compaction	8.40	3.03
Stripping	7.56	5.04
Finishing	18.48	0
Vibration maintenance	1.00	0
Total cost	80.91	60.02

- (iii) Cost of only the materials of SCC may appear to be slightly more, say about 15 percent or so.
- (iv) However, on a more rational basis of the total costs, including the labour charges for formwork and making good finished surfaces, SCC will be more advantageous.
- (v) From holistic considerations, SCC will be more cost-effective.

### Acknowledgement

The information contained herein has been based on the work carried out in the laboratories of Master Builders Technology (MBT) India Pvt Ltd and is hereby acknowledged.

### Reference

1. DOWSON, ALLAN J., *The application of self compacting concrete in precast products*, Allan Dowson Consulting.



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**Table 5 : Cost analysis of SCC and control concrete for similar strengths**

	Control concrete			SCC	
	Rate, Rs	Quantity/kg	Amount, Rs	Quantity/kg	Amount, Rs
Cement	3000/t	450	1350	400	1200
Fly ash	1500/t	-	-	175	263
Sand					
Natural	900/t	627	564	225	203
Crushed	850/t	267	227	680	578
Coarse aggregate					
20mm	370/t	510	189	405	150
10mm	370/t	430	159	330	122
Water	-	-	-	-	-
PCE-based admixture	140/l	-	-	5.175	725
Superplasticiser	33/l	11.25	371	-	-
Retarder	50/l	1.35	68	1.725	86
VMA	40/l	-	-	0.575	23
Total			2928		3350
Cost over control					16.05 percent