

CEL 774 CONSTRUCTION PRACTISES

Acceptance & Quality Control

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General Outline

- **Quality management of concrete at site or plant**
- **Role of in-situ testing**



Quality Control

⌘ **Quality assurance**

⌘ **Quality control**

☺ **Forward Control**

☹ **Immediate Control**

☹ **Retrospective Control**

⌘ **Quality monitoring**



Quality Control

⌘ **Quality assurance**

The operation of systems by which the client can be assured that the control is being applied over all aspects of the complete process from enquiry to delivery to ensure compliance of product with the specifications agreed with the client



Quality Control

⌘ **Quality control**

The operation of the procedures to maintain product quality at the selected level.

⌘ **Quality monitoring**

Measurement of quality and advising on necessary changes to maintain quality at the selected level.



Forward Control

–Materials

- **Storage**

- **Mix Design**

- **Plant Maintenance**

➤ ***Batching Plant and Mixers Maintenance.***



Immediate Control

–Correct weighing

- *Visual look of concrete*
 - *Slump &*
 - *moisture content of aggregate*
 - *Adjustment*
 - *Uniformity check.*

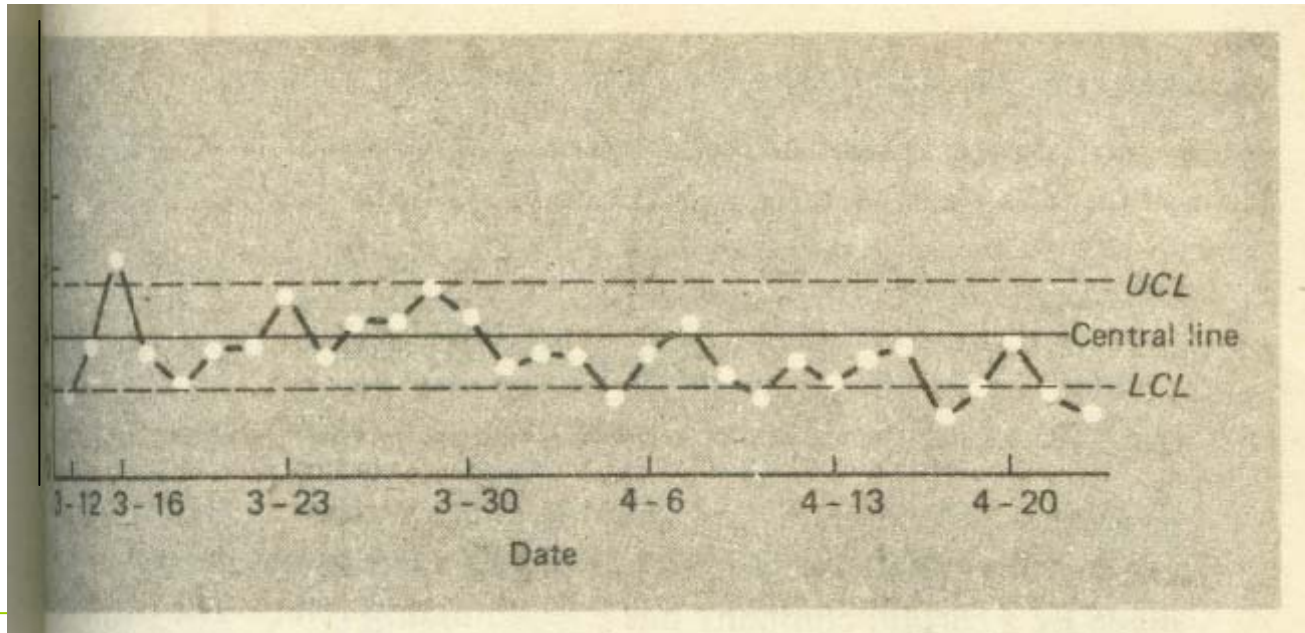


Retrospective Control (Monitoring)

– **Mean, SD and Correlations**

– **Control Charts**

– **CUSUM**



Retrospective Control

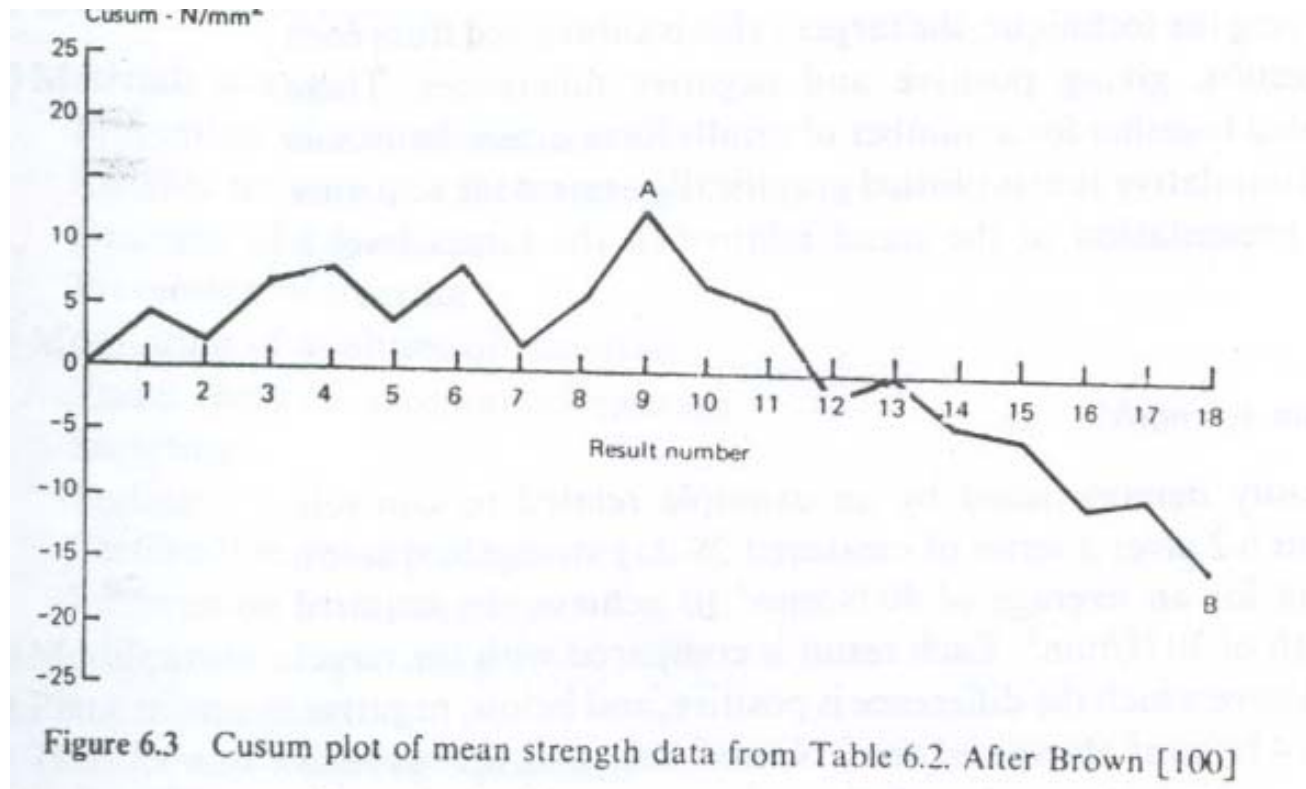
Table 6.2 Example of cusum applied to mean strength [100]

Result no.	28-day strength (N/mm ²)	Difference from target 40 (N/mm ²)	Cusum (N/mm ²)
1	44	+4	+4
2	38	-2	+2
3	45	+5	+7
4	41	+1	+8
5	36	-4	+4
6	44	+4	+8
7	35	-5	+3
8	43	+3	+6
9	47	+7	+13
10	34	-6	+7
11	38	-2	+5
12	33	-7	-2
13	42	+2	0
14	36	-4	-4
15	39	-1	-5
16	35	-5	-10
17	41	+1	-9
18	34	-6	-15

-*cusum*



Retrospective Control



Retrospective Control

Table 6.3 Target mean ranges [100]

Standard deviation (N/mm ²)	Target mean range of strengths (N/mm ²)
3.5	4.0
4.0	4.5
4.5	5.0
5.0	5.5
5.5	6.0
6.5	7.5
7.0	8.0

Note: Target mean range = $1.128 \times \text{s.d.}$, rounded to nearest 0.5 N/mm².



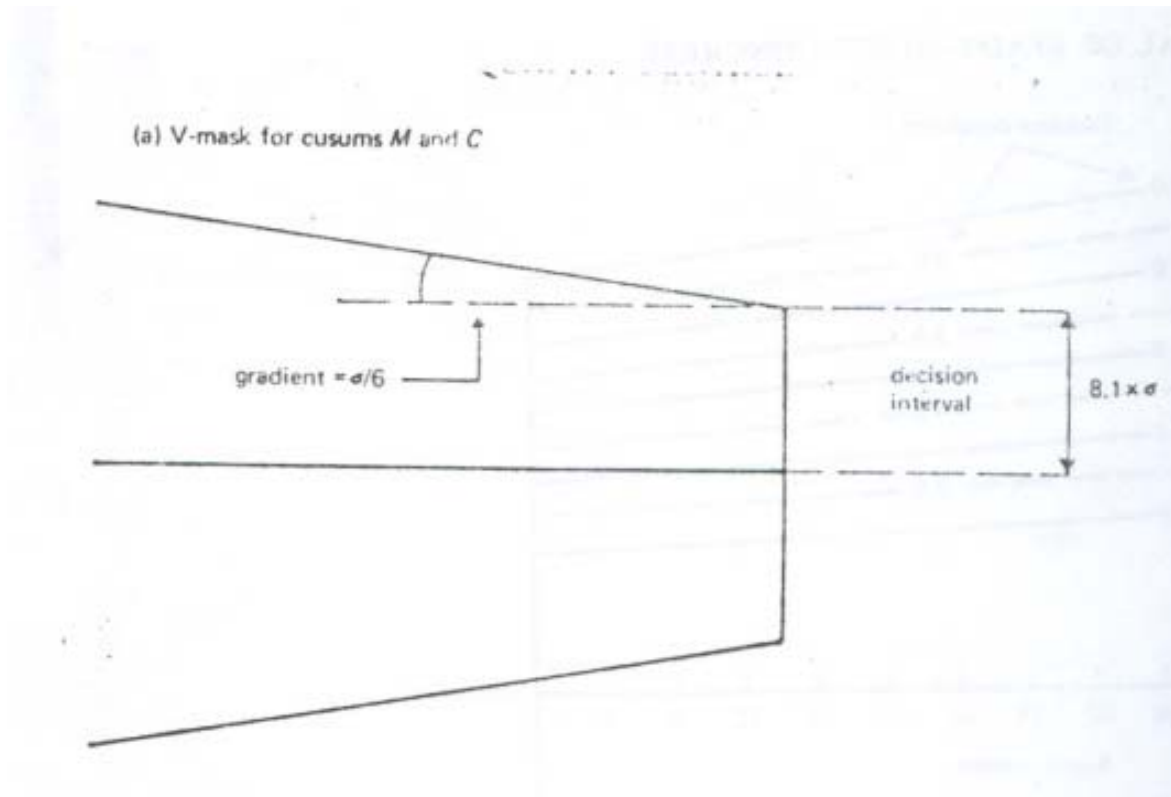
Retrospective Control

Table 6.4 Example of cusum applied to range [100]

Result no.	28-day strength (N/mm ²)	Range (N/mm ²)	Difference from target mean range 5.5 (N/mm ²)
1	44		
2	38	6	+0.5
3	45	7	+1.5
4	41	4	-1.5
5	36	5	-0.5
6	44	8	+2.5
7	35	9	+3.5
8	43	8	+2.5
9	47	4	-1.5
10	34	13	+7.5
11	38	4	-1.5
12	33	5	-0.5
13	42	9	+3.5
14	36	6	+0.5
15	39	3	-2.5
16	35	4	-1.5
17	41	6	+0.5
18	34	7	+1.5

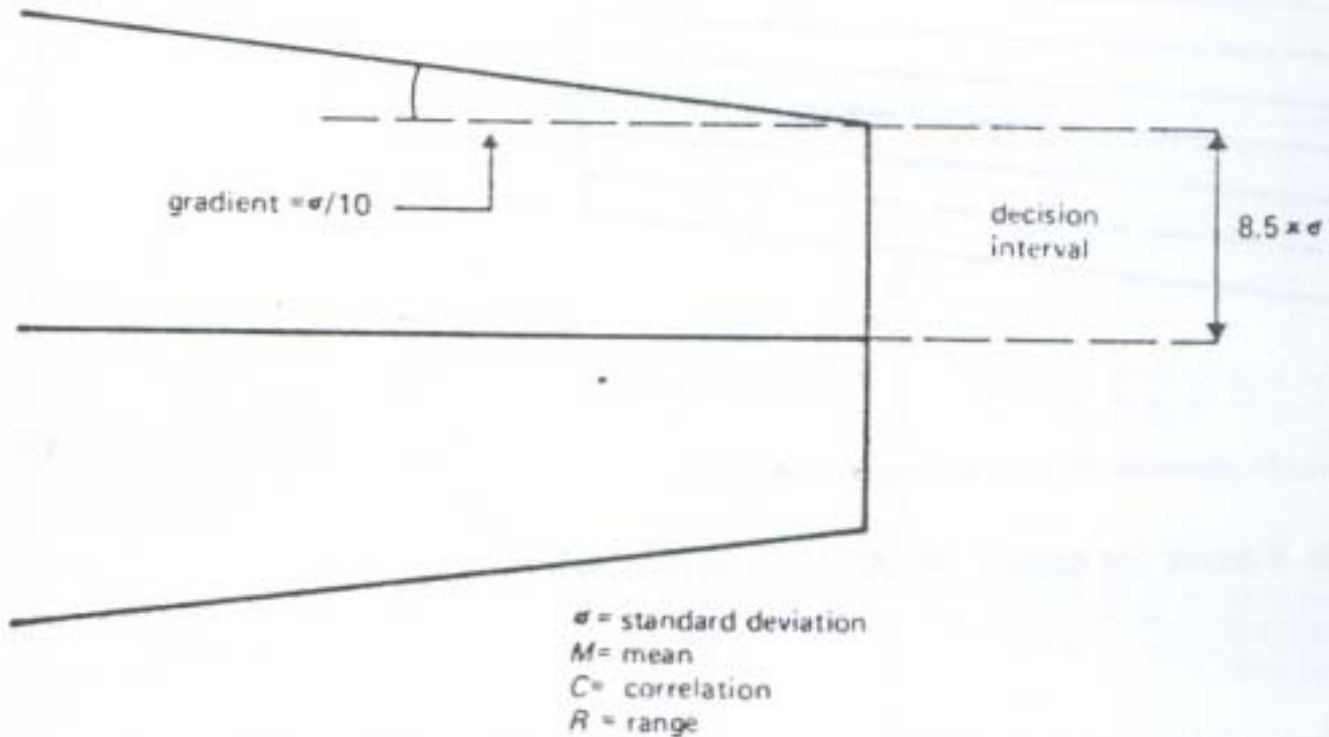


Retrospective Control

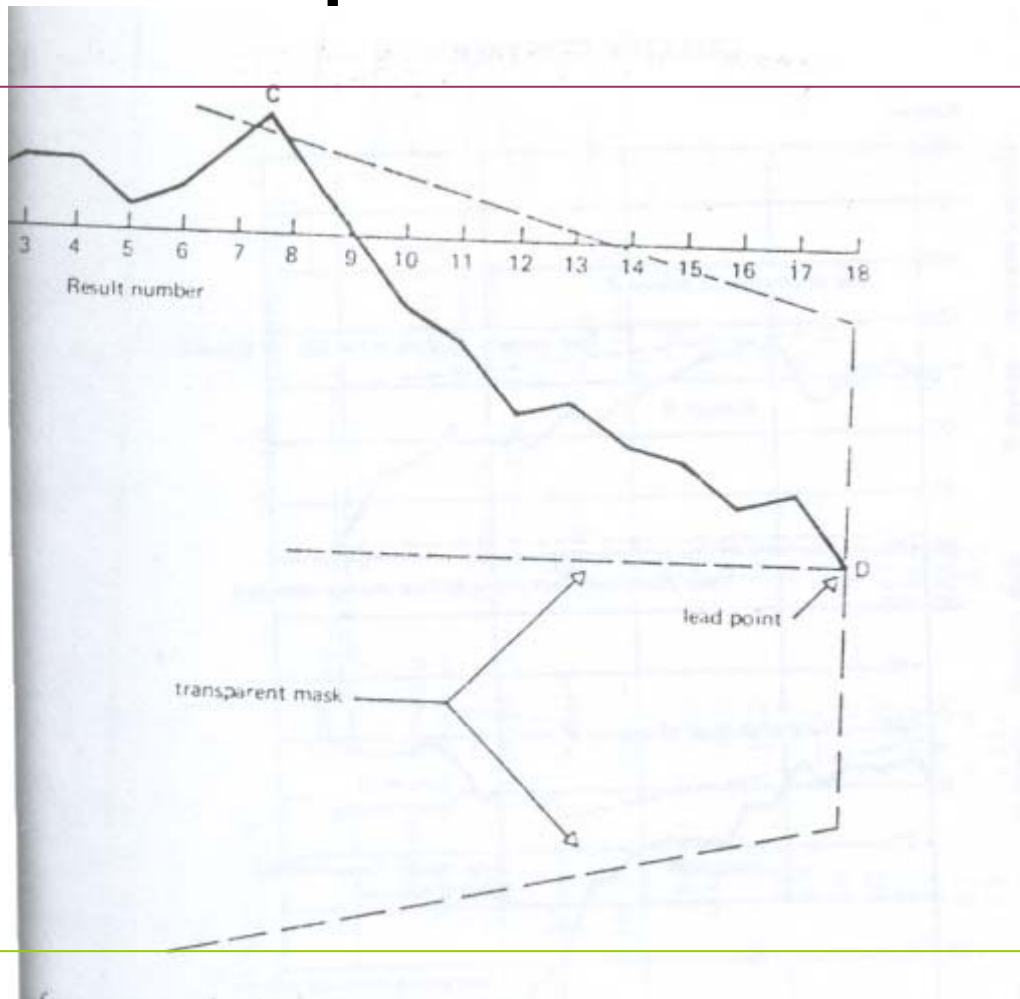


Retrospective Control

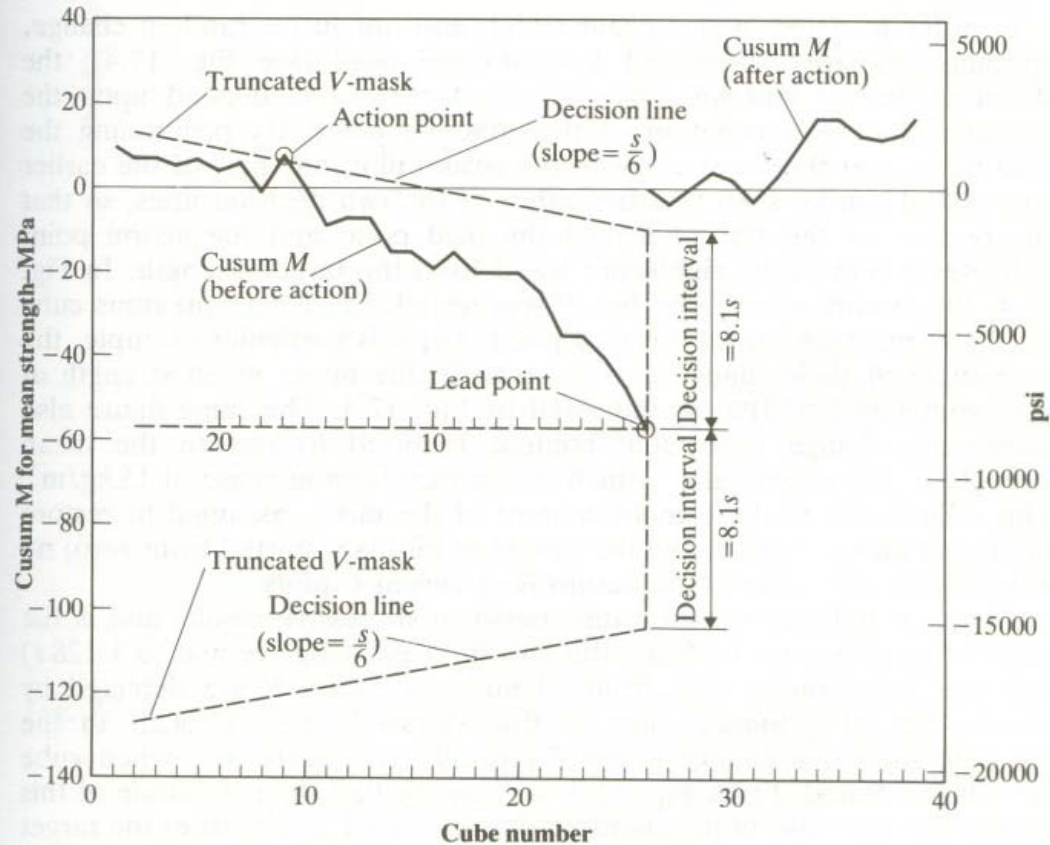
(b) V-mask for cusum R



Retrospective Control



Retrospective Control



Summary

Cusum



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***THANK YOU FOR
HEARING***



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