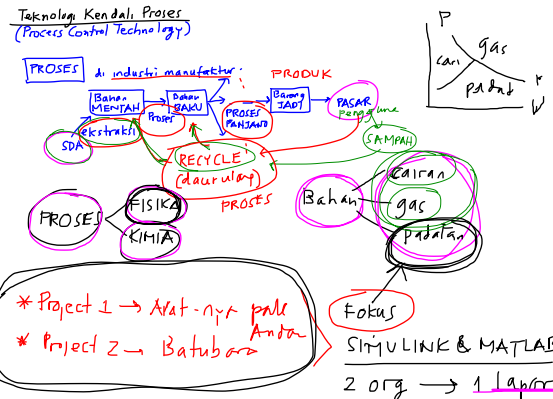
Teknologi Kendali Proses
(Process Control Technology)



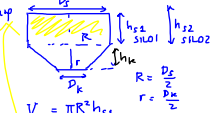
* Project 1 → Arah-nya pada Anda
* Project 2 → Batubara

Fokus

SIMULINK & MATLAB

2 org → 1 laporan.
Bab I Project 1
Bab II Project 2

penampang SILO

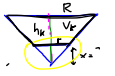


$R = \frac{D_s}{2}$

$r = \frac{D_k}{2}$

$V_{s1} = \pi R^2 h_{s1}$

V_k = Volume kerucut besar − Volume kerucut keul



$\frac{x}{h_k+x} = \frac{r}{R}$

$Rx = r(h_k+x)$

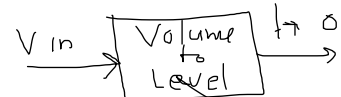
$(R-r)x = h_k r$

$x = \frac{h_k r}{(R-r)}$

Volume kerucut besar = $\frac{1}{3}(h_k+x).\pi R^2$

Volume kerucut keul = $\frac{1}{3} x.\pi r^2$

$V_k = \frac{1}{3}(h_k+x)\pi R^2 - \frac{1}{3} x \pi r^2$



$V_{in} > V_k$!

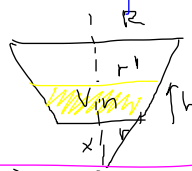
$h = h_k + y$

$V_s = y \cdot \pi \cdot R^2 = V_{in} - V_k$

$y = \frac{V_{in} - V_k}{\pi R^2}$

$h = h_k + \frac{V_{in} - V_k}{\pi R^2}$

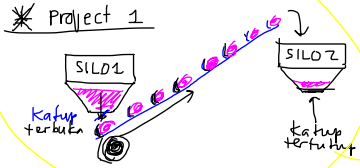
$V_{in} \leq V_k$



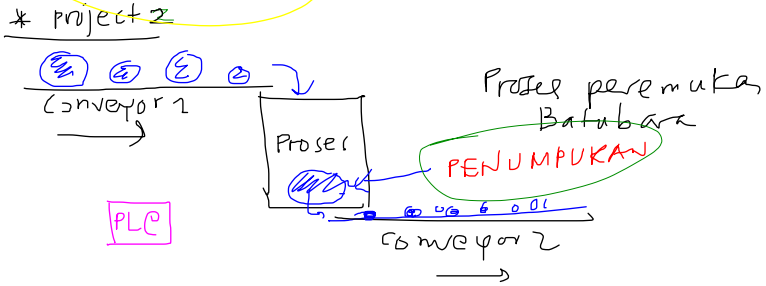
$\frac{h+x}{h_k+x} = \frac{r'}{R}$

$V_{in} = \frac{1}{3}(h+x)\pi r'^2 - \frac{1}{3} x \pi r^2$ → $h = \ldots ???$

* P.K : 1) Ukur R, r, h_k, h_{s1} dan h_{s2} → Pak Budi
2) Selesaikan persamaan $h = \ldots$ untuk $V_{in} \leq V_k$



Material di SILO1 dipindahkan ke SILO2 melalui konveyor



1) Hubungi Pak Budi

2) $\frac{(h+x)}{h_k+x} = \frac{r'}{R} \rightarrow r' = \frac{R(h+x)}{h_k+x}$

$V_{in} = \frac{1}{3}(h+x)\pi\left[\frac{R(h+x)}{h_k+x}\right]^2 - \frac{1}{3} x \pi r^2$

$3V_{in} + x\pi r^2 = \frac{\pi R^2}{(h_k+x)^2}(h+x)^3$

$(h+x)^3 = \frac{(h_k+x)^2(3V_{in} + x\pi r^2)}{\pi R^2}$

$h = \left[\frac{(h_k+x)^2(3V_{in} + x\pi r^2)}{\pi R^2}\right]^{1/3} - x$ **

check :

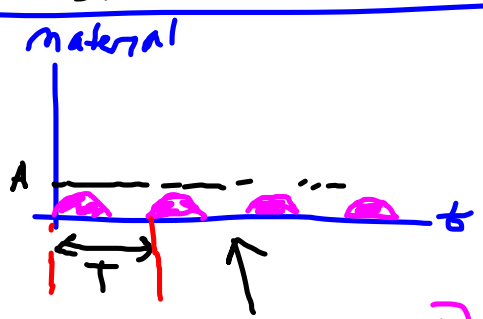
$V_{in} = V_k$

maka $h = h_k$

Hitung V_{max} SILO 1

$= V_{s1} + V_k$

* MODEL SIMULINK dan CONVEYOR

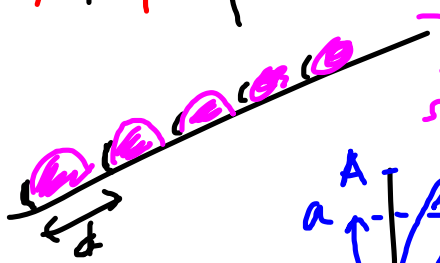


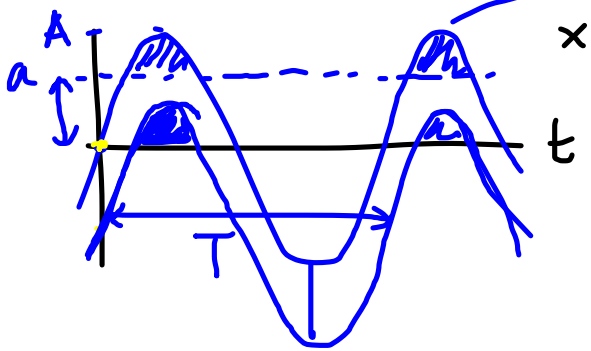
T = d, ω

d = jarak antar cawan

ω = kecepatan motor

A = bukaan katup silo1





$x'(t) = A \sin \omega t$

$x(t) = A \sin \omega t - a$

```
If x(t) ≤ 0
    y(t) = 0
else
    y(t) = x(t)
end
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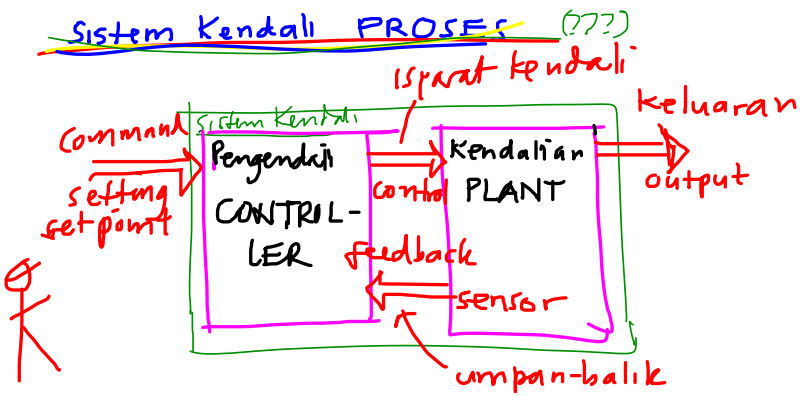
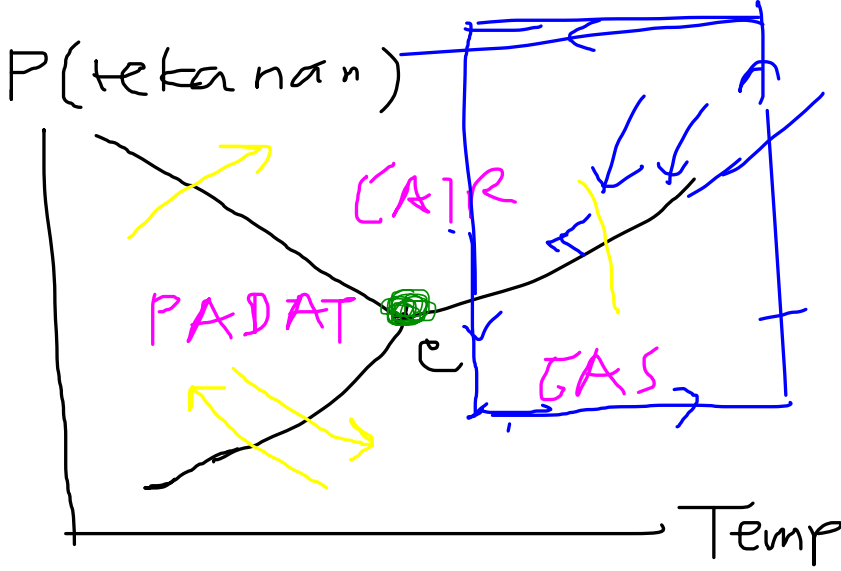




Sistem Kendali Process Sistem Kendali yang kendalianna berupa PROSES (Process Plant)

"Proses" = proses di INDUSTRI manufaktur (pabrik)

PROSES FISIKA

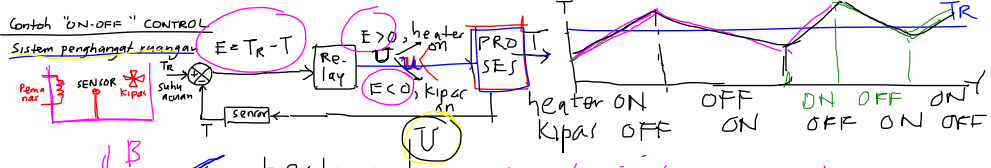
↳ tidak mengakibatkan terjadinya REAKSI KIMIA

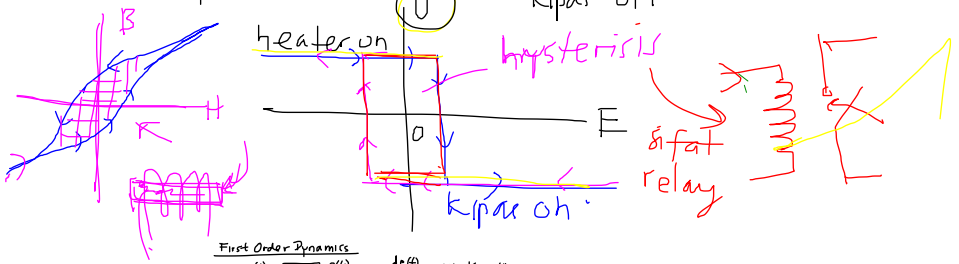
PROSES KIMIA

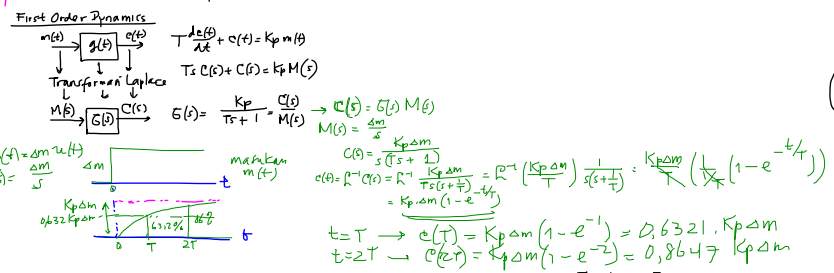
↳ melibatkan :
* zat / unsur berbeda
* proses fisika
* "katalis"

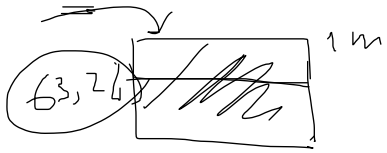
Contoh "ON-OFF" CONTROL

Sistem penghangat ruangan







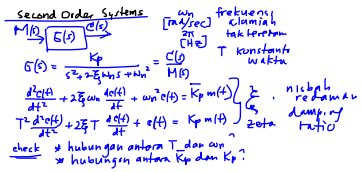


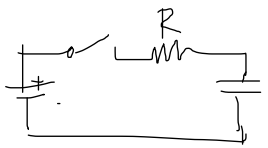
T = konstanta waktu (time constant)

[second] = [ohm]/[Henry] = [ohm][Farad]

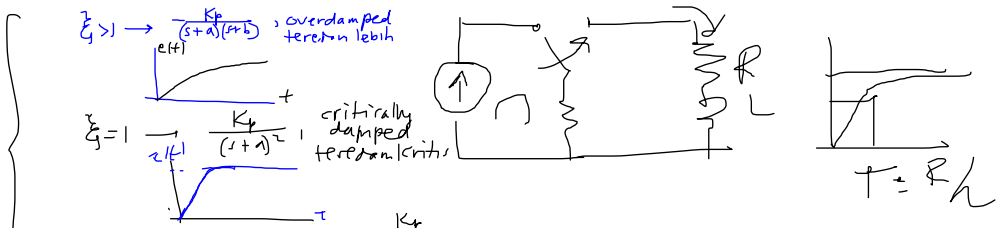
T : R/L atau RC

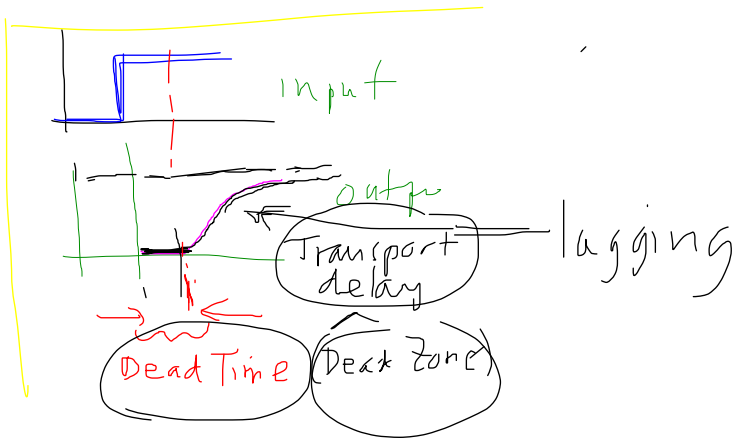
"lagging"



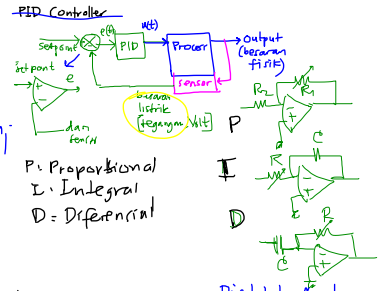


lagging

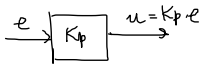




ANALOG



P



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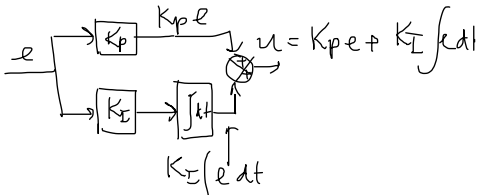

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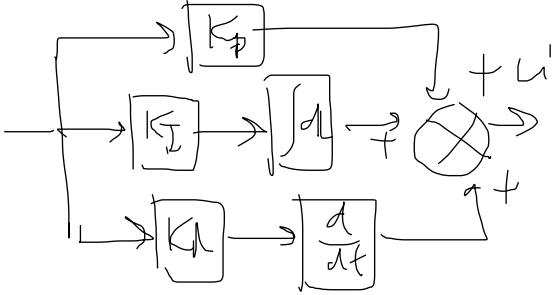
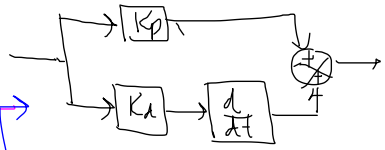


PD



DIGITAL