Shovel, Excavator and Loader Production per Hour

Hourly production in bank cubic metres and tonnes from bucket size, fill factor, swell factor, cycle time, availability, utilisation and propel time.

Input parameters

Unit system: SI

Parameter	Value	Unit
Bucket or dipper heaped capacity (loose)	40.000	m³
Bucket fill factor	85.000	%
Swell factor (bank per loose)	0.67000	
Load cycle time	30.000	s
Availability	85.000	%
Utilisation	80.000	%
Propel time factor (1 for loaders)	85.000	%
Bank density	2,650.0	kg/m³

Calculated results

Parameter	Value	Unit
Operating efficiency	68.000	%
Production	1,580.0	m³/h
Production by mass	4,187.1	t/h
Bank volume per pass	22.780	m³

Notes for this case

• Correct the cycle time for digging depth and swing angle before entering it. Propel time is 0.75 for strip mines, 0.85 open pits, 0.90 sand and gravel and 0.95 high-face quarries (Atkinson).

Formula and method

$$P_l = \frac{3600\, C_b\, SF\, E\, FF\, PT}{T_{cl}}, \quad E = A \times U$$

Variables

C_b	Bucket or dipper heaped capacity (loose)	m³
FF	Bucket fill factor	-
SF	Swell factor (bank per loose)	-
T_{cl}	Load cycle time	s
A	Availability	-
U	Utilisation	-
PT	Propel time factor (1 for loaders)	-
BD	Bank density	kg/m³
E	Operating efficiency	-
P_l	Production	m³/s
P_t	Production by mass	kg/s
V_{pass}	Bank volume per pass	m³

Method and standards

Loading production equation.

Assumptions and limits

- Average conditions; truck exchange delays are separate.

Report details

Report reference	FCC-NEN6-AH4B (the same inputs always give the same reference)
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Calculator	Shovel, Excavator and Loader Production per Hour
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Release checks	3 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/civil/mine-design/shovel-loader-production

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.