Poclain

MACHINE APPLICATIONS 2

MINES AND OPEN - PITS

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FURTHER DETAILS AVAILABLE ON REQUEST

Whenever such logos and letters appear in front of a site description

F :
Super 8 or 16 mm film

J.R. :
Job reference

I.P. :
Inter Poclain Magazine

Ask your dealer, or contact:
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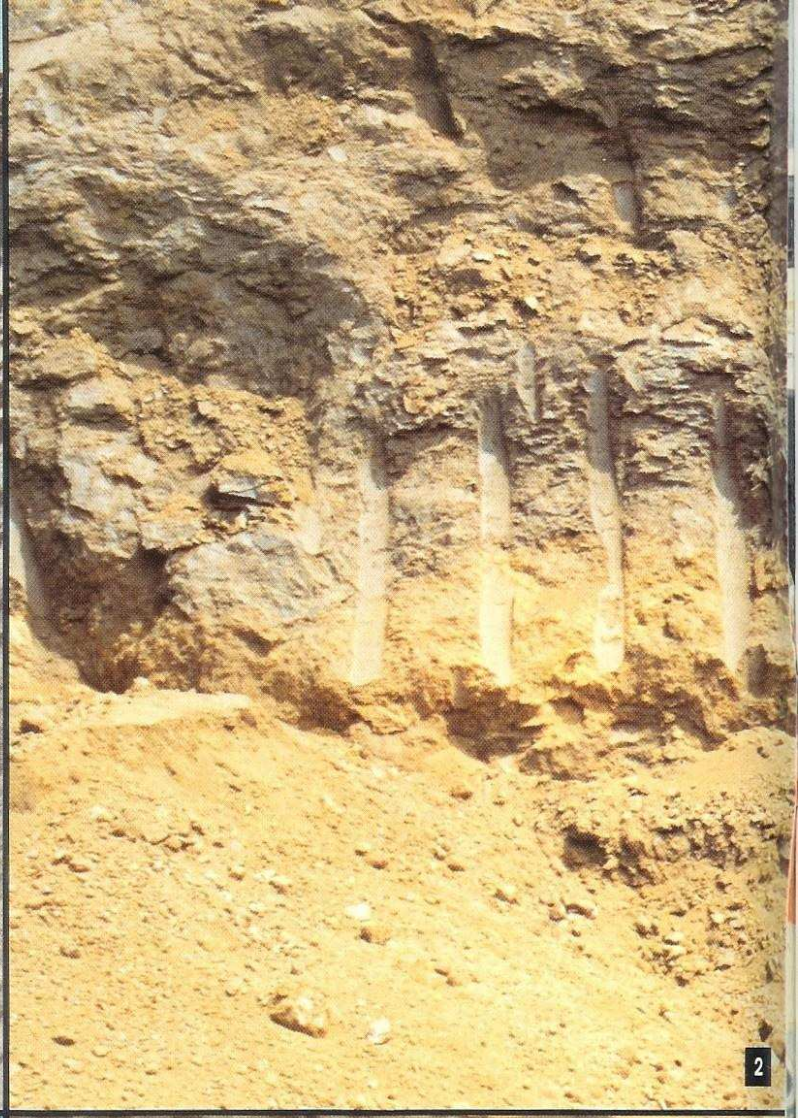
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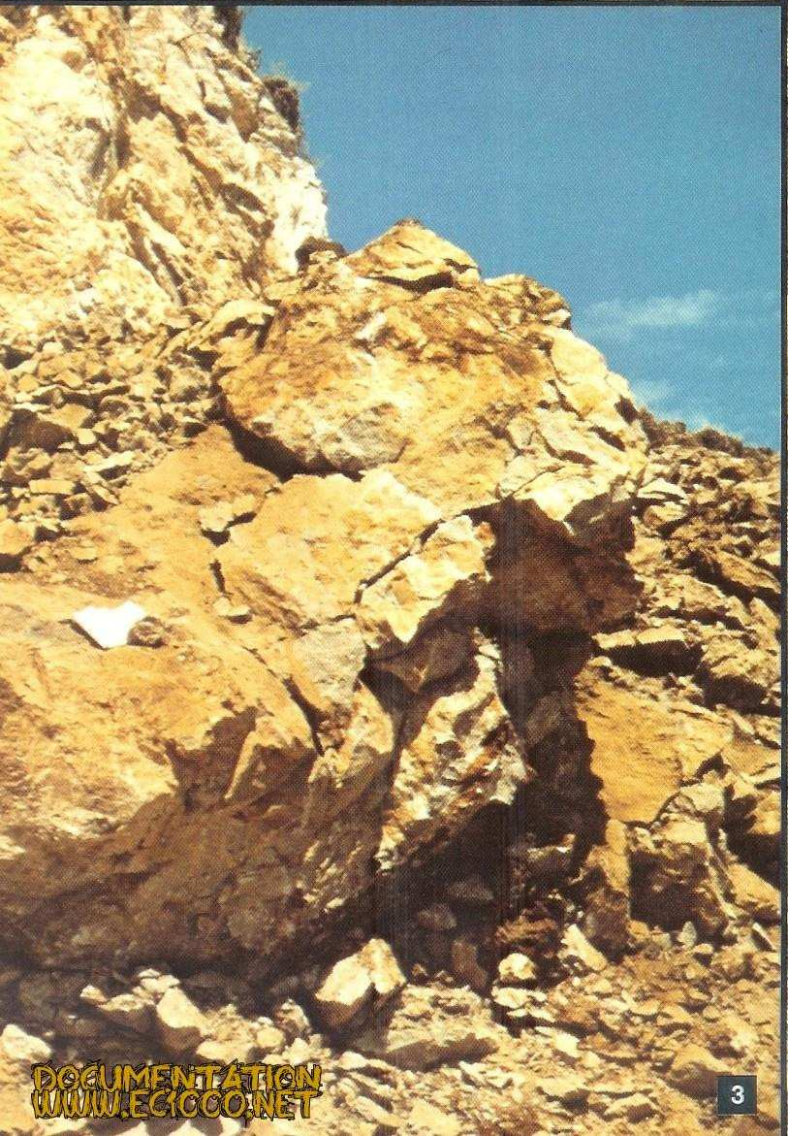
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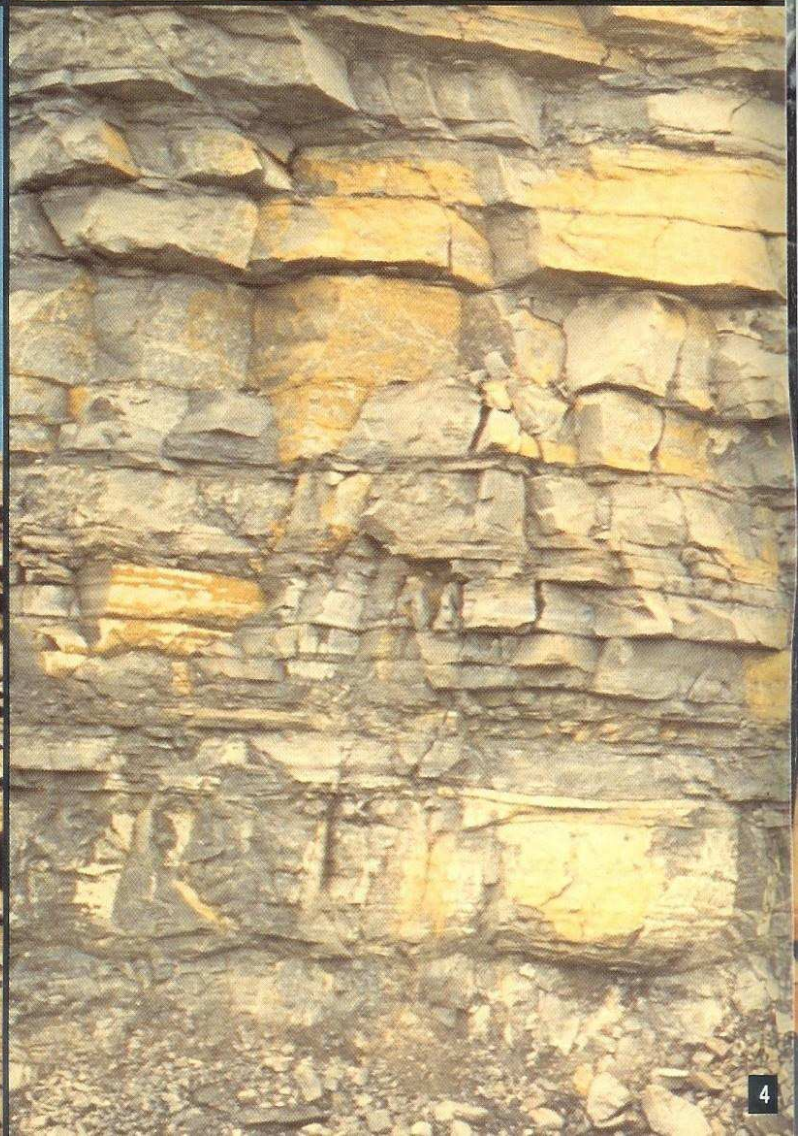
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"DIG'ABILITY" OF MATERIAL

Machine performances always depend on the type and configuration of terrain involved. To calculate production rates, POCLAIN geologists classify material to be excavated into 4 categories:

CLASS 1

Non-compacted and crumbling material as sand, gravel and slightly compacted crushed rocks. no. 1

CLASS 2, EASY DIGS

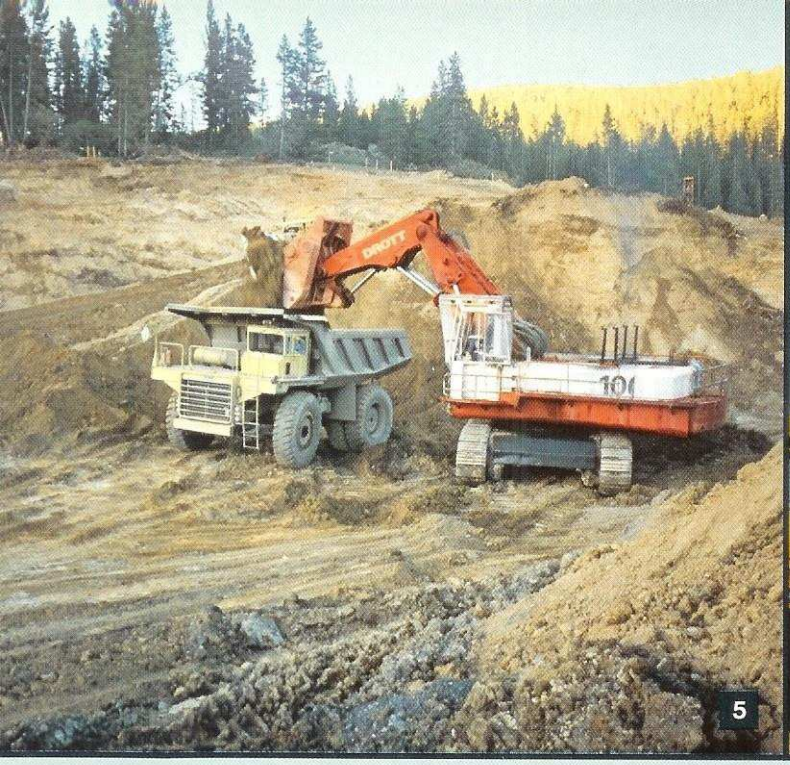
Cohesive and compact material: silt, sand, clay, friable rocks as chalk, marl, soft limestone (unblasted). no. 2

CLASS 3, HARD DIGS

Blasted rocks: finely blasted (20/30 cm blocks), well blasted blocks (<50 cm), hard sedimentary rocks with loosening-up blasting. no. 3

CLASS 4, VERY HARD DIGS

Material in strata: rock in thin horizontal strata, weathered shale, poorly blasted rocks with boulder imbrication. no. 4



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OVERBURDEN REMOVAL

TOPSOIL

TOPSOIL REMOVAL IN A URANIUM MINE

A 1000 ck removing a crest of sandy clay.
Direct digging, unloading in 50 t dumpers.
Machine with bottom-dump bucket for fast unloading of the material which becomes sticky in rainy weather.

no. 5

TOPSOIL REMOVAL IN A COAL MINE

400 CK directly digging and loading a mixture of clay and topsoil into 35 t dumpers.
The backhoe attachment ensures very high production due to a reduced swing angle (less than 30°) and a limited movement of the attachment.
Perfect visibility of the loading area.

no. 6

TOPSOIL REMOVAL IN A COAL MINE

300 CK digging in weathered shale.
Short backhoe dipperstick for a higher penetration force allowing direct digging.
Long boom for maximum outreach without moving the machine, which means cost reduction.
Fast unloading in 25 t semi-trailers by sheer dipper movement without raising the boom.

no. 7

OVERBURDEN REMOVAL IN A COAL MINE

600 CK removing the overburden over a narrow coal seam.
Loader attachment with 5.5 m^3 bottom-dump bucket.
Even, layer-by-layer extraction of a very cohesive material with limited swell (density in the bucket nearly identical to bank density).
During the dig, the machine does not move, which avoids ploughing up the haul unit access area.

no. 8


9


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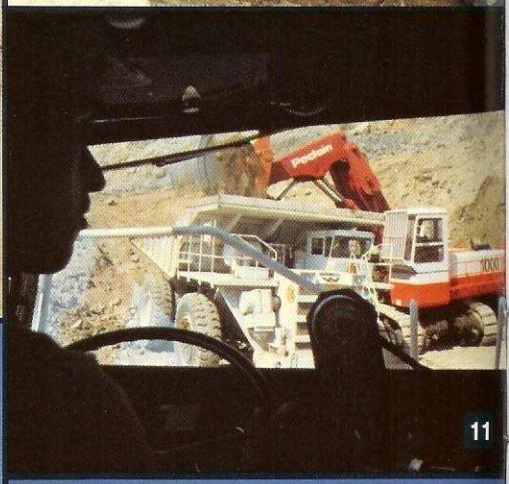
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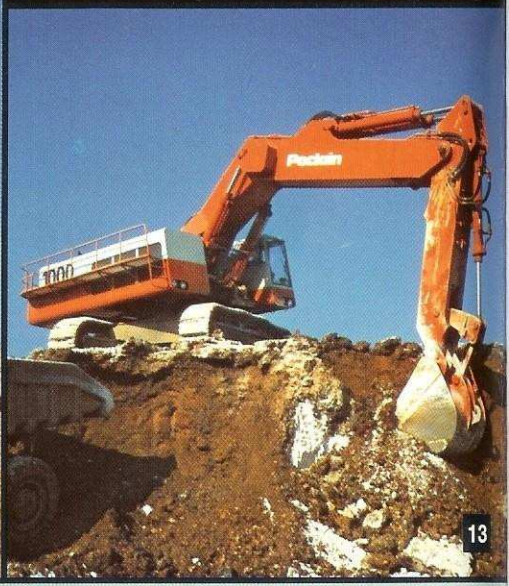
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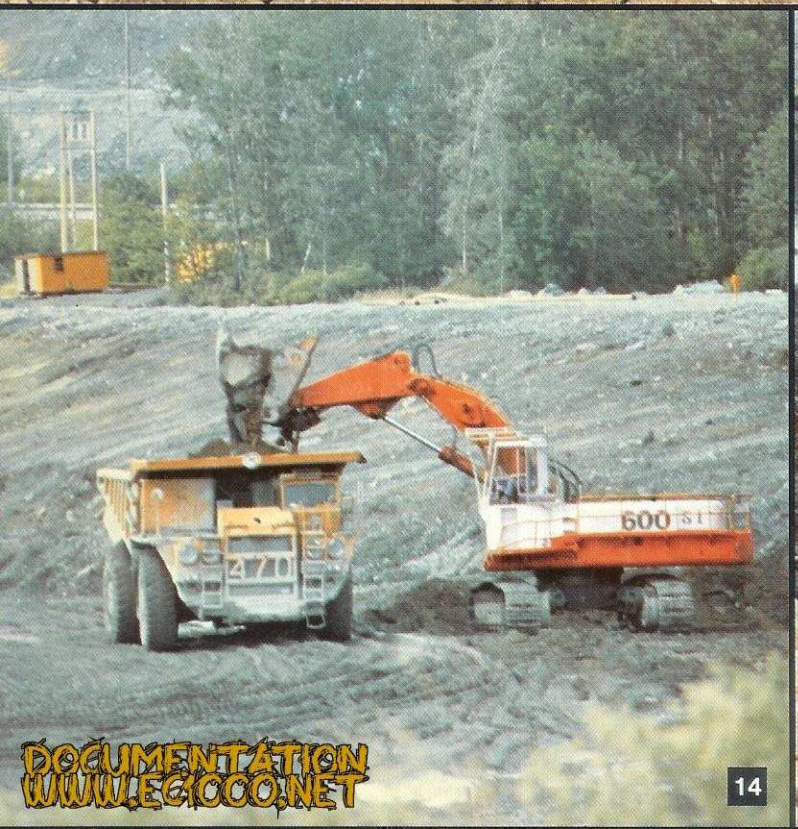
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WASTE REMOVAL

Easy to average conditions – Class 2

WEATHERED SHALE IN AN IRON ORE MINE

Two 1000 CK working in line win the material directly. Offloading into 85 t dumpers.
High output with 95 t penetration force and break-out force exerted over the entire height of the face.
90° swing with fast unloading of the 10 m^3 bottom-dump buckets.

J.R.016

no. 9-10-11

The attachment reach facilitates selective layer-by-layer extraction from entire digging face. Boulders are handled easily thanks to the heavy lift circuit giving over 45 tons of lifting capacity at 6 m reach.

no. 12

MIXED EXTRACTION OF WET CLAY AND LIMESTONE IN AN IRON ORE MINE

Direct digging with backhoe attachment loading 85 t dumpers.
Perfect control of the bucket fill. Short cycle times.

no. 13

SANDY CLAY IN AN ASBESTOS MINE

600 CK digging wet sandy clay (class 2).
Loading 100 t dumpers with bottomdump bucket and loader attachment. The elevated cab allows the operator to see the bottom of the truck body.

no. 14

SANDSTONE OVER A COAL SEAM

1000 CK digging into class 2 to 3 material.
Loading 85 t dumpers working two 8 hour shifts.
The ground reach of the attachment facilitates "cutting it fine": removing the overburden without touching the coal.

J.R.001

no. 15

16

17

19

18

OVERBURDEN REMOVAL IN A URANIUM MINE

1000 CK with loader attachment directly loading the material (class 2).
Penetration forces and attachment reach make direct loading possible, even in hard areas of the mine where the wheel-loader needs the help of a dozer.
Reduced operating cost with POCLAIN's 1000 CK. no. 16

Heavy duty conditions – Class 3

LIMESTONE EXTRACTION

1000 CK loading a mixed grain size compound of clay and limestone (class 3).
From his cab, the operator can spot weak points in the material where he can apply the penetration force and break-out force (wrist action) to shear the rock and fill the bucket quickly. no. 17

WINNING PRE-BLASTED SHALE ON BACKHOE


F.T.80

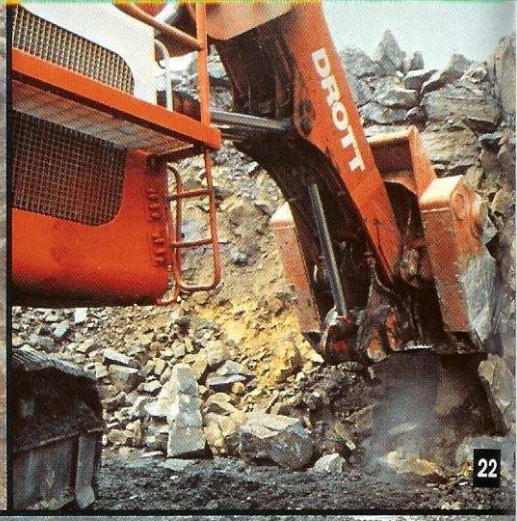
J.R.019
I.P.64
I.P.67

Really high output.
Short cycle time since at the end of the loading phase, the bucket is already at dumping height.
A 30° swing brings the bucket over 50 t dumpers with perfect visibility. no. 18

EXTRACTION OF CLAY AND SHALE WITH BACKHOE

300 CK directly loading this class 3 material.
The pit bottom is very hard on trucks: sharp-edged stones and water make truck circulation too arduous.
While the backhoe set up makes it possible to win material from up top, the short dipperstick allows direct digging. The penetration forces are higher when the dipper is shorter. no. 19

20



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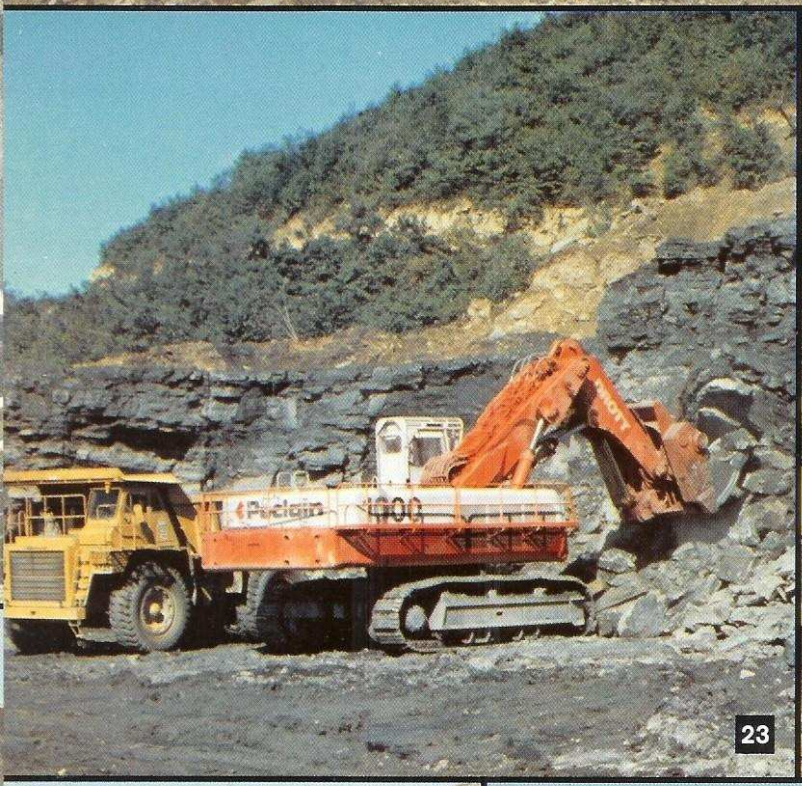

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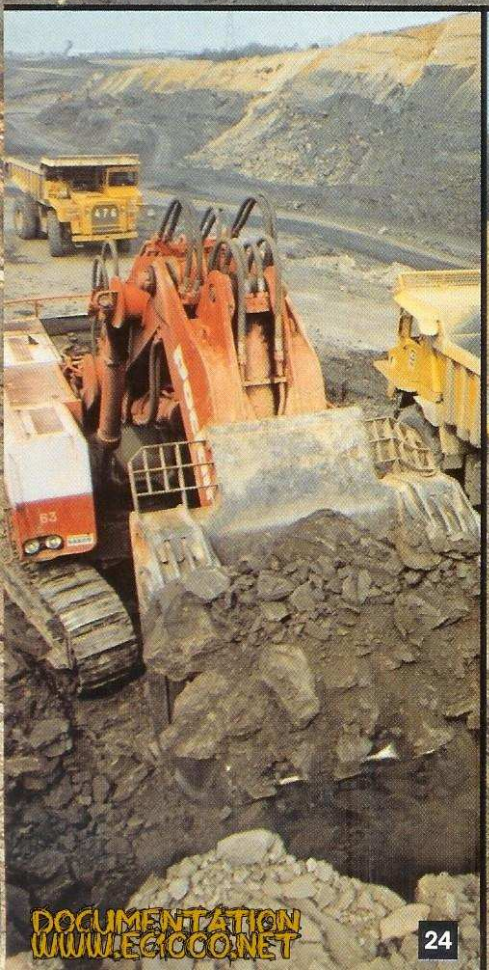
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BACKHOE OPERATION WITH LOOSENING BLAST NEAR A CEMENT PLANT – MATERIAL CLASS 3

Full-scale blasting can be replaced by a simple loosening blast to the overburden, reducing costs. Thanks to the 400 CK's big boulder handling capacity.
The backhoe setup loading trucks at the upper level saves on the need for special haul roads.

no. 20

Very hard digging conditions – class 4

SCHIST EXTRACTION IN A COAL MINE

Front-dump bucket with loader attachment.
For direct digging of fractured schist, class 4, the bucket wrist action allows boulders to be dislodged, pulled clear and loaded effortlessly.
The long reach of the attachment makes for easier positionning of haul units alongside the machine.

J.R.012
I.P.64

no. 21

SANDSTONE EXTRACTION IN A COAL MINE

1000 CK set up with loading attachment, short dipper and bottom-dump bucket, loading pre-blasted sandstone (class 4).
Cramped working space rules out access to cable shovels.
High reduction of drilling and blasting costs with loose blasting pattern.
The reach of the attachment ensures perfect cleaning-down of the face.
The bottom-dump bucket gently offloads boulders into the dump truck. No-shock loading means lower operating costs.

J.R.017


F.T.103

no. 22-23

SCHIST REMOVAL IN A COAL MINE

After only light blasting (due to the vicinity) overburden is loaded by a 600 CK with a bottom-dump bucket attachment.
The hydraulic excavator was the sole economical solution under the circumstances.

no. 24-25

26


27

28


29

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31

32

ORE EXTRACTION

SELECTIVE EXTRACTION

BACKHOE SETUP IN A URANIUM MINE

Selective extraction of ore pockets identified by geiger counter and staked out by small flags. The backhoe setup has resulted in a 10% decrease in ore dilution and in cost savings of nearly 30% at the treatment plant in the concentration process.

J.R.014

no. 26

FRONT-DUMP BUCKET IN A COAL MINE

After removal of the overburden by dragline, a POCLAIN hydraulic excavator loads the coal selectively with the flat bottom of the bucket, helped by the ability of its attachment to cut very precisely along the seam.

I.P.64

no. 27

LOADER SETUP IN A MULTI-SEAM COAL MINE

1000 CK loading the coal in a mine with several irregular and intermingled seams. The perfect 2-dimensional control of the bucket stroke helps the operator "cut it fine" and do a highly selective extraction job.
High penetration and break-out forces allow the material to be won directly without prior blasting and facilitate overburden removal.

no. 28

FRONT-DUMP BUCKET, LOADER SETUP IN A LEAD MINE

Several faces are worked simultaneously so that a constant quality of ore is supplied to the treatment plant.
The speed of the 400 CK from one face to the other has cut down time and the power of the hydraulic excavator has made blasting unnecessary.

J.R.007

no. 29

BULK EXTRACTION

LOADER SETUP IN A NICKEL MINE

The replacement of the cable shovel by a 600 CK has resulted in a nearly 30% saving in blasting costs. With same dipper capacity as the replaced cable shovel, production has increased.

J.R.023

no. 30

BACKHOE SETUP IN A COAL MINE

Extraction of a very thick coal seam.
Penetration and break-out forces applied by the bucket break the coal into small slabs, keeping fines to a minimun.

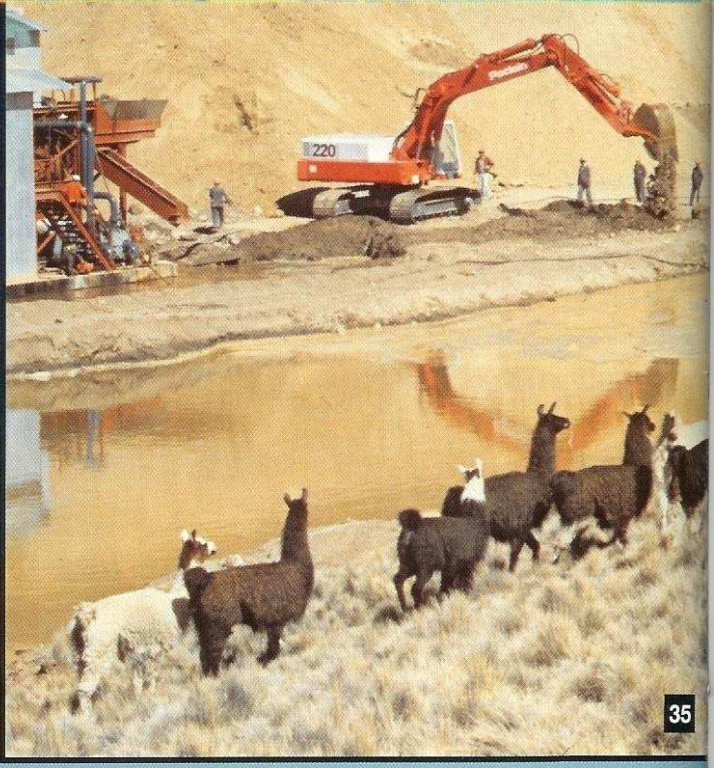
no. 31

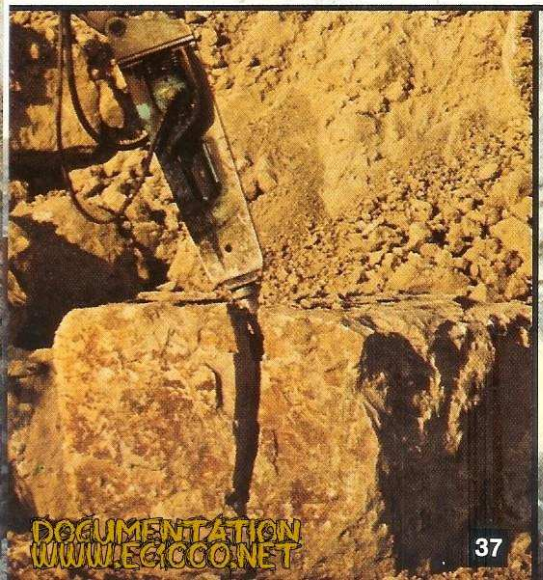
LIGNITE MINE WITH BACKHOE EXCAVATORS

Two 1000 CK on backhoe win the lignite located in horizontal layers between narrow clay strata without mixing the two.
The backhoe is the most selective method: the operator always sees what goes into the bucket. The wet slippery pit bottom being unpractical for dumpers, the machines load them up top.

J.R.027
I.P.73

no. 32





SPECIAL APPLICATIONS

POCLAIN can custom-design, engineer and build special excavators and attachments to solve particular problems.

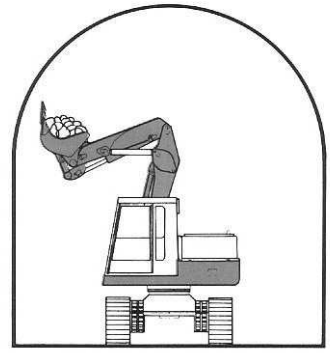
BLOCK REHANDLING WITH FIVE-TINE GRAB

Wide-opening hydraulic grab for handling blocks of any size.
High lifting capacity with the special heavy-lift hydraulic circuit.

no. 33

SMALL GAUGE EXCAVATORS IN MINE GALLERIES

The excavator is specially designed for operation in a narrow gallery (minimum width 5.2 m).
Short loader equipment and short-radius turret (1.58 m – 5'2").
Electric motor.



EXTRACTION WITH LOW GROUND PRESSURE EXCAVATORS: TALC MINING

Selective extraction with loader attachment after pre-blasting.
The excavator pre-grades the material before loading it onto waggons and dumpers.
Narrow buckets increase the penetration force.
The POCLAIN excavators were selected because of their reduced weight (11 t) to avoid crushing the material and for their mobility even when the ground is waterlogged and slippery.

no. 34

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220 H.P. ELECTRIC EXCAVATORS: A HIGH-ALTITUDE TIN MINE

Tin mine at 4,300 m (14,000') above sea level.
The excavator is connected to the processing plant power mains.
Difficult extraction of non-homogeneous material (class 3) (direct extraction of rock bench with no possibility of blasting).
The excavator supplies material directly to the plant feed hopper.

no. 35

HYDRAULIC HAMMER APPLICATION

The hydraulic hammer is fed by the excavator hydraulic circuit:
The hammer impacts break the big boulder chocking the hopper and preventing normal operation of the crusher.
The tire-mounted 70 H.P. excavator can perform a lot of ancillary tasks.

no. 36-37

WORK PATTERNS

POCLAIN hydraulic excavators offer alternative solutions to conventional extraction and loading methods.

3 main solutions can be implemented according to the configuration of the material and to the haul conditions for the dump trucks.

Excavator with loader equipment at the bottom of the bench

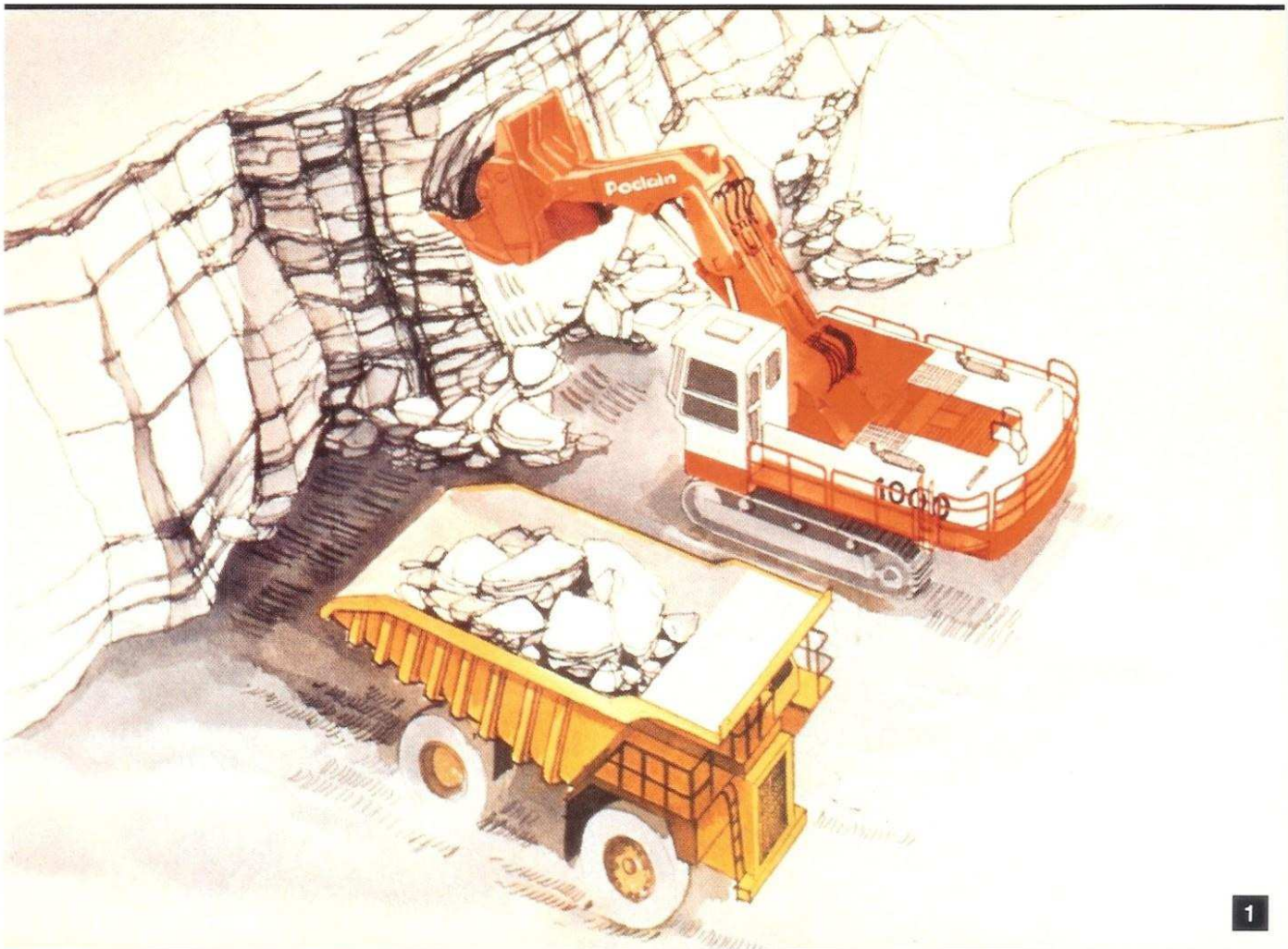
This is the standard work method (see sketch no. 1).

Excavator with backhoe equipment working from up top, dumpers at the bottom of the bench

When this method is compatible with the height of the bench, it is the ideal utilization of the excavator, ensuring short cycle times. Bucket already at dumping height at the end of the loading stroke (see sketch no. 2).

Excavators with backhoe equipment and dumpers up top

With this method, extraction is still possible despite waterlogging which may restrict the circulation of dumpers at the pit bottom. Cycles are slightly longer, but considerable savings are made by limiting access ramps and dumper slow-down on grades (see sketch no. 3).



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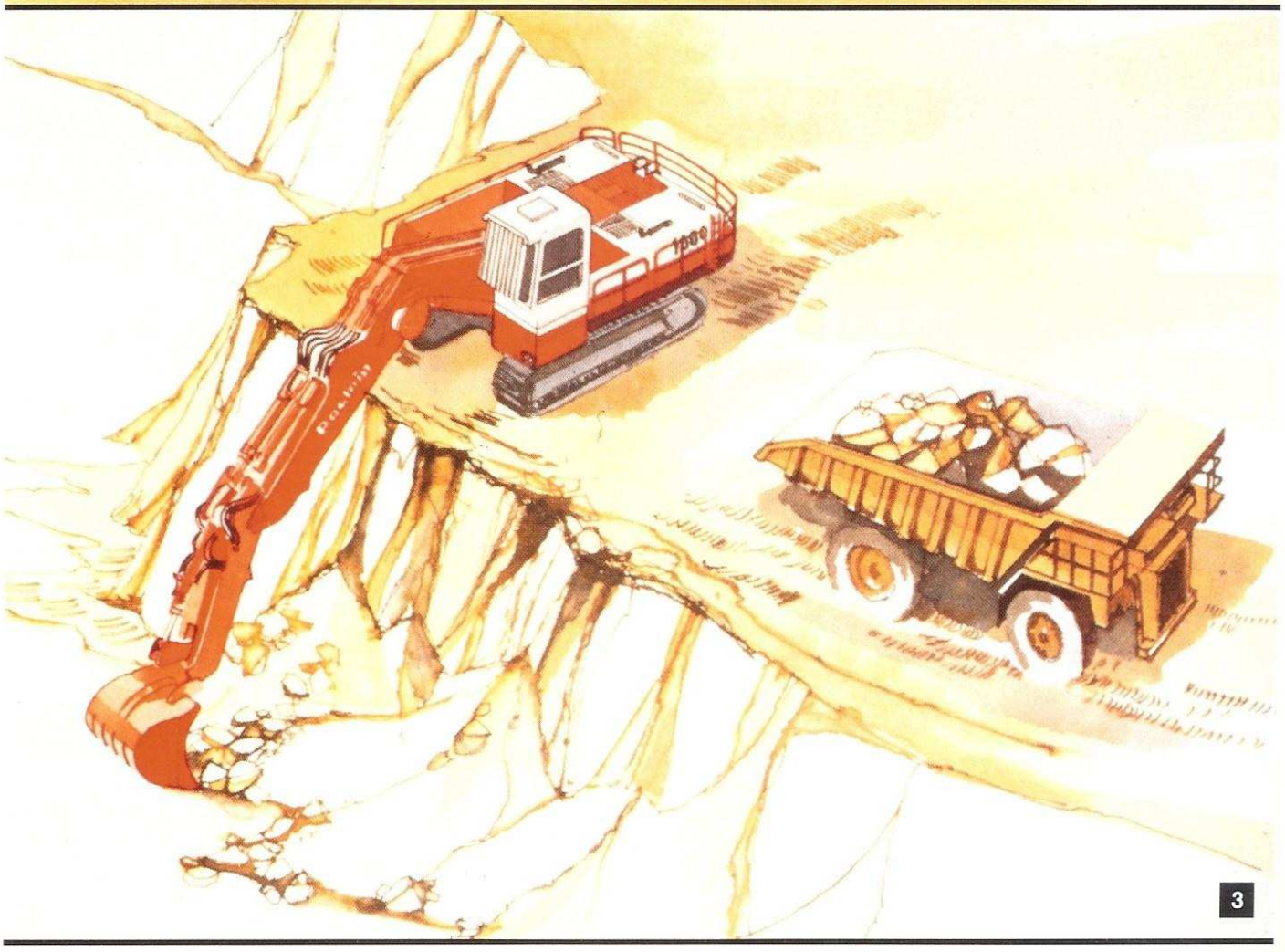

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THE POCLAIN "PLUS FACTORS"

1 Thanks to their highly original hydraulic system, POCLAIN excavators provide either independent or simultaneous use of all functions: digging force of the dipper, wrist action of the bucket, hoisting, swing and travel.

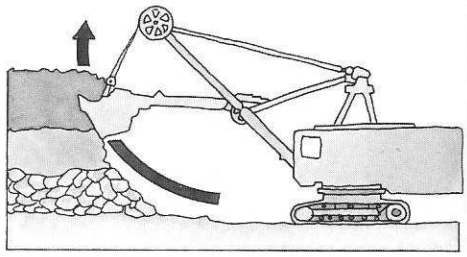
2 Static position during cycle, but the POCLAIN excavator can very precisely exert digging and crowding forces at any height on the bench (sketches no. 1 and 2).

3 The counter-leverage resulting from bench resistance is not exerted on the center of gravity of the excavator, but at the bucket. There is no need for heavy counter-weights.

These 3 main features provide 3 basic advantages for the end user.

SELECTIVITY

Different from the cable shovel which can only fill its bucket through the sweeping curve of the dipper handle, the POCLAIN excavator digs the bench in successive layers from the top. It can win each layer separately from the adjoining layer. A special feature known as the "floating boom"® makes it easy to follow the contours of a seam (sketches no. 3 and 4). This feature is very convenient when extracting thin layers (sketches no. 4 and 5). On backhoe, the operator has perfect visibility and control over bucket filling operations.



SAVINGS ON BLASTING

The POCLAIN excavator exerts considerable force into the fractures and cracks in the bench. It permits direct extraction of hard material. In solid rock, direct extraction is possible after a loosening-up blast.

MOBILITY

The POCLAIN excavator, being less heavy than conventional machines of similar ratings, is fitted with high-torque, fully proven hydrostatic travel motors. It is a fast mover which can be used to win material from distant points of the face.

And there is no time wasted when travelling clear of the blasting area.

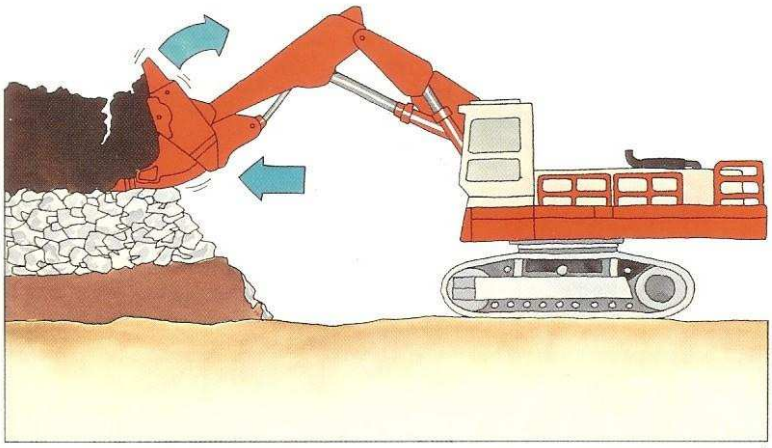
Moreover it can easily travel from one level to an other with a gradeability of 55% and more (sketch no. 5).

FAST CYCLING

Simultaneous use of all functions and low inertia of the turret (smaller counterweight) are dramatically reducing the cycle time.

SAFETY

Independent and simultaneous use of all functions ensures a perfect control over boulder down-fall while backing the machine (see sketch no. 6)



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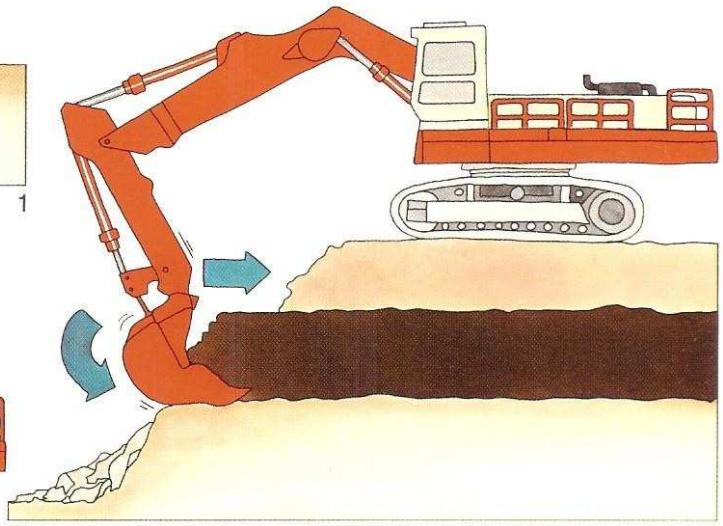

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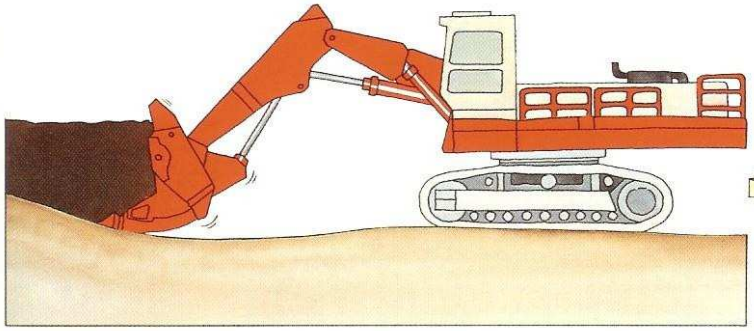

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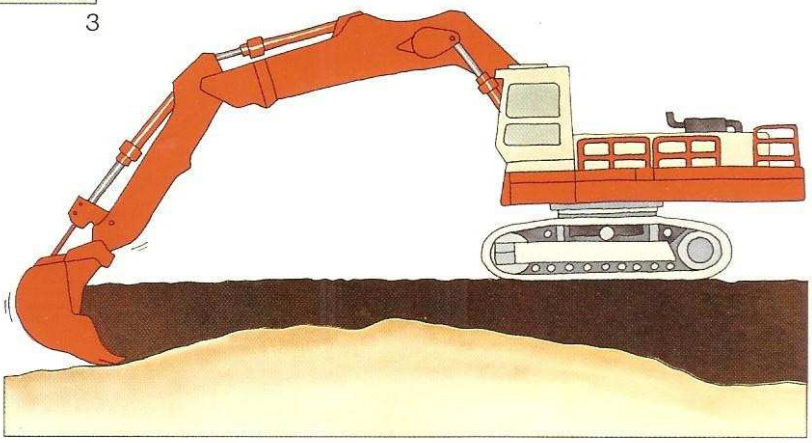

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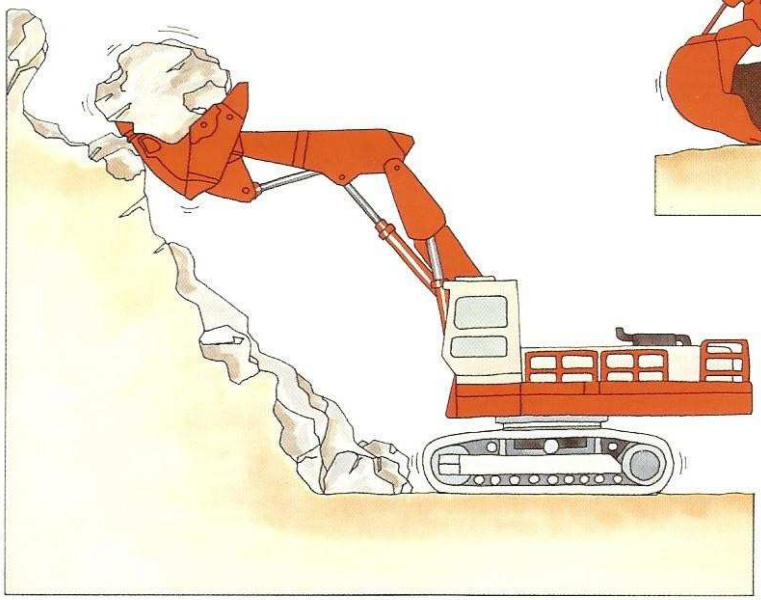

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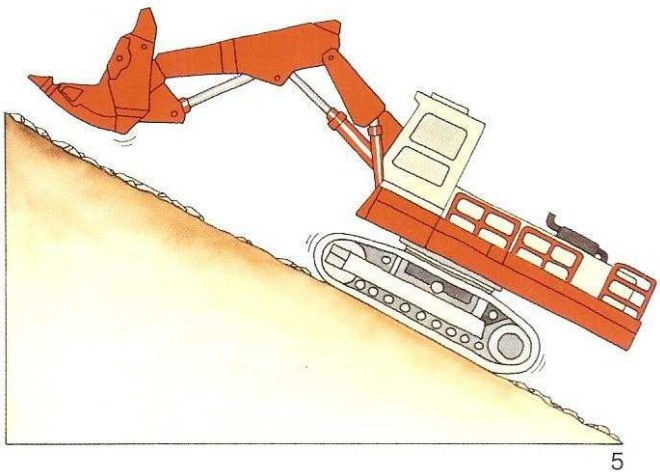

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POCLAIN MINING MACHINES

ATTACHMENTS

POCLAIN excavators for the mining sector can be rigged with a loader or backhoe setup and with booms and dippers of various dimensions.

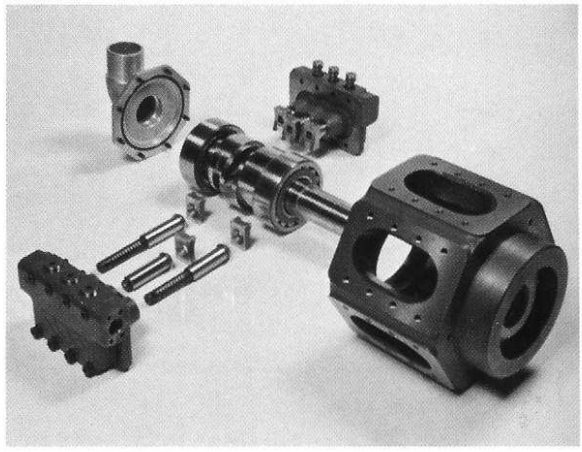
Digging forces are greater with short equipments, whereas long equipments come into their own on high benches.

The loader front-end can be rigged with either a front-dump bucket or a bottom-dump attachment.

"VARIODYN"® HYDRAULIC SYSTEM

CUSTOM-TAILORED HYDRAULIC

All hydraulic components (pumps, rams, swing and travel motors) are field-proven modules, designed and manufactured by POCLAIN.



EFFICIENT HYDRAULIC

Permanent flow adjustment to match power to the exact work requirements according to material resistance.

Independent flow allowing independent or simultaneous use of bucket, dipper, boom, swing and travel functions.

High-pressure: a limited volume of oil in circulation: less heat, less power losses.

High efficiency: the high pressure pump ensures a global efficiency (mechanical + volumetric efficiency) of 93% at 300 bars.
This efficiency is constant day in and out because of automatic wear compensation.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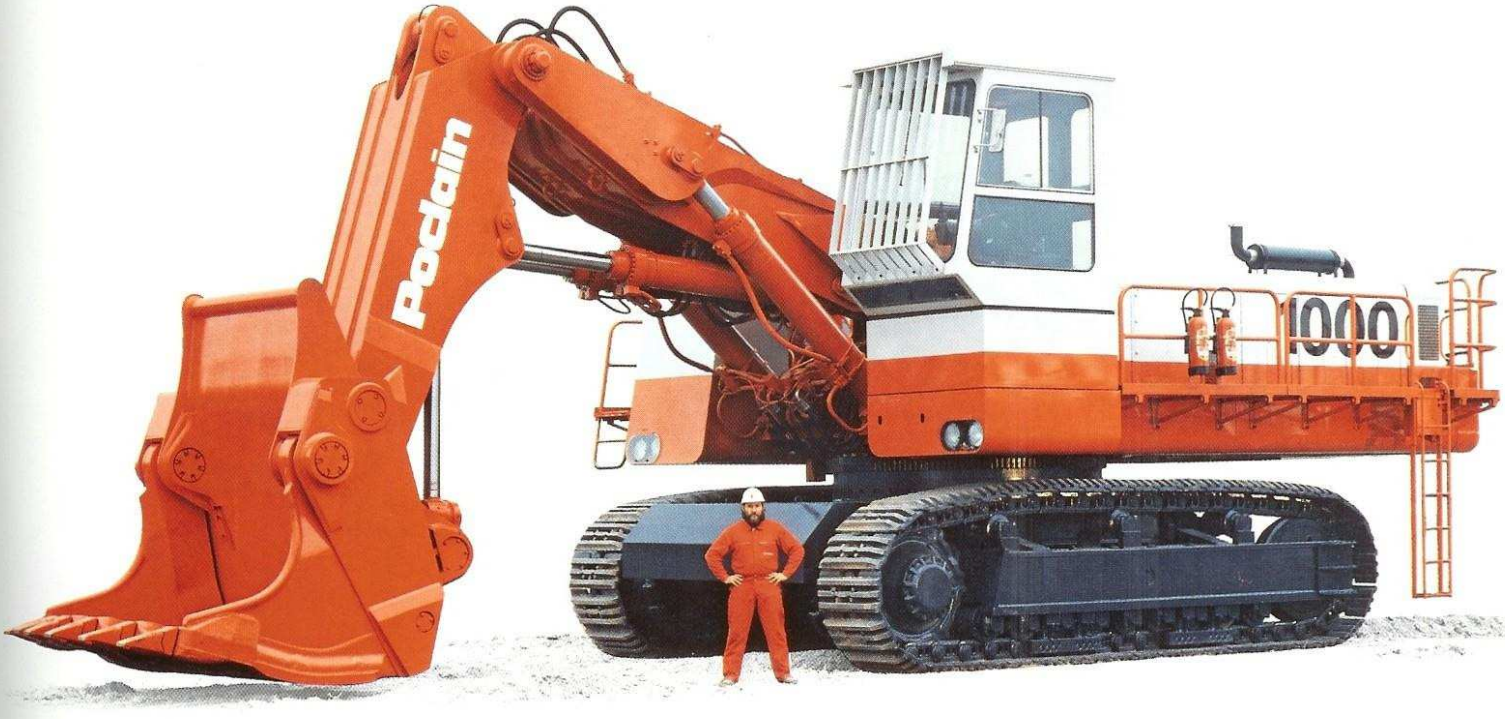
600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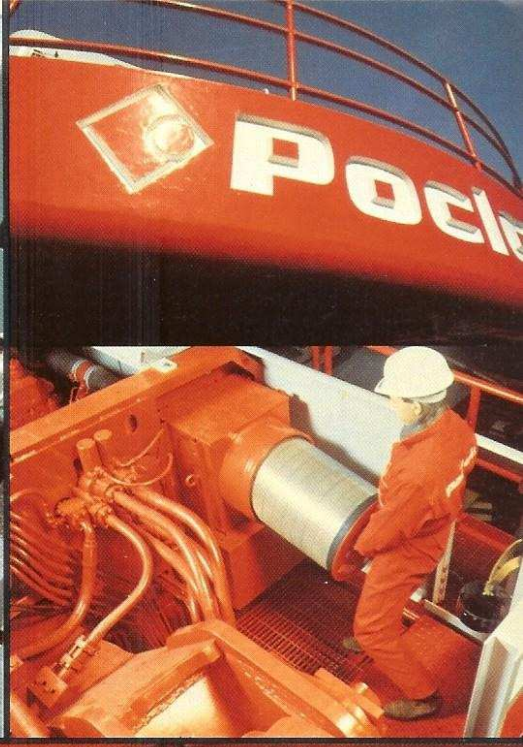
STANDARD OR OPTIONAL EQUIPMENTS

▲ STANDARD ■ OPTIONAL ● NOT AVAILABLE

	300 CK	400 CK	600 CK	1000 CK
Loader equipment	▲	▲	▲	▲
Backhoe equipment	▲	▲	▲	▲
Electric motor	■	■	■	■
Air-cooled diesel engine	▲	▲	■	●
Water-cooled diesel engine	●	●	▲	▲
High pressure hydraulic circuit	▲	▲	▲	▲
Independent and simultaneous functions (equipment, slew, left track, right track)	▲	▲	▲	▲
High-torque, self-braking hydraulic motors	▲	▲	▲	▲
Independent hydraulic cooling	▲	▲	▲	▲
Two-seater cab	●	●	▲	▲
Elevated cab	■	■	■	■
Tinted glass	●	●	▲	▲
Air conditioning	■	■	■	■
Grated footbridge with safety hand-rail	■	▲	▲	▲
Telescopic ladder	●	●	▲	▲
"F.O.P.S" protection	■	■	▲	▲
Centralized automatic lubrication	▲	▲	▲	▲
Fast fuel-filling system	●	●	■	■
Life-lubricated rollers	▲	▲	▲	▲
Hydraulic track-tensioning system	▲	▲	▲	▲
Dismountable 3 - part chassis	●	▲	▲	▲
Dismountable counterweight	▲	▲	▲	▲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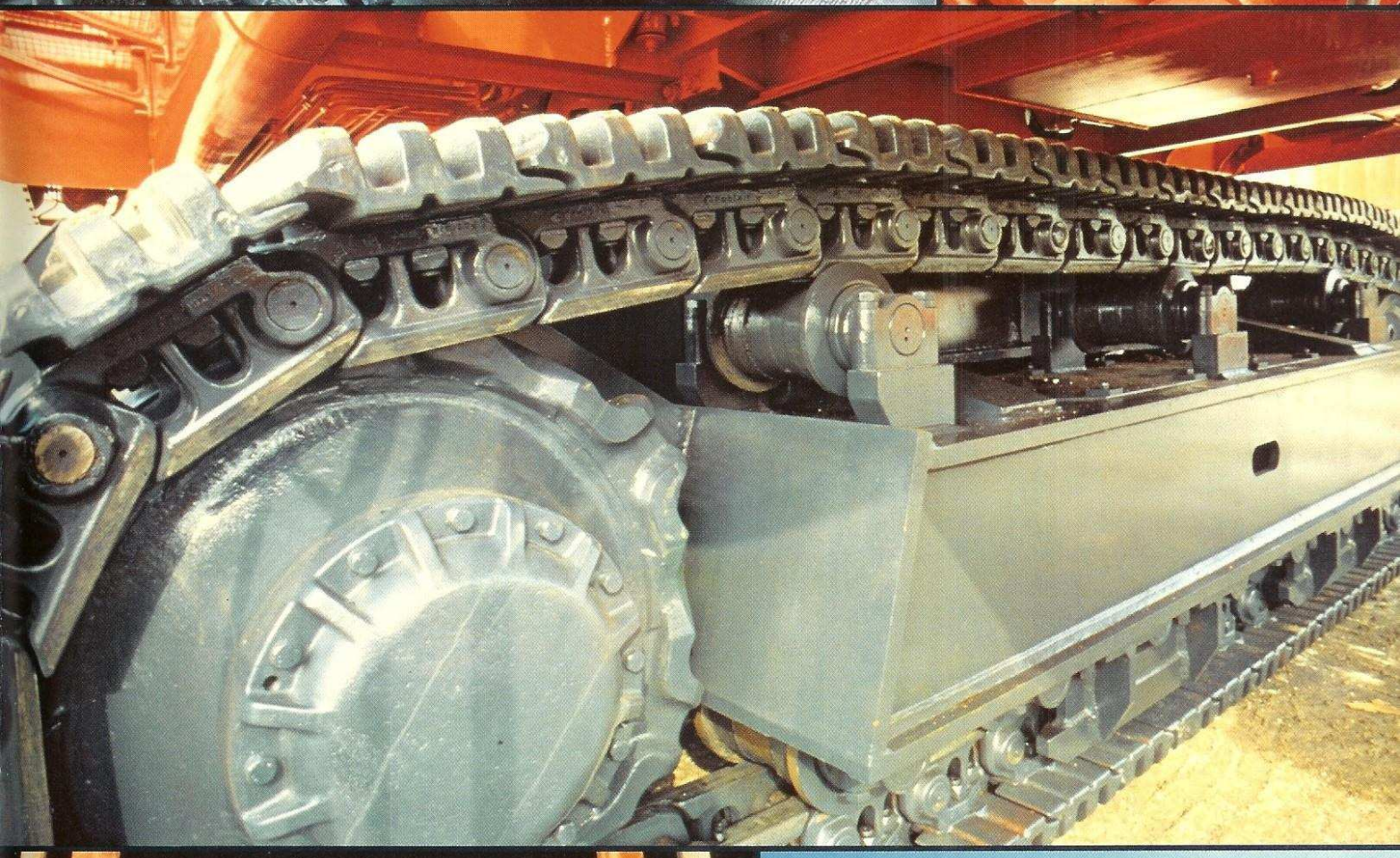

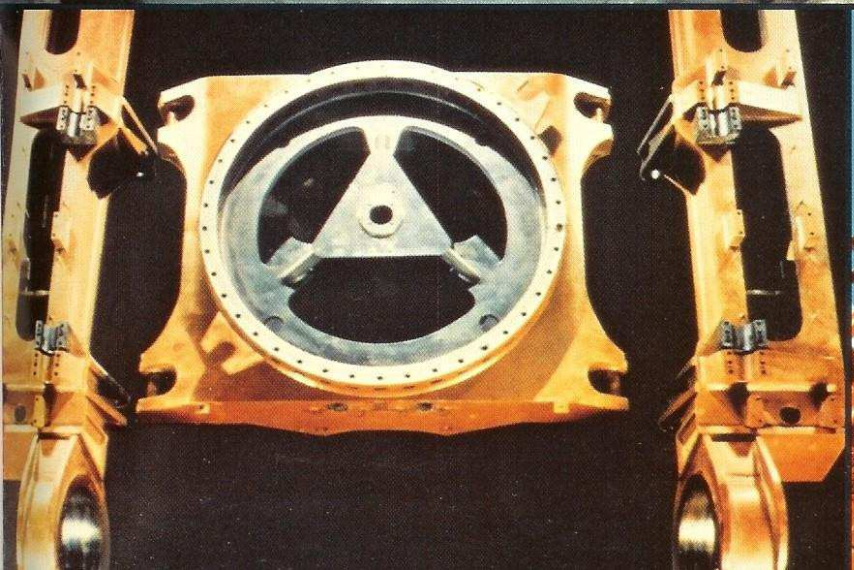

POCLAIN MINING MODELS

MODEL DESIGNATION	300 CK	400 CK	600 CK	1000 CK
MAX. WEIGHT (LOADER)	60 t	80 t	120 t	190 t
MAX. HP (SAE RATING)	230 kW (313 HP)	337 kW (458 HP)	455 kW (616 HP)	660 kW (896 HP)
BUCKET C'TY FOR VERY SEVERE DUTY LOOSE DENSITY D ≧ 2 D ≧ 3,400 lb per cu.y	3.2 m³	4 m³	5.5 m³	8.3 m³
BUCKET C'TY FOR HEAVY DUTY LOOSE DENSITY D = 1.8 D = 3,000 lb per cu.y	3.7 m³		6.8 m³	10 m³
BUCKET C'TY FOR NORMAL DUTY LOOSE DENSITY D = 1.8 D = 3,000 lb per cu.y	4.4 m³	5.5 m³	7.6 m³	11.5 m³
BUCKET C'TY FOR LIGHT DUTY LOOSE DENSITY D < 1.5 D < 2,500 lb per cu.y			11.5 m³	17 m³
DUMPER CLASS	20 – 35 t	30 – 50 t	35 – 85 t	50 – 120 t

PRODUCTION CHART

MODEL DESIGNATION	300 CK		400 CK		600 CK		1000 CK	
CYCLE TIME	20"	30"	20"	30"	20"	30"	25"	35"
BUCKET C'TY (in cu.m)	4.4	4.4	5.5	5.5	7.6	7.6	11.5	11.5
LOOSE DENSITY MATERIAL CLASS 2	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
HOURLY PEAK PRODUCTION	1,420t	950t	1,780t	1,190t	2,460t	1,640t	2,980t	2,130t
AVERAGE HOURLY PRODUCTION	840t	540t	1,000t	670t	1,390t	930t	1,680t	1,200t
AVERAGE YEARLY PRODUCTION (2,200 HOURS)	1,770,000t	1,180,000t	2,213,000t	1,475,000t	3,057,000t	2,038,000t	3,700,000t	2,640,000t
AVERAGE YEARLY PRODUCTION (4.500 HOURS)	3,620,000t	2,410,000t	5,425,000t	3,020,000t	6,250,000t	4,170,000t	7,570,000t	5,410,000t

The above chart gives the average yearly production of our machines based on the following criteria:

Peak production:

$$\text{Hourly P.P. (in tonnes)} = \frac{\text{Bucket capacity (heaped – CECE std)} \times \text{Loose density (1.8 = 3000 lb per cu.y)} \times 3600"}{\text{Cycle time}}$$

The cycle time can vary, depending of site configuration, material or rock characteristics and loading or dumping height.
This peak production (P.P.) is corrected with a coefficient "K" which includes:

- Operator's efficiency
- Machine efficiency
- Site efficiency

Poclain
hydraulic excavators

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