

FORMULÁRIO

Gestão de Stocks

EOQ

$$Q = \sqrt{\frac{2DS}{H}} ; N = D/Q ; ROP = d \times L$$

$$TC = \frac{Q}{2} \times H + \frac{D}{Q} \times S + P \times D$$

POQ

$$Q = \sqrt{\frac{2DS}{H(1 - \frac{d}{p})}}$$

$$TC = \frac{Q}{2} (1 - \frac{d}{p}) \times H + \frac{D}{Q} \times S + P \times D$$

$$t_p = t_1 = \frac{Q}{p}$$

$$T = \frac{Q}{D}$$

$$N = D/Q$$

$$I_{\max} = M = Q(1 - \frac{d}{p})$$

Modelos probabilísticos

$$SS = Z_{\alpha} \sigma_{dLT}$$

$$ROP = \mu_{LT} \times \mu_d + SS$$

$$ROP = LT \times \mu_d + SS$$

$$ROP = \mu_{LT} \times d + SS$$

$$\alpha = P(X > ROP) = \text{probabilidade de ruptura}$$

$$TC = \left(\frac{Q}{2} + SS\right) \times H + \frac{D}{Q} \times S + P \times D$$

$$\sigma_{dLT} = \sqrt{\mu_d^2 \times \sigma_{LT}^2 + \mu_{LT} \times \sigma_d^2}$$

$$\sigma_{dLT} = \sqrt{LT} \times \sigma_d$$

$$\sigma_{dLT} = \sqrt{d^2 \times \sigma_{LT}^2}$$

Gestão de projetos

$$EF = ES + \text{duração da actividade}$$

$$LS = LF - \text{duração da actividade}$$

$$\text{Folga} = LS - ES = LF - EF$$

$$\text{Duração esperada} = t = \frac{a + 4m + b}{6}$$

$$\text{Variância da duração} = \left[\frac{(b-a)}{6}\right]^2$$

$$\text{Custo de esmagamento por período de tempo} = \text{Crash cost per period} = \frac{CC - NC}{NT - CT}$$

Modelos de Filas de Espera

$$L_q = \lambda \times W_q ; L_s = \lambda \times W_s ; L_s = L_q + \lambda / \mu ; W_s = W_q + 1 / \mu$$

M/M/1

$$L_q = \frac{\lambda^2}{\mu(\mu - \lambda)} ; L_s = \frac{\lambda}{\mu - \lambda}$$

$$W_q = \frac{\lambda}{\mu(\mu - \lambda)} ;$$

$$\rho = \frac{\lambda}{\mu} ; P_0 = 1 - \rho \quad P_n = P_0 \times \left(\frac{\lambda}{\mu}\right)^n$$

$$W_s = \frac{1}{\mu - \lambda}$$

$$P(n > k) = \rho^{k+1}$$

M/M/S

$$P_0 = \frac{1}{\left[\sum_{n=0}^{S-1} \frac{1}{n!} \left(\frac{\lambda}{\mu}\right)^n \right] + \frac{(\lambda/\mu)^S}{S!} \times \frac{S\mu}{S\mu - \lambda}} (S\mu > \lambda) \quad L_q = \frac{\lambda \times \mu \times \left(\frac{\lambda}{\mu}\right)^S}{(S-1)!(S\mu - \lambda)^2} P_0 \quad \rho = \frac{\lambda}{S\mu}$$

$$P_n = \frac{\left(\frac{\lambda}{\mu}\right)^n}{n!} P_0 \quad (n \leq S)$$

$$P_n = \frac{\left(\frac{\lambda}{\mu}\right)^n}{S! S^{n-S}} P_0 \quad (n > S)$$

M/D/1

$$L_q = \frac{\lambda^2}{2\mu(\mu - \lambda)} ;$$

$$W_q = \frac{\lambda}{2\mu(\mu - \lambda)} ;$$

$$\rho = \frac{\lambda}{\mu} \quad P_0 = 1 - \rho$$

Sequenciamento

$$CR = \frac{\text{Data prometida} - \text{Data actual}}{\text{Número de dias de trabalho}}$$

$$\text{Tempo médio de conclusão} = \frac{\text{Soma Flow Time}}{\text{Número de trabalhos}}$$

$$\text{Utilização} = \frac{\text{Tempo total de trabalho}}{\text{Soma flow time}}$$

$$\text{Atraso médio} = \frac{\text{Tempo total em atraso}}{\text{Número de trabalhos}}$$

$$\text{Número médio de trabalhos no sistema} = \frac{\text{Soma flow time}}{\text{Tempo total de trabalho}}$$

Gestão da Capacidade e das Restrições

$$\text{Utilização da capacidade} = \frac{\text{Output atual}}{\text{Capacidade desenhada}}$$

$$\text{Eficiência} = \frac{\text{Output atual}}{\text{Capacidade efetiva}}$$

$$\text{Capacidade} = \frac{1}{\text{Tempo de ciclo}}$$

Controlo Estatístico do Processo

$LSC_{\bar{X}} = \bar{\bar{X}} + A_2 \times \bar{R}$ $LIC_{\bar{X}} = \bar{\bar{X}} - A_2 \times \bar{R}$ $LC_{\bar{X}} = \bar{\bar{X}}$ $LSC_R = D_4 \times \bar{R}$ $LIC_R = D_3 \times \bar{R}$ $LC_R = \bar{R}$ $C_{pk} = \min(C_{pki}; C_{pks})$ $C_p = \frac{LSE - LIE}{6 \times \sigma}$ $C_{pki} = \frac{\mu - LIE}{3 \times \sigma} \text{ e } C_{pks} = \frac{LSE - \mu}{3 \times \sigma}$	$LSC_c = \bar{c} + 3 \times \sqrt{\bar{c}}$ $LIC_c = \text{máx}(0; \bar{c} - 3 \times \sqrt{\bar{c}})$ $LC_c = \bar{c}$ $LSC_p = \bar{p} + 3 \times \sqrt{\frac{\bar{p}(1 - \bar{p})}{n}}$ $LIC_p = \text{máx}(0; \bar{p} - 3 \times \sqrt{\frac{\bar{p}(1 - \bar{p})}{n}})$ $LC_p = \bar{p}$
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The Normal Distribution

Cumulative Standard Table

$$P(Z \leq z) = \Phi(z)$$

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239	0.5279	0.5319	0.5359
0.1	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
0.2	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
0.3	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.6480	0.6517
0.4	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
0.5	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
0.6	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
0.7	0.7580	0.7611	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7852
0.8	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8078	0.8106	0.8133
0.9	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
1.0	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
1.1	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
1.2	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
1.3	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
1.4	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9279	0.9292	0.9306	0.9319
1.5	0.9332	0.9345	0.9357	0.9370	0.9382	0.9394	0.9406	0.9418	0.9429	0.9441
1.6	0.9452	0.9463	0.9474	0.9484	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
1.7	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
1.8	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706
1.9	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
2.0	0.9772	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817
2.1	0.9821	0.9826	0.9830	0.9834	0.9838	0.9842	0.9846	0.9850	0.9854	0.9857
2.2	0.9861	0.9864	0.9868	0.9871	0.9875	0.9878	0.9881	0.9884	0.9887	0.9890
2.3	0.9893	0.9896	0.9898	0.9901	0.9904	0.9906	0.9909	0.9911	0.9913	0.9916
2.4	0.9918	0.9920	0.9922	0.9925	0.9927	0.9929	0.9931	0.9932	0.9934	0.9936
2.5	0.9938	0.9940	0.9941	0.9943	0.9945	0.9946	0.9948	0.9949	0.9951	0.9952
2.6	0.9953	0.9955	0.9956	0.9957	0.9959	0.9960	0.9961	0.9962	0.9963	0.9964
2.7	0.9965	0.9966	0.9967	0.9968	0.9969	0.9970	0.9971	0.9972	0.9973	0.9974
2.8	0.9974	0.9975	0.9976	0.9977	0.9977	0.9978	0.9979	0.9979	0.9980	0.9981
2.9	0.9981	0.9982	0.9982	0.9983	0.9984	0.9984	0.9985	0.9985	0.9986	0.9986
3.0	0.9987	0.9987	0.9987	0.9988	0.9988	0.9989	0.9989	0.9989	0.9990	0.9990

α	0.400	0.300	0.200	0.100	0.050	0.025	0.020	0.010	0.005	0.001
Z_α	0.253	0.524	0.842	1.282	1.645	1.960	2.054	2.326	2.576	3.090
$Z_{\alpha/2}$	0.842	1.036	1.282	1.645	1.960	2.240	2.326	2.576	2.807	3.291

Constantes para as cartas de controlo

Dimensão da amostra n	A_2	d_2	D_3	D_4
2	1.881	1.128	0	3.267
3	1.023	1.693	0	2.574
4	0.729	2.059	0	2.282
5	0.577	2.326	0	2.114
6	0.483	2.534	0	2.004
7	0.419	2.704	0.076	1.924
8	0.373	2.847	0.136	1.864
9	0.337	2.97	0.184	1.816
10	0.308	3.078	0.223	1.777
11	0.285	3.173	0.256	1.744
12	0.266	3.258	0.283	1.717
13	0.249	3.336	0.307	1.693
14	0.235	3.407	0.328	1.672
15	0.223	3.472	0.347	1.653
16	0.212	3.532	0.363	1.637
17	0.203	3.588	0.378	1.622
18	0.194	3.64	0.391	1.608
19	0.187	3.689	0.403	1.597
20	0.18	3.735	0.415	1.585
21	0.173	3.778	0.425	1.575
22	0.167	3.819	0.434	1.566
23	0.162	3.858	0.443	1.557
24	0.157	3.895	0.451	1.548
25	0.153	3.931	0.459	1.541