Breaking the Cycle

It never settles, your solids control was never built to catch it, and it is cutting your equipment every hour it circulates. Here is what removing it is worth.

A 2 micron steel particle needs 48.3 days to fall two metres through still drilling mud. A 400 barrel active system turns over every 28 minutes. It would have to survive roughly 2,500 complete turnovers before it could reach the bottom. It never gets the chance. It is not settling slowly; on any operational timescale it is not settling at all.

How long a particle takes to fall two metres

SIZE	SETTLING TIME	SURVIVES SOLIDS CONTROL
100 µm	27.8 min	0.0%
40 µm	2.9 h	1.2%
4 µm	12.1 days	68.6%
2 µm	48.3 days	98.0%
0.5 µm	2.11 yr	98.0%

Conventional solids control removes 98% of the metallic wear by mass and leaves 2%. That remainder is overwhelmingly the fine fraction, ferrous and non-ferrous, and it is what destroys pumps, motors and downhole tools.

STAGE 3

Single pass versus kidney loop

A ditch magnet sees the fluid once. The coarse swarf sticks and the fines carry on. A high-gradient unit runs as a continuous recirculating slip-stream: it captures 97% of the ferrous debris in the fluid that passes through it, and the active system passes through it again and again all shift.

97% captured per pass, ferrous and entrained non-ferrous down to and below 0.5 micron

How fast the tank comes clean

A different question to capture per pass, and it depends on how much of the system goes through the loop. On a deliberately conservative 15% slip-stream:

HOURS	2 um CLEARED	0.5 um CLEARED
2 h	11%	4%
4 h	21%	7%
8 h	38%	14%
12 h	51%	21%
24 h	76%	37%

On a 2 micron steel particle a high-gradient field pulls about 26,256 times harder than gravity. Gravity moves it 0.48 microns per second; the field moves it 12,600. Magnetic force scales with particle volume, so it does fall away for the very finest debris, which is exactly why high gradient and many passes both matter. Field strength alone is not the answer.

STAGE 3

What it is worth

Representative figures per rig per year. The indicative total already contains the NPT, consumable, fluid and asset-life lines: NPT value is a contributor to it, never an addition on top of it.

MEASURE	LAND RIG	OFFSHORE RIG
Cost of one non-productive day	$25,000 - $180,000	$200,000 - $1,000,000+
NPT avoided, 1 to 3 days/yr	$25k - $540k	$200k - $3.0M
Manual cleaning labour freed	~6-8 crew-hrs/day	~6-8 crew-hrs/day
Mud dilution reduction	40% - 60%	40% - 60%
Waste disposal	$50 - $150 /bbl	$200 - $500 /bbl
Indicative total benefit per rig per year	**~$114,000 - $268,000**	**~$0.93M - $2.29M**

It also removes roughly 48 manual interventions per day at the flowline, about 17,500 a year, each one a hands-on handling of ferrous debris near rotating and flowing equipment. Vendor field data shows 30%+ NPT reduction and about 52% longer component life.

The next step

A 20 minute review of your active system arrangement and wear history. We will tell you whether the fine fraction is likely to be costing you anything before anyone talks about equipment.

Day rates, labour and disposal costs vary widely by region, rig class and contract.
Performance figures are vendor field and demonstration data, to be confirmed by field data.
Modelled on a 15% slip-stream, 400 bbl active system, 2.14 turnovers per hour.
Wear-debris size distribution taken as d^-1.73.