

Capital Project NPV, IRR and Payback

How-to guide: what the workbook does, how to use it and what every number means.

mfgcalcs.com



Capital Project NPV, IRR and Payback

Turn a capital project's year-by-year spend and savings into NPV, IRR, payback and a sensitivity view, ready for a capital request.

For: Plant and operations managers, manufacturing and continuous-improvement engineers, and plant controllers preparing or reviewing capital requests.

Version 1.0.0 · updated 15 October 2026

Quick start

1. On Setup, type the project name, your currency, the discount (hurdle) rate, tax rate, depreciation period and maximum payback your company uses.
2. On Cash Flows, type one row per year from year 0: capital spend, labour, material and other savings, added operating cost, and any after-tax resale value in the last year.
3. Read the Check column: anything other than OK names the problem in words (a missing year, years out of order).
4. Open the Dashboard: NPV, IRR and payback against your rules, which estimate moves NPV most, and NPV at other discount rates and savings levels.

What is in the workbook

Start Here	Read this first: what the workbook does and how to use it.
Setup	Project name, currency, and the evaluation rules: discount rate, tax, depreciation, payback limit.
Cash Flows	One row per year from year 0: spend, savings and costs in; tax, net cash, present value and payback out.
Dashboard	NPV, IRR and payback against your rules, what moves NPV most, and NPV under other assumptions.
Method	How every number is calculated, with assumptions, limits and sources.
Verify	Self-check: the workbook's formulas recomputed on fixed inputs against an independent reference.

What each number means

Quantity	How it is calculated	Units
Total savings	Labour savings + material and scrap savings + other savings, per year.	currency
Depreciation	Capital spent in the previous N years / N, where N is the tax depreciation period (straight line, starting the year after each spend).	currency

Quantity	How it is calculated	Units
Tax effect	(Total savings - added operating cost - depreciation) x tax rate. Negative = tax saved that year.	currency
Net cash flow	Total savings - added operating cost - tax effect - capital spend + terminal value.	currency
Discount factor	$1 / (1 + \text{discount rate})^{\text{year}}$: end-of-year cash, year 0 undiscounted.	-
Present value and NPV	Present value = net cash flow x discount factor. NPV = the sum of all years' present values, year 0 included.	currency
Cumulative cash and PV	Sum of net cash flows (or present values) up to and including the year (SUMIFS on the Year column, so row order does not matter).	currency
IRR	The discount rate at which NPV = 0: Excel's IRR over the year block (years 0 to 15 in order). 'Not found' when the cash flows never change sign.	%
Payback	In the year cumulative cash first turns positive: (year - 1) + the share of that year's cash needed to recover the rest, as if cash arrives evenly. Discounted payback does the same with cumulative present value.	years
Profitability index	(NPV + present value of capital spend) / present value of capital spend. At least 1 when NPV is at least 0.	x
Break-even savings level	$1 - \text{NPV} / (\text{present value of total savings} \times (1 - \text{tax rate}))$: the share of the planned savings at which NPV falls to zero.	%
NPV swing	Each estimate's after-tax effect on NPV (its present value x (1 - tax rate) for savings and operating cost; capital spend less its depreciation tax saving; terminal value as typed) x the swing %. Ranked by size.	currency
Sensitivity table	NPV recomputed at five discount rates and four savings levels: sum of (net cash flow + (level - 1) x savings x (1 - tax rate)) / (1 + rate) ^{year} .	currency

Assumptions, limitations, sources and the self-check (the Verify sheet, which recomputes the workbook's formulas on fixed test inputs) are in the workbook. The last page shows the Dashboard with the example data for Kestrel Pressings, a fictional business.

Free from MFG Calcs - keep this credit when you share it.

Engineering estimates for planning and improvement work. Verify the results against your own process, data and standards before you rely on them.

Capital Project NPV, IRR and Payback

NPV, IRR and payback against your rules, what moves NPV most, and NPV under other assumptions.

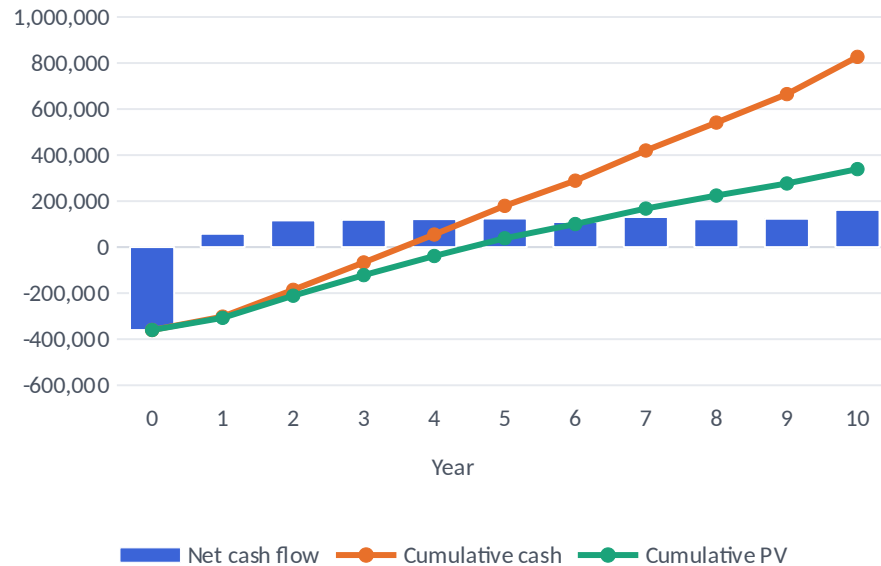
mfgcalcs.com

Robotic press tending, Line 3 (example) - Kestrel Pressings (example)

Discount rate 10% a year, tax 25%, 11 years of cash flow from year 0. Amounts in USD; year 0 is not discounted.

NET PRESENT VALUE (USD)	INTERNAL RATE OF RETURN	SIMPLE PAYBACK (YEARS)	DISCOUNTED PAYBACK (YEARS)
339,123	26.8%	3.5	4.5
Accept at or above 0	Hurdle 10.0%	Limit 3.0	Years until discounted cash turns positive
On target	On target	Above target	

Cash flow and cumulative cash by year



NPV swing: each estimate worse or better

