Process Yield and Scrap Through Several Stages

Overall yield and the starts needed for a good-part quantity through up to three process stages with their scrap rates.

Method: Rolled throughput yield Y = Π(1 − s_i)

Input parameters

Unit system: SI

Parameter	Value	Unit
Good parts needed	1,000.0	
Scrap at stage 1	3.0000	%
Scrap at stage 2	5.0000	%
Scrap at stage 3	2.0000	%

Calculated results

Parameter	Value	Unit
Overall yield	90.307	%
Starts needed (rounded up)	1,108.0	
Starts minus good parts needed (scrap plus rounding surplus)	108.00	

Formula and method

$$Y = \prod_i (1 - s_i), \quad N_0 = \left\lceil \frac{Q}{Y} \right\rceil, \quad N_s = N_0 - Q$$

Variables

Q	Good parts needed	-
s_1	Scrap at stage 1	-
s_2	Scrap at stage 2	-
s_3	Scrap at stage 3	-
Y	Overall yield	-
N_0	Starts needed (rounded up)	-
N_s	Starts minus good parts needed (scrap plus rounding surplus)	-

Method and standards

Chained yields.

Assumptions and limits

- Independent stages; scrap rates are expected averages.
- N_s = N_0 − Q includes the surplus from rounding the starts up (good parts beyond Q), so it can exceed the expected scrap by up to one part per stage; stage-by-stage whole-part scrap may differ.

References

- Rolled throughput yield Y = Π(1 − s_i)

Report details

Report reference	FCC-37CR-110Y (the same inputs always give the same reference)
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Release checks	2 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/mechanical/manufacturing/scrap-yield

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.