

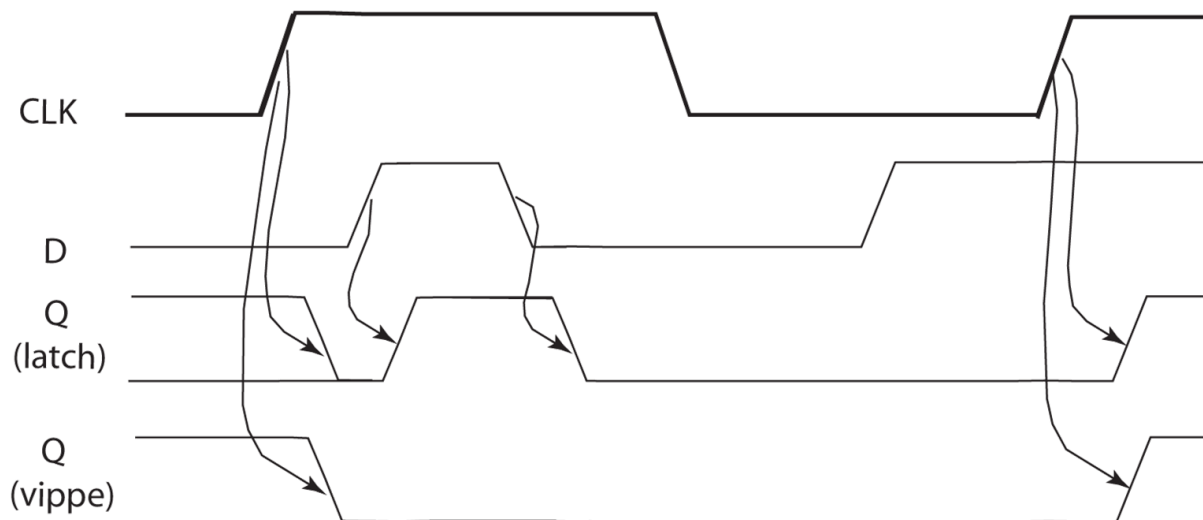
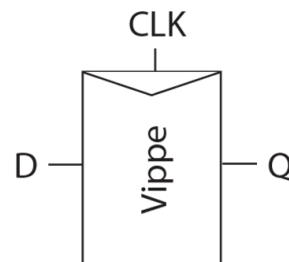
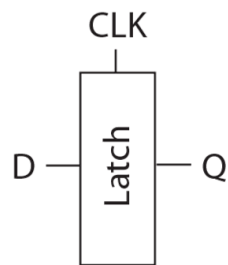


UiO : Universitetet i Oslo

# INF3400 Del 10 Teori Sekvensielle kretser

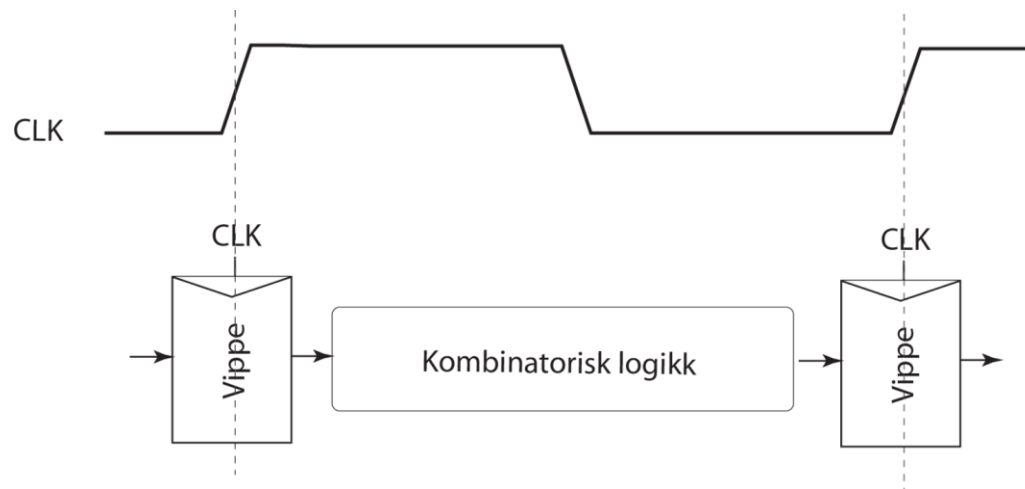


# Introduksjon til sekvensielle kretser



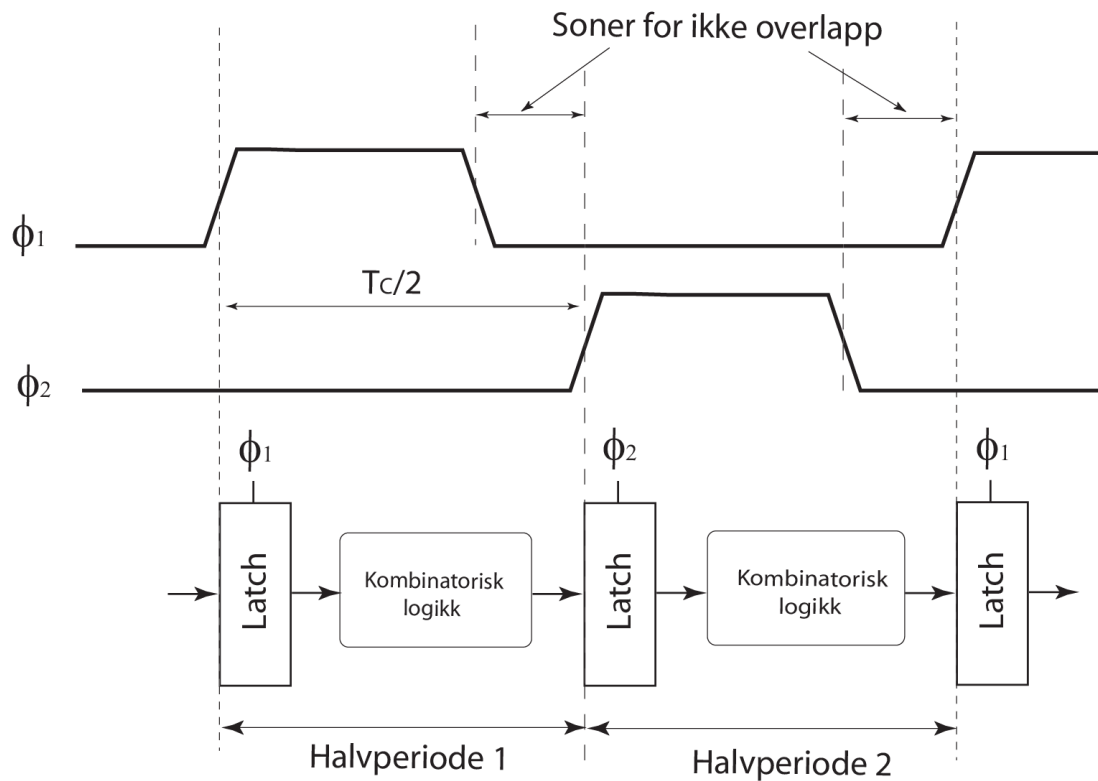
# Sekvenseringsmetoder

Vipper



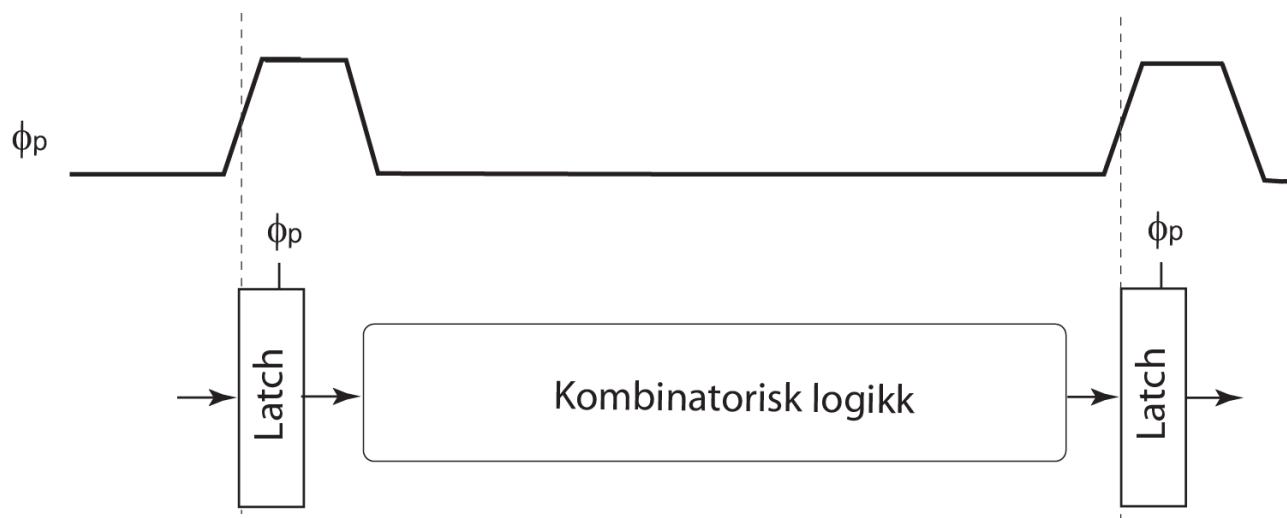
**Vipper er i seg selv ikke transparente.**

# Latcher



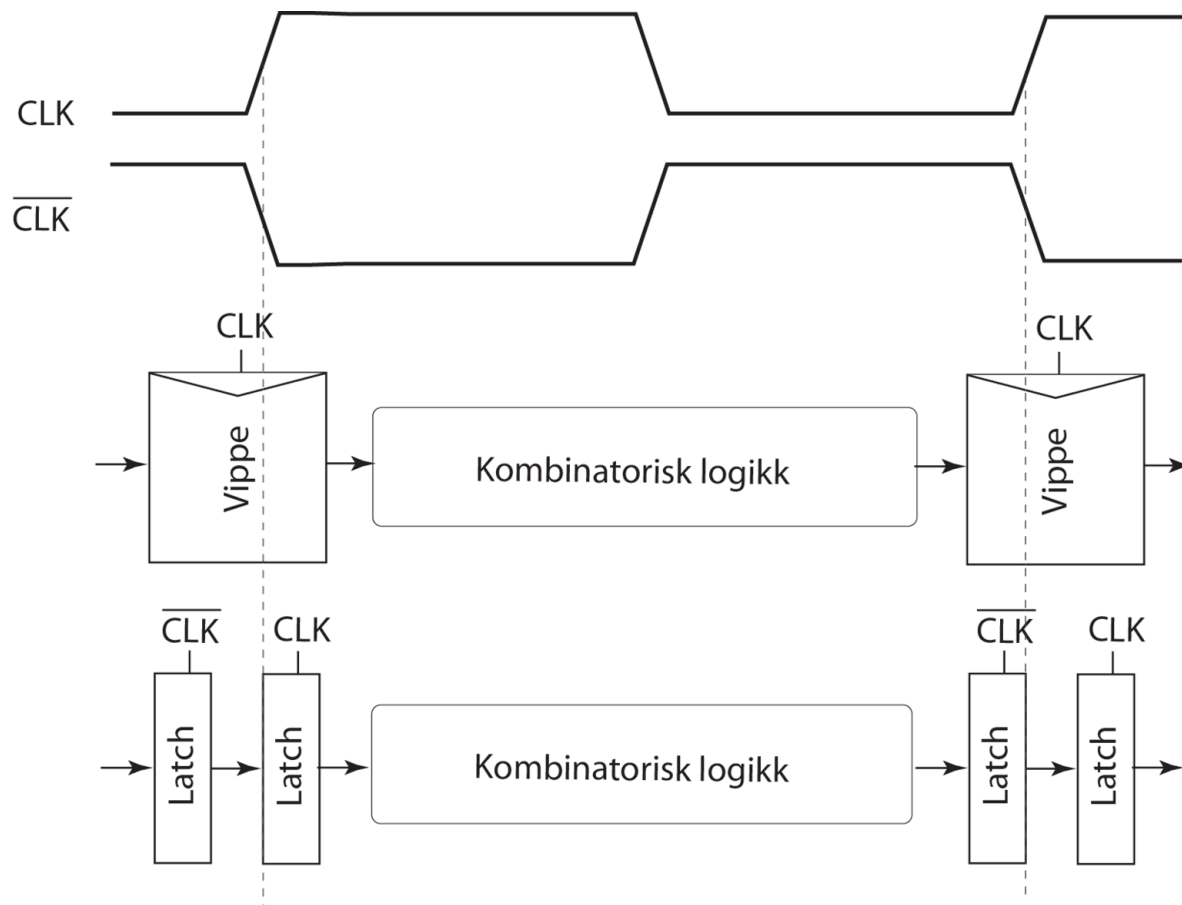
**Latcher delvis transparente.**

# Lacher som styres av pulser

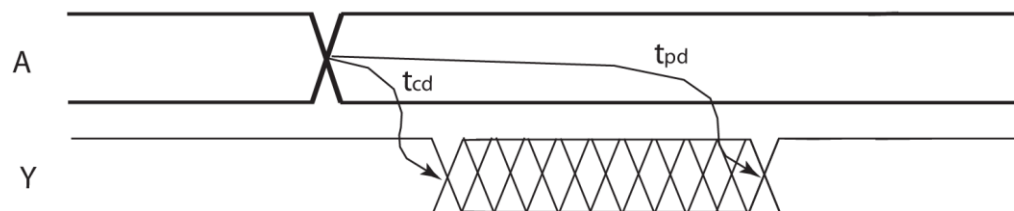
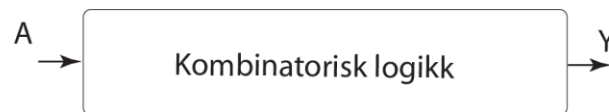


**Reduserer latches transparente periode.**

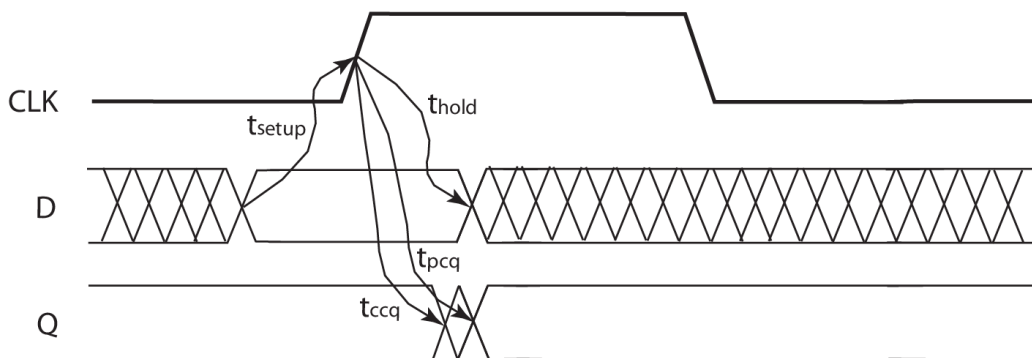
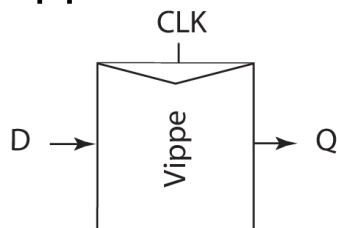
# Vipper lages av latcher



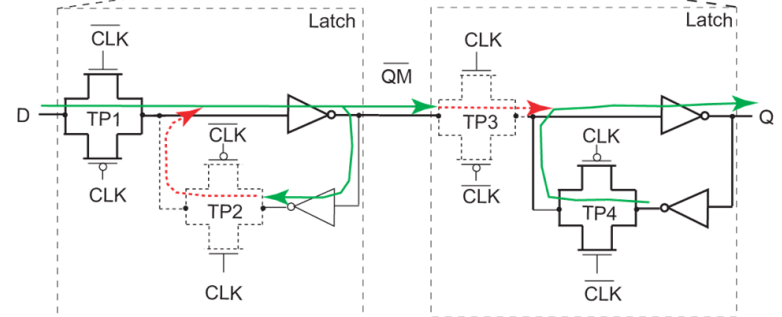
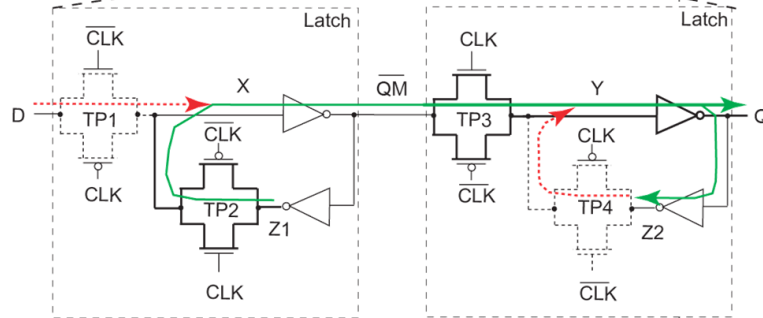
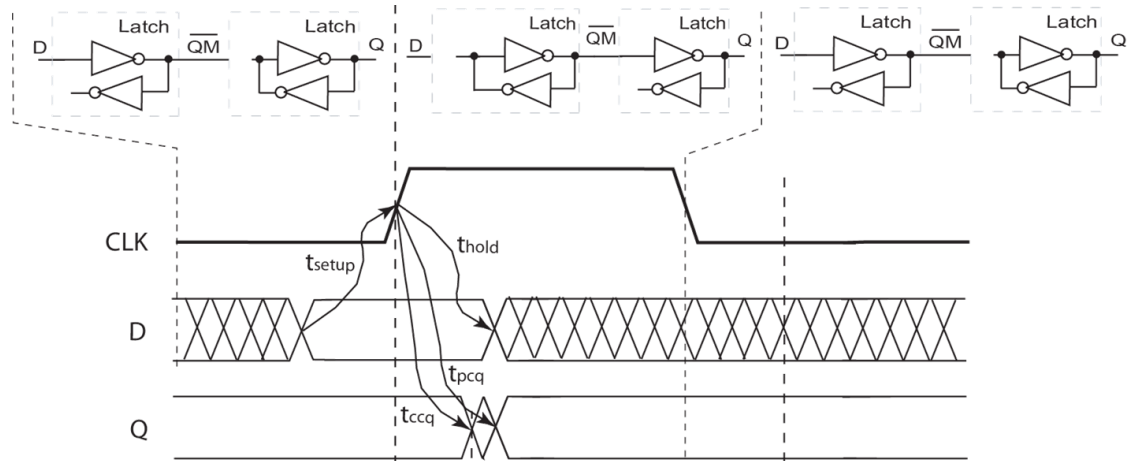
# Timing for kombinatorisk logikk



## Timing for vipper

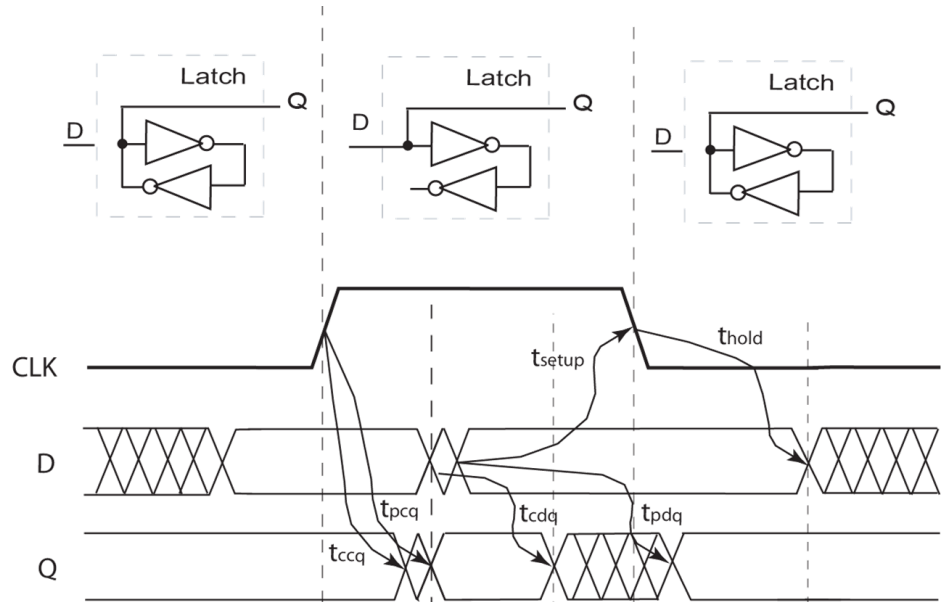
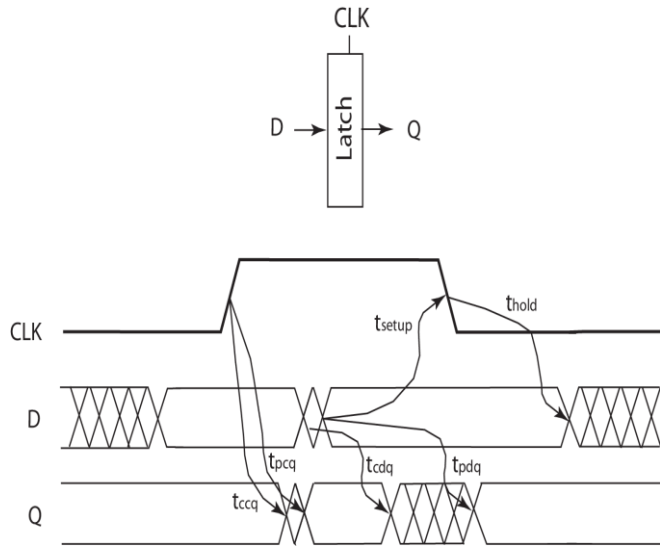


Term	
$t_{pd}$	Propageringsforsinkelse
$t_{cd}$	Contamination forsinkelse
$t_{ccq}$	Klokke til Q cont. forsinkelse
$t_{pcq}$	Klokke til Q prop. forsinkelse
$t_{setup}$	Setup tid
$t_{hold}$	Hold tid

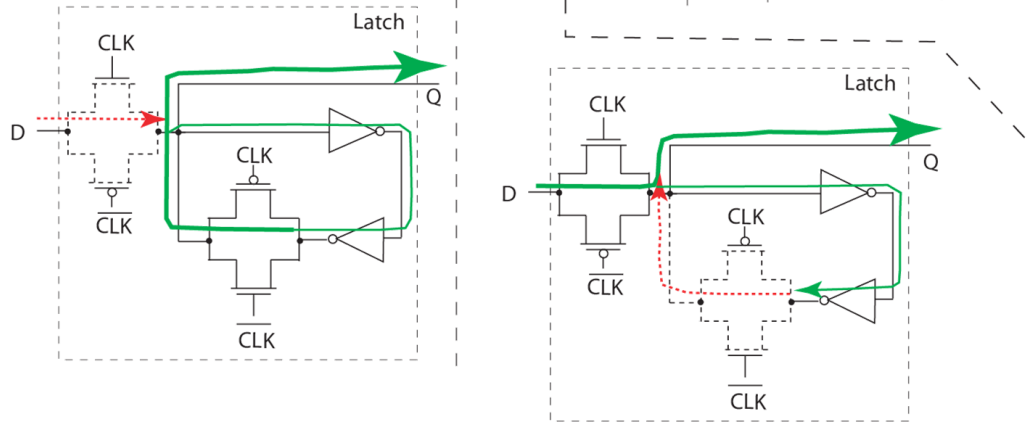




# Timing for latcher

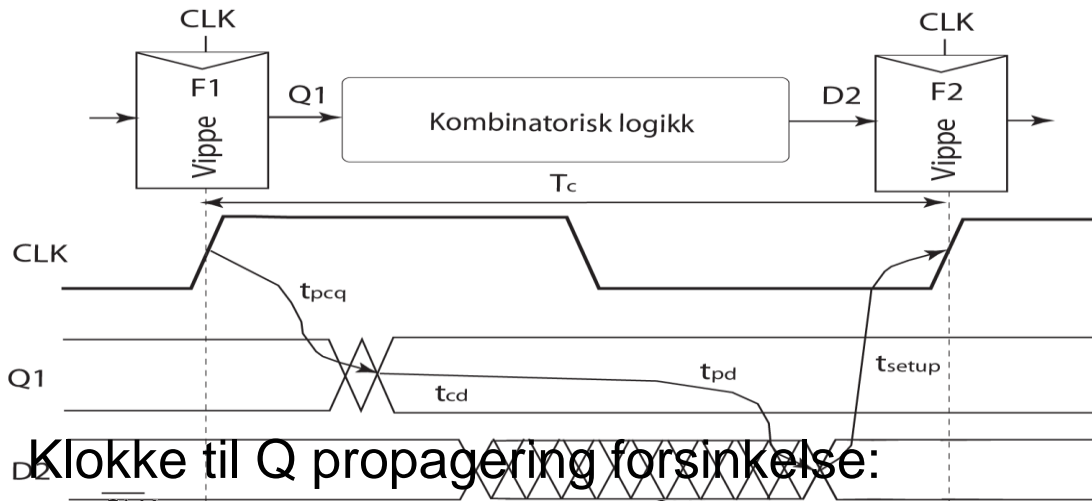


Term	
tpdq	D til Q prop. forsinkelse
tcdq	D til Q cont. forsinkelse
tccq	Klokke til Q cont. forsinkelse
tpcq	Klokke til Q prop. forsinkelse
tsetup	Setup tid
thold	Hold tid



# Begrensning for maks tidsforsinkelse

Vippe

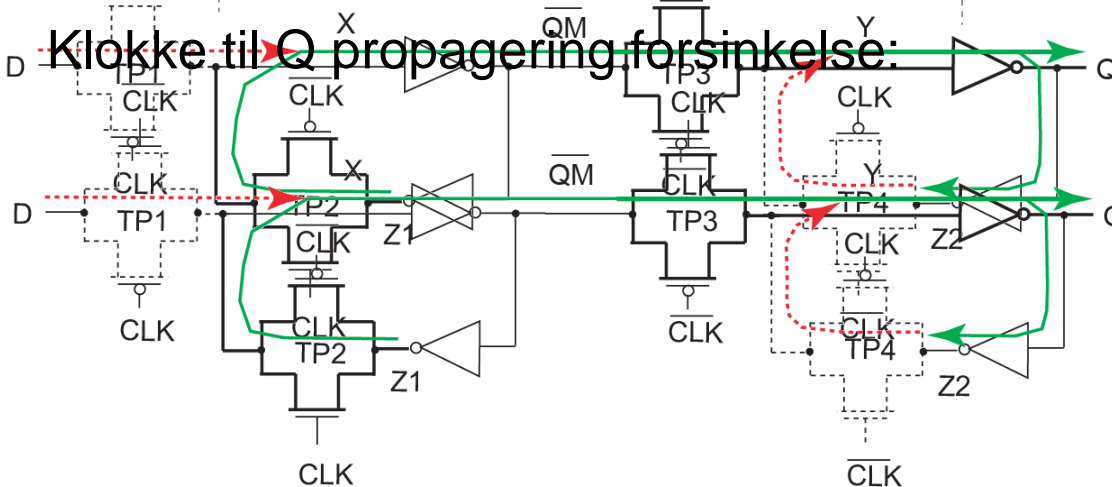


$$T_C \geq t_{pcq} + t_{pd} + t_{setup}$$

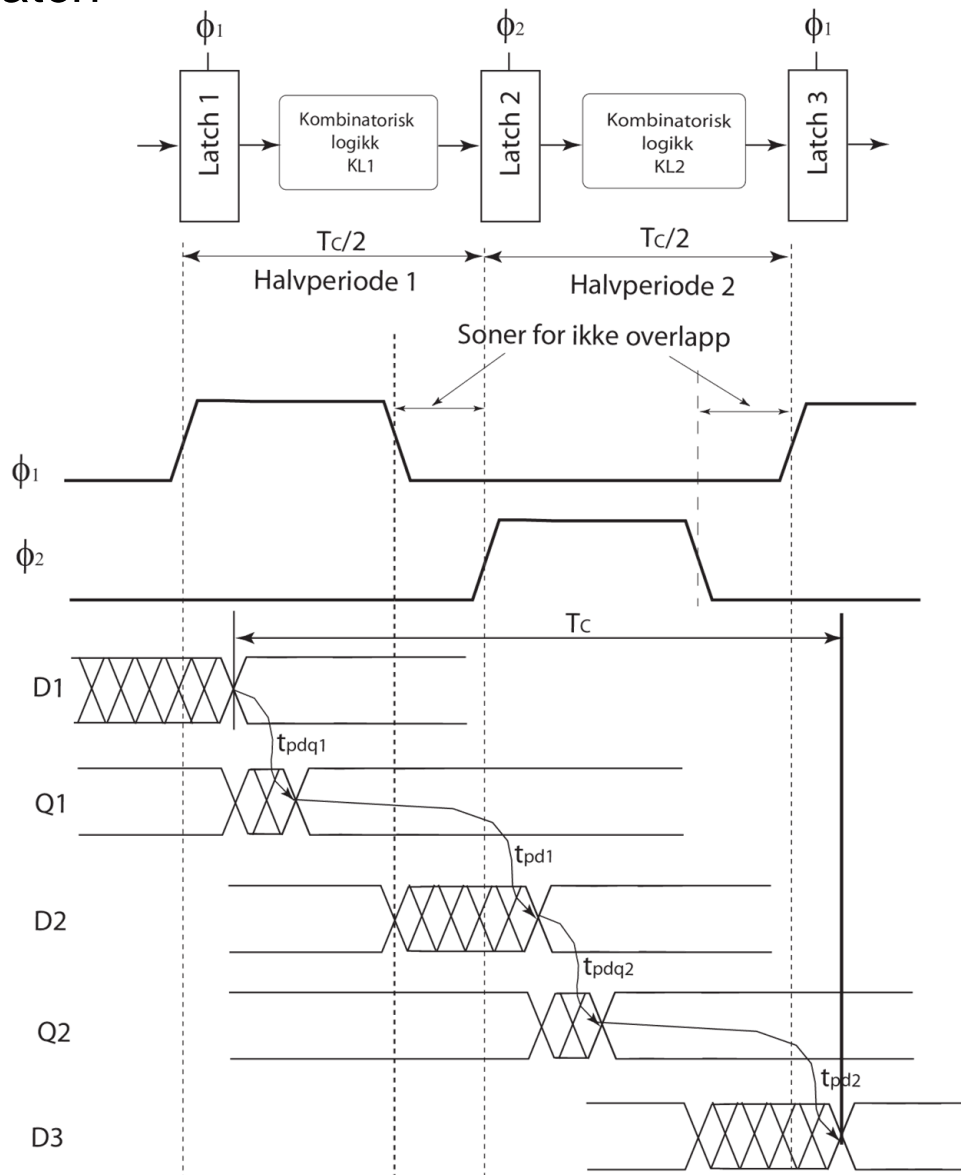
$$t_{pd} \leq T_c - (t_{setup} + t_{pcq})$$

Klokke til Q propagering forsinkelse:

Klokke til Q propagering forsinkelse:



# Latch

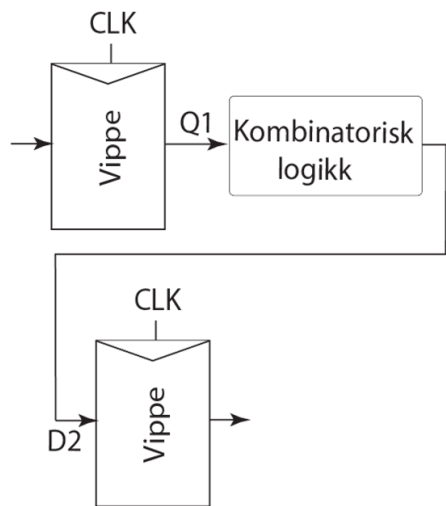


$$T_C \geq t_{pdq1} + t_{pd1} + t_{pdq2} + t_{pd2}$$

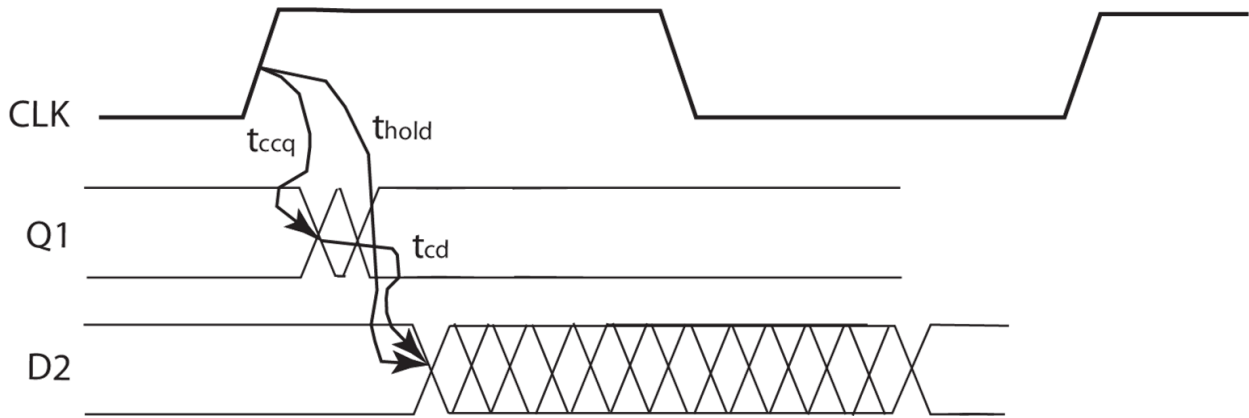
$$t_{pd} \leq T_c - (2t_{pdq})$$

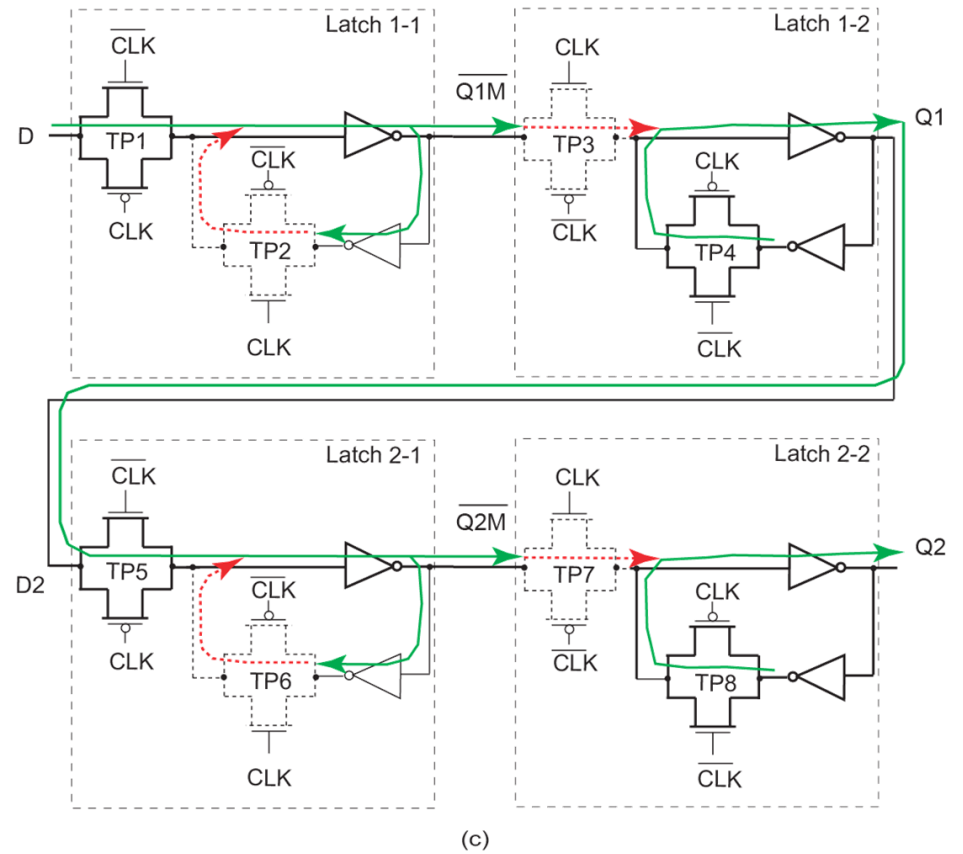
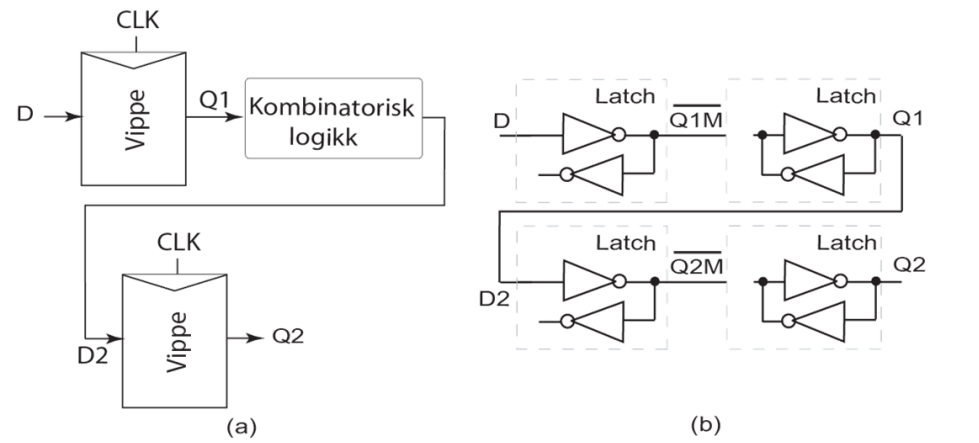
# Begrensning for minimum tidsforsinkelse

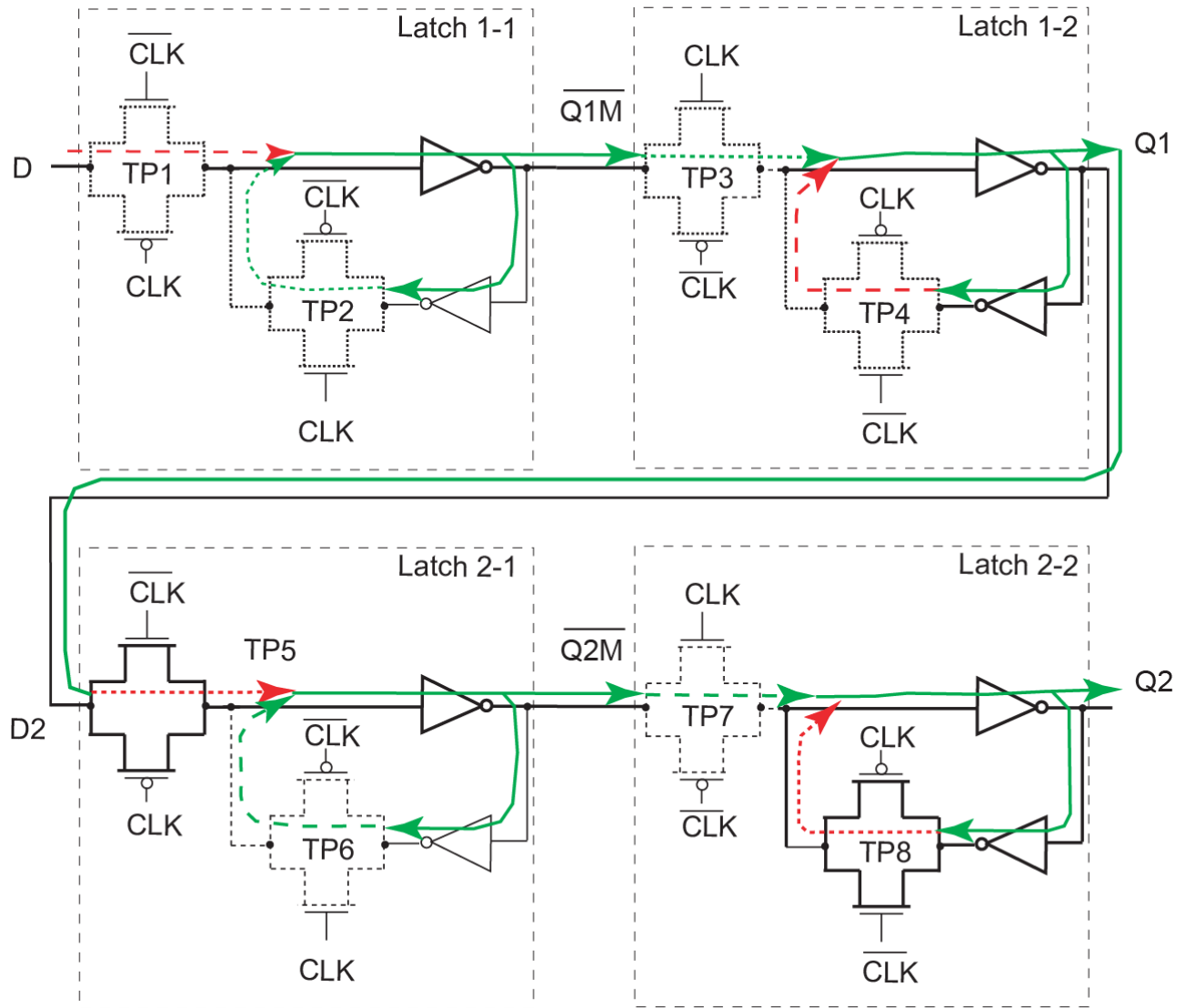
Vippe



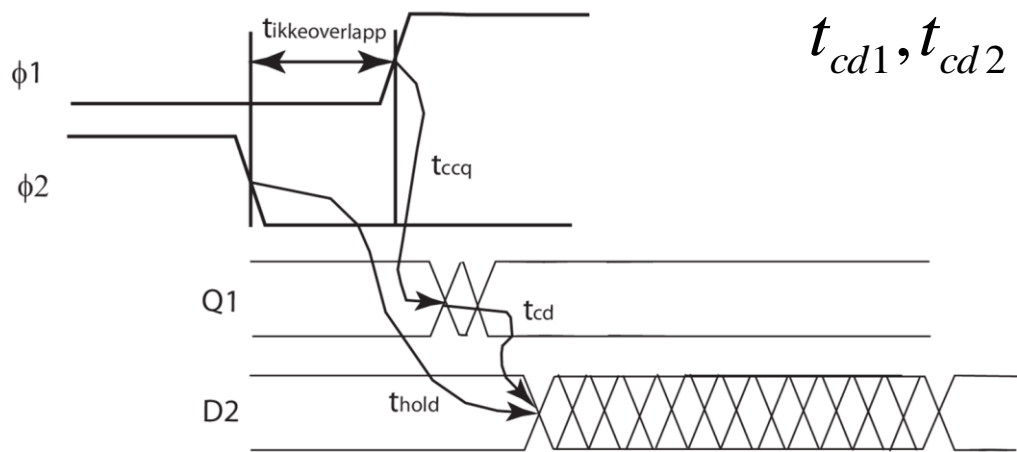
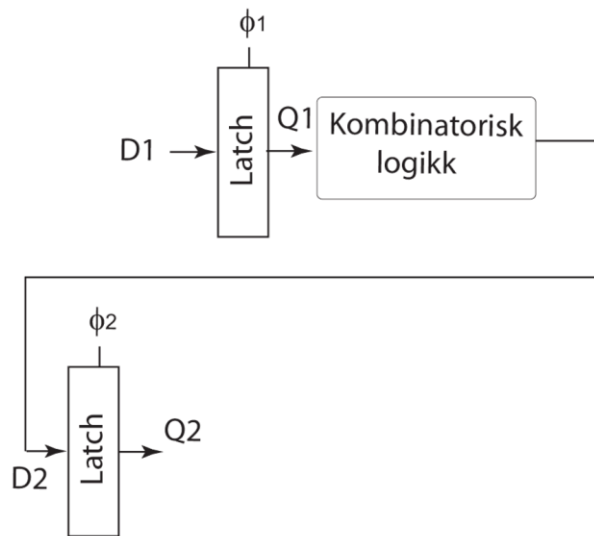
$$t_{cd} \geq t_{hold} - t_{ccq}$$



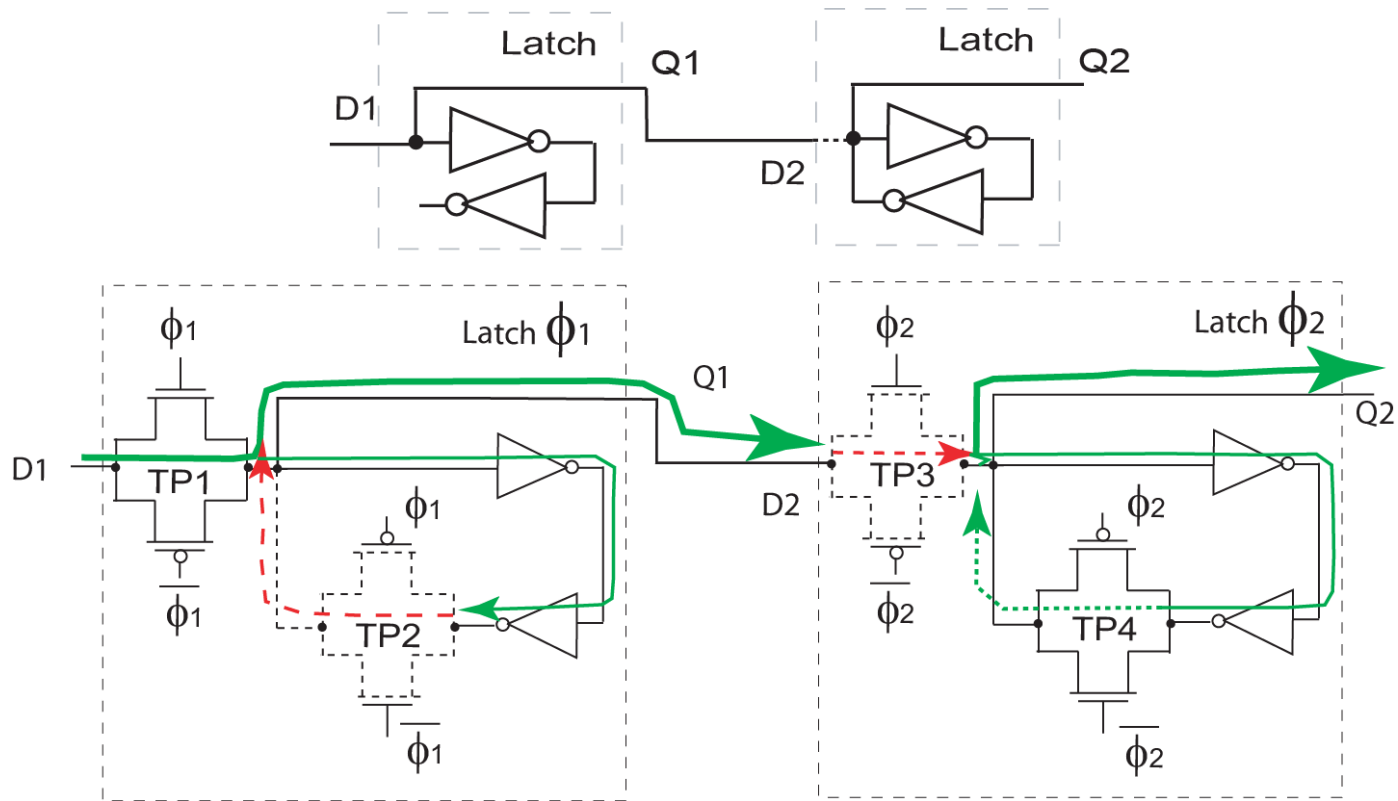




# Latch



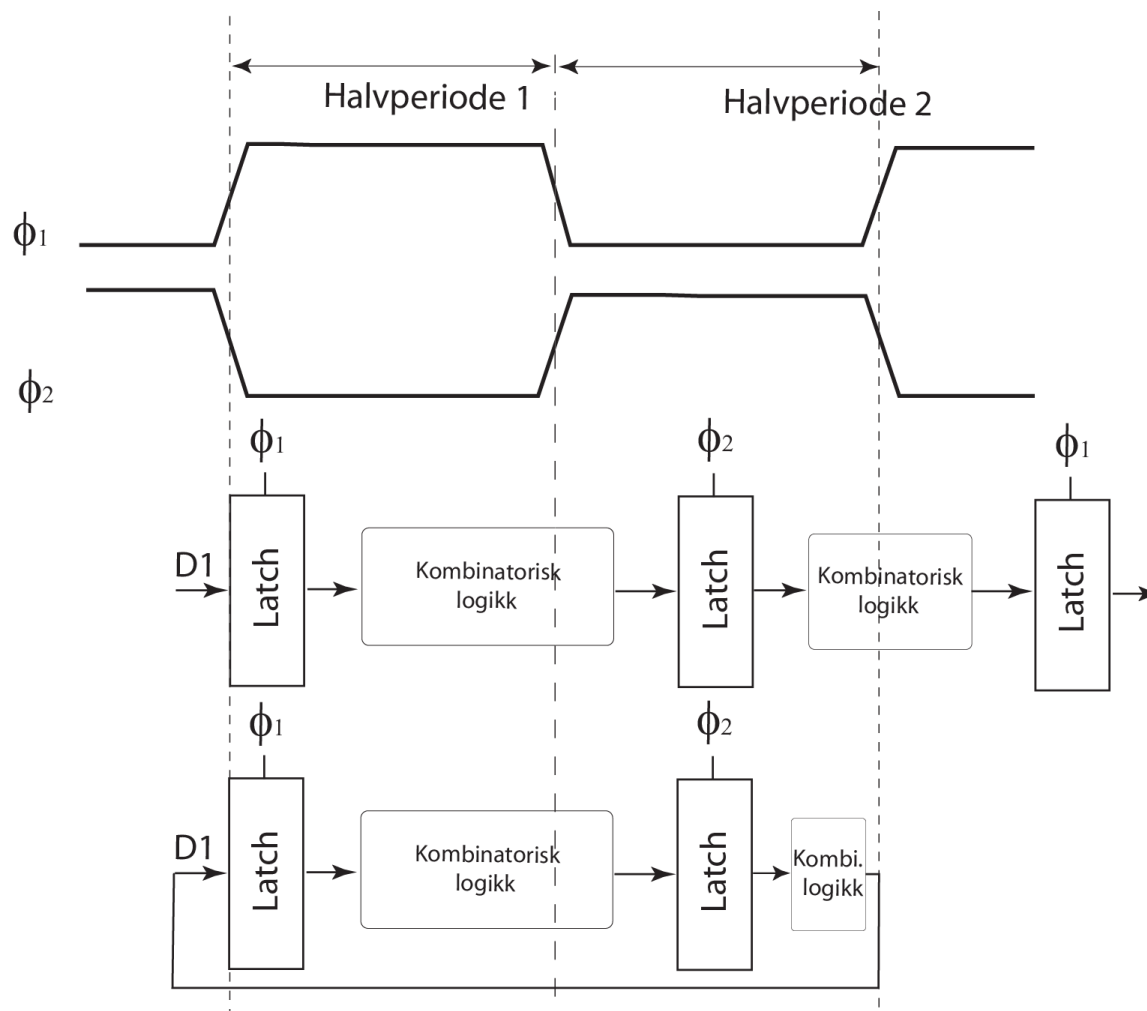
$$t_{cd1}, t_{cd2} \geq t_{hold} - t_{ccq} - t_{ikkeoverlapp}$$

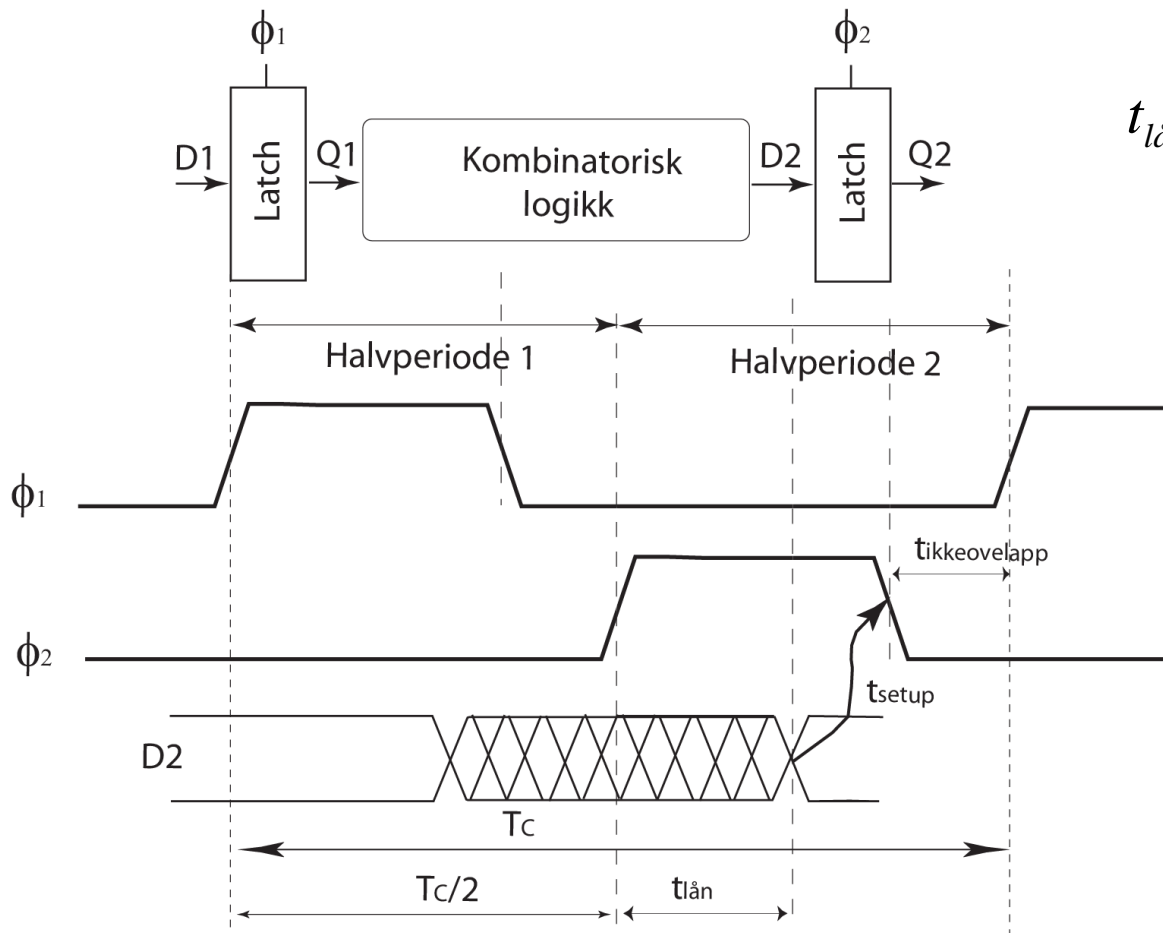


$$t_{hold} \leq t_{ikkeoverlapp} + t_{ccq} + t_{cd}$$



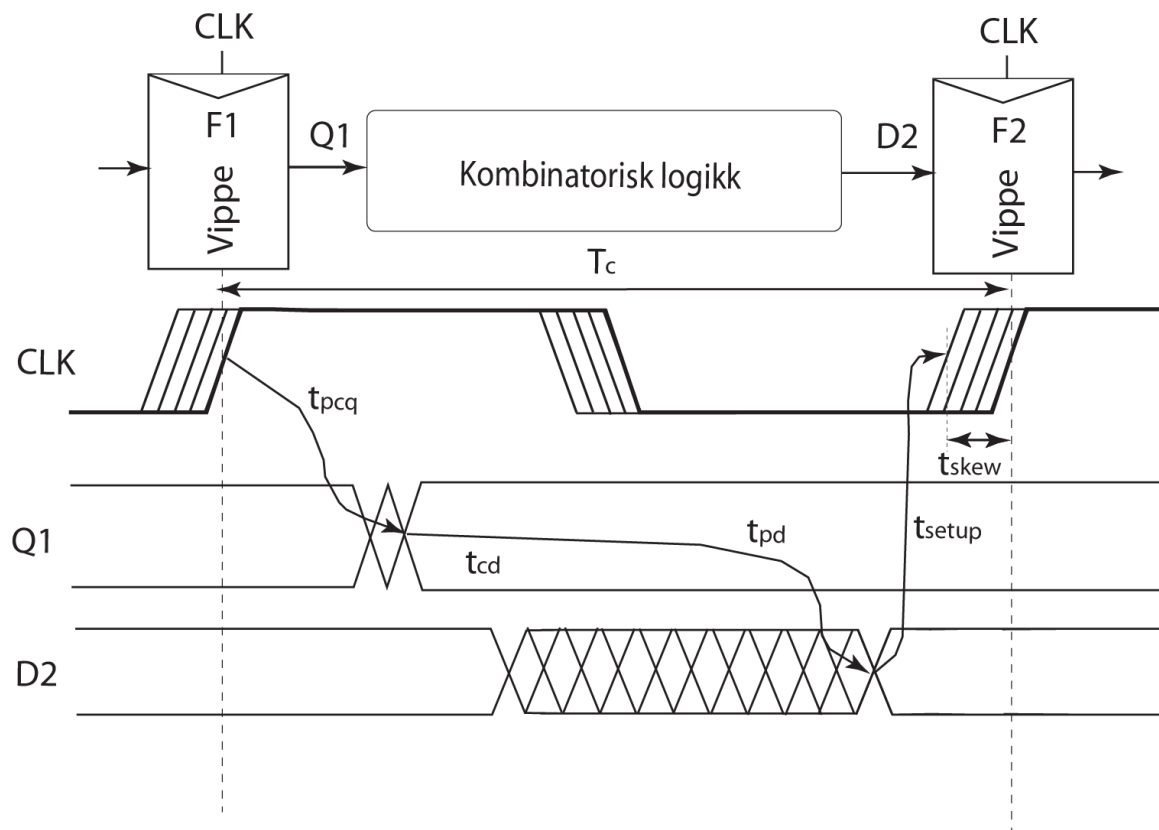
# Fordeling av tid mellom klokkefasene

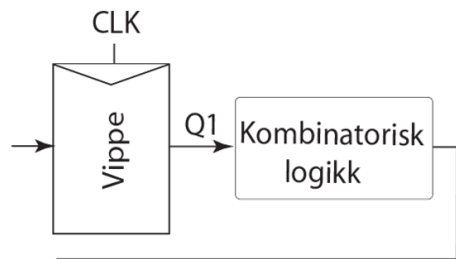




$$t_{lan} \leq \frac{T_c}{2} - (t_{setup} + t_{ikkeoverlapp})$$

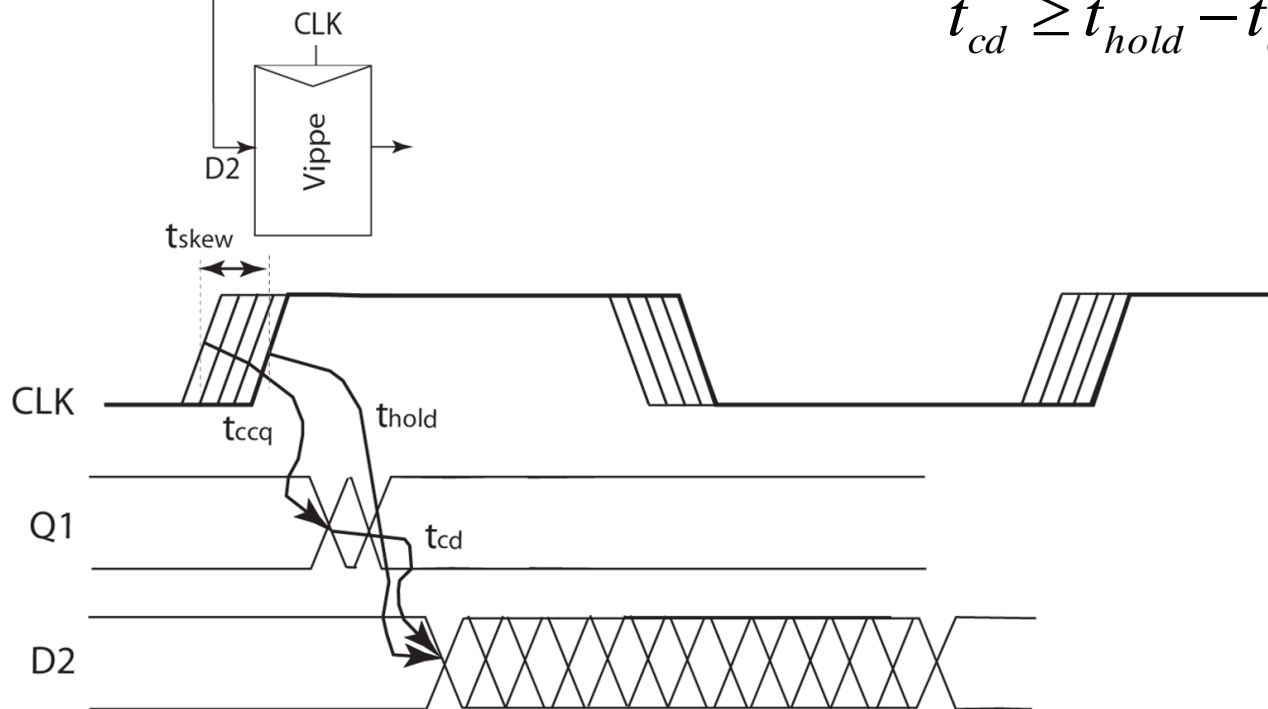
# Klokke skew

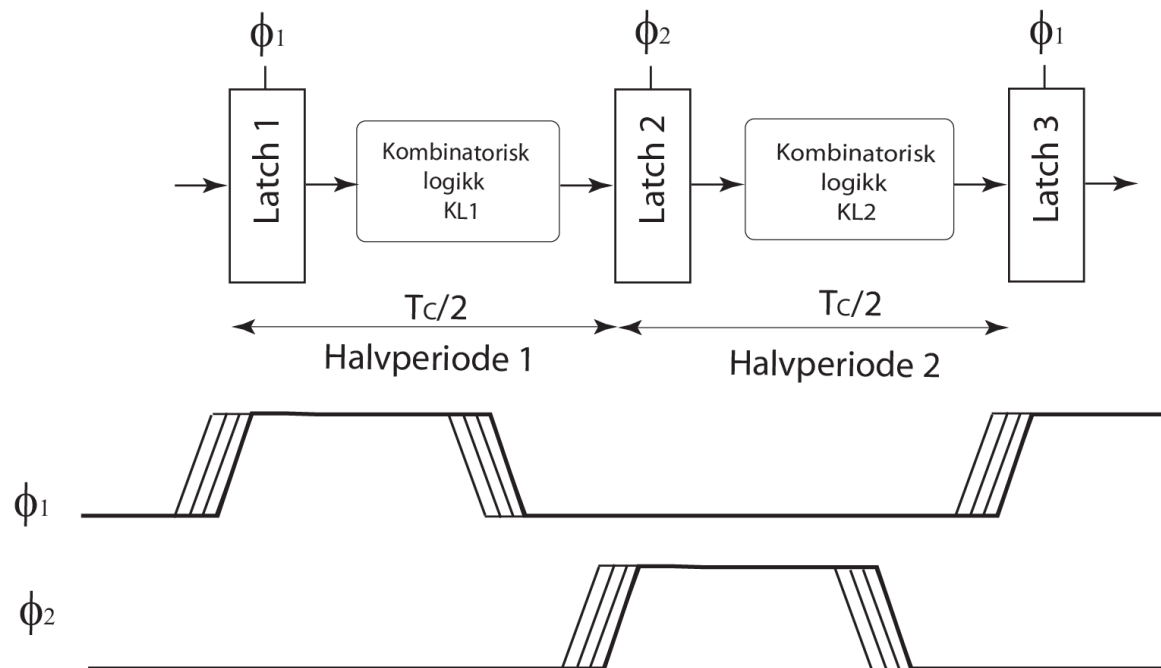




$$t_{pd} \leq T_C - (t_{pcq} + t_{setup} + t_{skew})$$

$$t_{cd} \geq t_{hold} - t_{ccq} + t_{skew}$$





$$t_{pd} \leq T_c - 2t_{pdq}$$

$$t_{cd1}, t_{cd2} \geq t_{hold} - t_{ccq} - t_{ikkeoverlapp} + t_{skew}$$