Automatic Lubrication Systems

ROI Calculation Guide

Cost modeling, worked ROI examples, payback drivers by industry, and a data-collection worksheet for your own calculation.

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Automatic Lubrication Systems: An ROI Calculation Guide for Maintenance and Reliability Engineers

About This Guide

This guide explains how to build a defensible return-on-investment (ROI) case for an automatic lubrication system (ALS), whether you are evaluating a single mobile machine or an entire production line. It is written for maintenance managers, reliability engineers, and plant engineers who need to justify capital requests with numbers their finance team will accept.

The guide does three things. First, it identifies where manual lubrication actually costs money — not just the grease and the labor, but the failures, the downtime, and the safety exposure that rarely appear in a maintenance budget. Second, it gives you a general ROI formula and works through two fully transparent examples so you can see every assumption. Third, it provides a data-collection worksheet so you can replace our assumptions with your own plant data before you ask anyone for a budget.

Where industry figures are cited, the source is named in the text and listed in the References section. The two worked examples are **illustrative examples**, built from published industry data and clearly stated assumptions. They are not customer case studies and do not describe any specific installation.

About IsoHiTech

IsoHiTech is the trade name of Nanjing Emitech Technology Co., Ltd., a manufacturer of centralized lubrication systems founded in 1999 and based in Nanjing, China. The company designs and builds grease and oil pumps, progressive distributor blocks (the DJF1000, DJF2000, DJF2500, and DJF3000 series), PDI injectors, dual-line metering valves (ZVB and VSG series), and the fittings and monitoring accessories that connect them. Typical operating ranges across the product families include progressive blocks rated from 16 MPa (DJF1000) to 25 MPa (DJF2000/2500/3000) with metered deliveries from 0.08 to 4.8 ml per cycle, and dual-line valves rated to 40 MPa (400 bar) with adjustable discharge volumes. Systems serve mining, steel, cement, port machinery, and mobile equipment applications worldwide.

1. The Hidden Cost of Manual Lubrication

Manual lubrication looks cheap because its cost is fragmented: a technician's hour here, a grease cartridge there, a bearing replacement that gets booked to "mechanical failure" rather than to the lubrication program that could have prevented it. When you aggregate those fragments, manual lubrication is usually one of the most expensive maintenance activities per dollar of visible spend.

The time cost is larger than it appears

How long does it take to grease one point by hand? Graco's published ROI methodology cites a study by a major oil company estimating **3 minutes per grease point** as the average, once you include locating and cleaning the fitting, connecting the gun, dispensing, disconnecting, and cleaning up — and on mobile equipment, frequently climbing to reach the point. On a 20-point machine that is one hour per greasing round, every round, every day the machine operates. On a 100-point line it is five hours per round.

Missed and wrong lubrication drives failures

The bearing industry's own failure analysis is blunt about this. SKF states that **poor lubrication accounts for over 36% of premature bearing failures**, and that when contamination is included — which manual greasing frequently introduces through dirty fittings and gun nozzles — the combined share rises well above 50%. Manual lubrication fails in both directions: points get skipped entirely (greasing while the machine is down, in bad weather, or during a staffing gap), and points that do get greased get the wrong amount, because a grease gun delivers whatever number of strokes the technician happens to give it.

The downtime multiplier

The reason a small lubrication failure becomes a large financial event is the cost of the downtime it triggers. Aberdeen Research has estimated the average cost of unplanned downtime across manufacturing sectors at approximately **$260,000 per hour**. Your own number will be lower or higher — and Section 6 shows you how to find it — but even a modest production line earning $1,000 per hour of contribution makes a single eight-hour, lubrication-related stoppage a five-figure event.

Safety exposure

Manual lubrication sends technicians to elevated, confined, and moving-equipment-adjacent locations on a fixed schedule — exactly the exposure pattern that safety statistics flag. EU-OSHA data indicate that roughly **10–15% of fatal occupational accidents in Europe are related to maintenance operations**, and that in some member states around 15–20% of all workplace accidents are maintenance-related. Every greasing round eliminated is exposure removed from that denominator.

2. The Five Cost Components

A complete ROI model for automatic lubrication compares the installed cost of the ALS against five avoidable cost streams. Each has a simple modeling rule.

Cost component	What it includes	Modeling rule
Labor	Loaded wages of technicians performing manual greasing rounds	Points x time per point x frequency x labor rate
Bearing and component failure	Replacement bearings, seals, shafts, pins, bushings; rebuild labor	Historical annual spend x lubrication-attributable share x expected reduction
Unplanned downtime	Lost production contribution during lubrication-related stoppages; also machine unavailability during manual greasing	Downtime hours x value per hour x expected reduction
Lubricant waste	Over-application, purged grease, contaminated product, disposal	(Manual consumption − metered consumption) x unit price
Safety	Incident cost exposure from access-based greasing (falls, contact with machinery)	Exposure-hours eliminated x incident rate x average incident cost (often modeled qualitatively)

Three modeling notes matter for credibility:

- **Use your own attribution.** Do not claim that 36% of your bearing failures are lubrication-related because SKF says so globally. Pull your own work orders, tag failure causes honestly, and use your own percentage. It is usually high enough.
- **Discount the reduction, not just the cost.** An ALS does not eliminate 100% of lubrication-related failures. A defensible model assumes a 50–80% reduction and states the assumption.
- **Treat safety conservatively.** Most finance teams will not accept a monetized safety benefit in an ROI calculation. Present safety as a parallel qualitative benefit and let the four hard cost streams carry the payback case.

3. The ROI Formula and Two Worked Examples

The general formula, following the structure published by Graco and standard capital-budgeting practice, is:

Payback period (months) = 12 x Installed ALS cost / Annual avoidable cost

Annual avoidable cost = Labor savings + Failure/downtime savings + Lubricant savings (+ safety benefit, if monetized)

ROI over a horizon of N years is then:

ROI (%) = 100 x (Annual avoidable cost x N − Installed cost) / Installed cost

Example A — A 20-point mobile machine (illustrative example)

This is an illustrative example, not a customer case study. Assumptions follow the structure of the published Graco excavator calculation, using the literature value of 3 minutes per point and US-style rates.

Parameter	Value	Basis
Lubrication points	20	Typical 20-tonne-class excavator / wheel loader
Time per point	3 min	Major oil company study, cited by Graco

Parameter	Value	Basis
Greasing frequency	Daily	OEM service interval for this machine class
Operating days per year	220	Assumption
Annual greasing hours	220 h	20 x 3 min x 220 days
Machine value lost while greasing	$56/h	Rental-rate equivalent (Graco method)
Loaded labor rate	$25/h	Assumption
Annual manual lubrication cost	$17,820	220 h x ($56 + $25)
Installed ALS budget	$8,000	Indicative installed budget for a progressive system (pump + DJF-series blocks + lines); not a quotation
Payback period	≈ 5.4 months	12 x 8,000 / 17,820
3-year ROI	≈ 568%	100 x (17,820 x 3 − 8,000) / 8,000

Note what this example deliberately excludes: any bearing-failure avoidance, any unplanned-downtime savings, any grease savings, and any safety benefit. On mobile equipment, manual greasing normally happens with the machine stopped, so the machine-unavailability term alone (the rental-rate equivalent) plus labor already repays the system in under six months. Graco's own published example for the same machine class arrives at a comparable figure — roughly nine months using 1 minute per point — which confirms the order of magnitude.

Example B — A 100-point production line (illustrative example)

This is an illustrative example, not a customer case study. The setting is a process line (steel, cement, or similar) where most points can be greased while running, so the dominant savings stream is failure and downtime avoidance rather than labor.

Cost stream	Assumption	Annual value
Labor	100 points x 3 min = 5 h per weekly round; 50 rounds/yr; loaded rate $45/h	$11,250
Unplanned downtime	Baseline: 12 h/yr of lubrication-attributed stoppages at $5,000/h contribution; ALS assumed to eliminate 60%	$36,000
Bearing/component spend	Historical lubrication-attributable replacement spend, 60% reduction	$15,000
Grease waste	Over-application reduced by 500 kg/yr at $6/kg	$3,000
Total annual avoidable cost		$65,250
Installed ALS budget	Indicative installed budget for a dual-line system (pump station + ZVB/VSG metering valves + main and branch lines); not a quotation	$32,000
Payback period	12 x 32,000 / 65,250	≈ 5.9 months
3-year ROI	100 x (65,250 x 3 − 32,000) / 32,000	≈ 511%

The two examples make the same structural point from opposite ends: on mobile equipment the payback is driven by the machine-time you stop wasting; on process lines it is driven by the failures you stop having. In both cases the labor line alone rarely justifies the investment — and rarely needs to.

4. Payback Drivers by Industry

The five cost components exist everywhere, but their weight shifts sharply by industry. Aim your data collection at the component that dominates your sector.

Mining

The dominant driver is **unplanned downtime on high-value assets** — shovels, draglines, crushers, conveyors. A single down hour on a primary crusher stalls the entire circuit behind it. Dust and contamination make manual greasing quality erratic, so the failure-avoidance stream is also large. Dual-line systems (ZVB/VSG class valves, rated to 40 MPa) dominate here because a blocked point does not stop lubrication to the remaining points, and line lengths of 100 m or more are routine.

Steel

The dominant driver is **bearing and component spend in hot, wet, contaminated zones** — caster segments, rolling mill chocks, runout tables. Heat degrades grease fast, so small, frequent, metered doses from an ALS outperform large, infrequent manual doses on both lubricant condition and bearing life. Downtime value per hour is high but stoppages are rarer than in mining; the recurring component spend is the steadier number to model.

Cement

The dominant driver is a split between **downtime on bottleneck equipment** (mills, kilns, crushers) and **labor and access cost**. Cement plants are dusty and spread out; greasing rounds are long, and many points are at height or near rotating equipment, which is also where the safety benefit concentrates. Progressive systems (DJF2500/3000 class blocks at 25 MPa, with cycle-monitoring pins or switches) are common on these distributed point counts.

Mobile equipment (construction, ports, agriculture)

The dominant driver is **machine availability**: every manual greasing round is machine time lost, and the machine is often serviced wherever it sits, in whatever conditions. Example A above is the template. Fleet operators should multiply the single-machine result by fleet size — the ALS cost scales linearly, but so does the saving.

5. Sensitivity: What Moves Payback Most

Using the Example B structure and flexing one variable at a time shows where your estimate is fragile:

Variable flexed	Change	Effect on payback (base ≈ 5.9 months)
Downtime value per hour	$5,000/h → $2,500/h	Payback stretches to ≈ 8.1 months
Downtime reduction achieved	60% → 40%	Payback stretches to ≈ 7.2 months
Time per point	3 min → 2 min	Payback stretches to ≈ 6.2 months
Loaded labor rate	$45/h → $30/h	Payback stretches to ≈ 6.2 months
Installed cost	$32,000 → $45,000	Payback stretches to ≈ 8.3 months
Grease savings	Removed entirely	Payback stretches to ≈ 6.2 months

The ranking is consistent across both examples and matches industry experience:

1. **Downtime value per hour** is the single most powerful variable on process lines. Get this number from finance, not from a benchmark report.
2. **Assumed failure/downtime reduction** is the second. This is why the conservative 50–80% band matters — over-claiming here is the fastest way to lose credibility with a finance reviewer.
3. **Total greasing hours** (points x frequency x time per point) dominates mobile-equipment cases.
4. **Labor rate and lubricant price** move the result least. They are worth measuring but not worth agonizing over.

A robust business case is one that still pays back in under 18 months with every assumption set to its pessimistic end. If your case only works at optimistic values, fix the data before you submit it.

6. Data You Need for Your Own Calculation

Replace every assumption in Section 3 with your own figures using this worksheet.

Data item	Where to find it	Typical range
Lubrication point count per asset	OEM lubrication chart; physical walkdown	10–40 mobile; 50–600 process line
Time per point	Timed observation of one real greasing round	1–3 min (3 min is the published literature average)
Greasing frequency	OEM service manual, adjusted for environment	Daily to monthly

Data item	Where to find it	Typical range
Operating days/hours per year	Production or fleet records	200–350 days
Loaded labor rate	Payroll/HR (wage + benefits + overhead)	$25–60/h
Machine downtime value	Finance: lost contribution per hour; rental rate as proxy for mobile equipment	$50–10,000+/h
Lubrication-attributed downtime hours	CMMS work orders, 2–3 years, honestly tagged	5–50 h/yr per line
Lubrication-attributed bearing/component spend	Maintenance purchase and rebuild records	Site-specific; often $10,000–$100,000/yr on process lines
Grease consumption and unit price	Purchasing records	$4–12/kg depending on grade
Safety exposure	EHS records: greasing-related access tasks and near-misses	Qualitative in most ROI cases
Installed ALS cost	Vendor quotation, including installation labor and commissioning	Asset-specific; request a formal quote

Two collection tips: time an actual greasing round rather than estimating it (technicians consistently underestimate access and travel time), and have someone other than the lubrication advocate tag the failure causes in the CMMS pull — it removes the appearance of motivated attribution.

7. References

- SKF, "SKF Lubricants" — poor lubrication accounts for over 36% of premature bearing failures; higher with contamination included. https://cdn.skfmediahub.skf.com/api/public/0901d196802103bc/pdf_preview_medium/0901d196802103bc_pdf_preview_medium.pdf
- Aberdeen Research downtime benchmark, as reported by MachineMetrics, "The Real Cost of Downtime in Manufacturing" — average unplanned downtime cost ≈ $260,000/hour. https://www.machinemetrics.com/blog/the-real-cost-of-downtime-in-manufacturing
- Graco Inc., "What's the return on investment (ROI) of an automatic lubrication system?" — ROI formula structure; 3 minutes per grease point (major oil company study); excavator worked example. https://www.graco.com/gb/en/vehicle-service/solutions/articles/whats-the-return-on-investment-of-an-automatic-lubrication-system.html
- EU-OSHA, "Maintenance and Occupational Safety and Health: A statistical picture" — ≈10–15% of fatal occupational accidents related to maintenance; country data on maintenance-related accident shares. https://osha.europa.eu/sites/default/files/maintenance_OSH_statistics.pdf
- Machinery Lubrication (Noria), "Automated Lubrication — Benefits and Design Options." https://www.machinerylubrication.com/Read/175/automated-lubrication
- IsoHiTech product specifications used in this guide: DJF2500 progressive block (25 MPa, 0.08–1.28 ml/cyc), ZVB dual-line valve (40 MPa), VSG dual-line metering block (40 MPa, 1–8 outlets).

8. Put Your Own Numbers In

The formulas in this guide are only as good as the data you feed them. If you would like help turning your worksheet into a quotation and a payback estimate for your specific point counts, line lengths, and lubricants, our engineering team can review your data and propose a system configuration.

- **Request a quotation and system proposal:** https://isohitech.com/contact-for-a-quote/
- **Size the lubricant requirements for your bearings first:** https://isohitech.com/bearing-lubrication-calculator/

All worked examples in this guide are illustrative examples based on published industry data and stated assumptions. They are not customer case studies, and actual results depend on your equipment, operating schedule, and baseline lubrication practice.