



CDNS KAOS · GROUND

KAOS-MC LAND

THE KAOS HEAVY CARRIER CONFIGURED FOR MECHANICAL LAND CLEARANCE

The KAOS Heavy carrier with a flail ahead of its tracks, six tools on one interface and a record of the ground it worked, with nobody in the area.



3.0 m

WORKING WIDTH, CONFIGURABLE

0.5–3.0 km/h

WORKING SPEED

15 km/h

ROAD AND TRACK SPEED, UP TO

6

TOOL MODULES ON ONE INTERFACE

~10.5 m

LONG WITH THE FLAIL

AT A GLANCE

A FLAIL AHEAD OF THE TRACKS. A PERSON OUTSIDE THE BOUNDARY.

The width the tool works, the speeds it works and travels at, the tools it carries and its length with the flail: the figures a clearance task is planned around.

NOBODY IN THE AREA

THE WORKING STATE IS AN EMPTY CAB

The machine works the lane under autonomous, supervised or remote control, with a named person at a station outside the hazardous area.

ONE CARRIER, SIX TOOLS

CHANGING THE WORK IS A TASK ON THE GROUND

Flail or tiller, rake, dozer blade, roller, magnetic sweep and soil sifter mount on one interface, so the site sets the sequence and the carrier stays.

THE RECORD

EVIDENCE RATHER THAN AN ASSURANCE

A georeferenced map, the machine's state, video and reports, so the ground worked can be audited by somebody who was not there.

THE KAOS CARRIER

A GENERATOR ON TRACKS, A CIRCUIT FOR THE TOOL

The diesel makes electricity and the flail's hydraulics run on a pump of their own, so rotor speed, ground speed and depth are separate settings.

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01 · SPECIFICATION

THE CLEARANCE CONFIGURATION. EVERY FIGURE IT CARRIES.

Grouped the way a mine action program's engineer reads a clearance machine: the configuration, the working geometry, the envelope, power, navigation and the record, and the tools.

01 THE CONFIGURATION

PARAMETER	VALUE	BASIS
Platform	KAOS Heavy tracked carrier	the carrier this configuration is built on
Configuration	Modular autonomous land-clearance system	mechanical processing of suspected ground
Primary attachment	Flail or tiller module on hydraulic arms	interchangeable with the other tool modules
Control	Autonomous, supervised or remote	the cab is empty while the tool works
Personnel	Nobody in the hazardous area	the task is planned, run and monitored from outside it

02 WORKING GEOMETRY AND SPEED

PARAMETER	VALUE	BASIS
Working width	3.0 m	configurable
Processing depth	Adjustable	set by threat and soil
Working speed	0.5–3.0 km/h	terrain and mission dependent
Road and track speed	Up to 15 km/h	travel on road and track

03 ENVELOPE AND MASS

PARAMETER	VALUE	BASIS
Length	~10.5 m with the flail	approximate
Width	3.2 m	approximate
Height	3.1 m	approximate
Operational mass	~38,000–42,000 kg	configuration dependent

04 POWER AND ENDURANCE

PARAMETER	VALUE	BASIS
Power	High-horsepower diesel; dedicated hydraulic system	the tool circuit shares a pump with nothing

PARAMETER	VALUE	BASIS
Drivetrain	Series diesel-electric carrier	the diesel turns a generator and electric motors drive the tracks
Operational range	Extended duration	fuel dependent

05 NAVIGATION, PERCEPTION, LINK AND RECORD

PARAMETER	VALUE	BASIS
Navigation	GNSS/INS, LiDAR, vision, odometry	positions the work in the frame the site is surveyed in
Perception	360° LiDAR, stereo and thermal cameras, millimetre-wave radar	radar keeps working in the dust the tool raises
Communications	Dual redundant, with radio, satellite and mesh options	a lost link stops the machine or returns it
Mission recording	Georeferenced map, machine state, video, reports	the task as authorized and as carried out

06 TOOL MODULES

PARAMETER	VALUE	BASIS
Flail / tiller	Primary clearance tool; replaceable flails; heavy plate housing	processes the lane to the set depth
Rake / debris	Surface preparation and debris removal	clears wire, root and scrap before the rotor runs
Dozer blade	Grading and surface preparation	a stated depth is measured from a graded surface
Roller	Compaction	load through a rolling drum on the machine's own arms
Magnetic sweep	Ferrous metal collection	lifts loose metal ahead of the search that follows
Soil sifter	Separation and analysis before clearance	what it finds sets the depth, the speed and the tool

02 · THE WORK

SUSPECTED GROUND IN, USABLE GROUND OUT. THE RECORD IS WHAT IS DELIVERED.

Mine action turns suspected ground back into usable ground, and what a client receives is evidence: a defined area worked to a stated depth by a stated method, recorded well enough to be signed for.

KAOS-MC Land supports mine action, infrastructure recovery and community safety by doing the bulk of the work mechanically, with nobody in the hazardous area. Proving ground is repetitive, measurable work over hectares, dangerous because nobody knows which square metre is the bad one. Dealing with a device that has been found is one expert act on one known object, and it belongs to qualified people under the authority that owns the ground.

SURVEY**IT NARROWS THE AREA**

Survey reduces a suspected area to the ground that has to be worked, before the machine arrives.

MECHANICAL PROCESSING**IT PREPARES AND PROVES THE GROUND**

Vegetation and debris off, soil worked to a stated depth across a stated width, recorded against a grid, with nobody in the hazardous area.

THE FIND**IT BELONGS TO ANOTHER TRADE**

Search, the individual find and what is done about it are a separate discipline, carried out under the authority that owns the ground.

03 · THE CARRIER

THE KAOS HEAVY CARRIER. A CLEARANCE TOOL AHEAD OF THE TRACKS.

KAOS-MC Land is not a new machine. It is the KAOS Heavy tracked carrier in a clearance configuration, and most of what the work asks was already a property of the platform.



CDNS KAOS is one tracked architecture in three sizes, drawn around the absence of a driver. Clearance is a configuration at the heavy end of the family: the carrier as drawn, a flail or tiller on hydraulic arms ahead of the tracks, and one interface that settles what the machine does that day.

- ✓ **An empty working state by design.** Nobody aboard is the case the carrier was drawn to, not a mode it is put into.
- ✓ **Brakes held off by power.** Each side's brake closes on its spring when control power is lost.
- ✓ **An interface that refuses.** Fitted equipment cannot enable torque or release a brake, and it declares its mass and centre of gravity before the carrier takes its limits from it.
- ✓ **A sensor ring around the perimeter.** Protected from debris, and checked against what the tool hides.

Traction on a lane is small and steady: a straight line at 0.5 to 3.0 km/h. The rotor is the opposite, continuous flow at pressure with a load that jumps at every stone, so the tool circuit is dedicated and the battery on the bus takes the spike when the head loads. Rotor speed, ground speed and depth become three settings rather than three consequences of one throttle.

04 · THE PRIMARY TOOL

A ROTOR, CHAINS AND HAMMERS. THE GROUND IS WORKED TO A SET DEPTH.

The primary attachment is a flail or tiller module on hydraulic arms, a deliberately simple machine in which every part of the simplicity does a job.

A heavy shaft runs the working width of the head, turned by the tool circuit's own hydraulic drive. Chains hang from hubs along it with a hardened hammer at the end of each, and as the rotor turns the hammers strike the ground in an overlapping pattern to the depth the head is set to. A chain carries no bending moment, so a buried rock costs a hammer rather than a broken tine.

Flail and tiller are two rotors on one mount and one drive: the flail strikes and throws, the tiller cuts and turns. The head changes at the end of the arms on locking pins, hydraulic couplings and an electrical connection, and the machine reads what is fitted before it hands over oil.

THE FLAILS

CONSUMABLES, ON PINS, IN SETS

The hammers wear from the first minute and are meant to. They change on pins in the field, in sets that keep the rotor balanced.

THE HOUSING

HEAVY PLATE OVER THE ROTOR

Plate closes the top and back of the chamber so what the rotor lifts goes back into the ground, with chain curtains across the mouth.

THE SKIDS

A DEPTH HELD OVER MOVING GROUND

The head rides on adjustable skids, on arms that let it follow the surface rather than fight it.

05 · WORKING GEOMETRY

THREE SETTINGS DESCRIBE THE WORK. SPEED ALSO SETS HOW HARD THE GROUND IS WORKED.

The tool works 3.0 m wide, configurable, to a depth set by threat and soil, at a working speed between 0.5 and 3.0 km/h.



The rotor turns at the speed its own circuit sets, so the strikes a square metre receives rise as ground speed falls: halve the speed and the same ground takes twice the work. Working speed sets how thoroughly the ground is worked as well as how quickly the lane advances.

Depth and speed are bought from one another. Working deeper removes more soil per metre advanced, and a head will not advance faster than its rotor can work what it is cutting. Lanes overlap, and whatever overlap the procedure requires comes off the 3.0 m in proportion.

06 · SIX TOOLS

SIX TOOLS ON ONE MOUNT. THE SURVEY DECIDES THE SEQUENCE.

The flail is the primary tool and one of six. All six mount on the same carrier through the same interface, and a real task runs several of them in turn.

1. **Soil sifter: read the ground** Separation and analysis before clearance. What it finds sets the depth, the speed and the tool.
2. **Rake and debris: take the surface off** Wire, root, rubble and scrap cleared before anything else runs, so the rotor does not wrap.
3. **Dozer blade: make the ground a surface** Grading and surface preparation, because a stated depth is measured down from a surface.
4. **Flail or tiller: process to depth** The primary clearance tool at the width, depth and speed the first three steps settled, on the lane pattern the supervisor authorized.

5. **Magnetic sweep: lift the metal** Ferrous collection out of worked soil, so the search that follows is not answering a signal every metre.

6. **Roller: load the ground** Compaction where the task calls for it, through a rolling drum on the machine's own arms.

The order is the site's, not the machine's. A route task may be blade and roller alone; another may be sifter, rake and flail with no roller at all. What the machine standardizes is the change: one mount, one drive and one identity handshake, so changing what the machine does is a task on the ground rather than a second machine on a transporter.

07 · PERCEPTION AND THE RECORD

FIVE WAYS OF SEEING THE LANE. FOUR RECORDS OF THE GROUND IT WORKED.

The tool makes its own weather, so the machine carries sensors that do not share one weakness, and it records the work in the frame the site is surveyed in.

360° LIDAR

SHAPE, ALL ROUND

Range and geometry in every direction: the boundary, the edge of the last lane, an obstacle, a person. Darkness is nothing to it; dust is.

STEREO AND THERMAL

APPEARANCE, AND PEOPLE

Two views give depth and texture, and thermal finds a person at night, in vegetation and in dust.

MILLIMETRE-WAVE RADAR

THE SENSOR THAT WORKS IN THE DUST

It passes through the dust and light rain that scatter light, and it is carried because the tool blinds the other sensors.

GNSS AND INS

WHERE THE MACHINE IS, ON A GRID

Satellite position carried and smoothed by an inertial unit: the frame the whole record is written in.

ODOMETRY

WHAT THE TRACKS SAY

Distance and heading from the drive. It carries position under a treeline, and where it disagrees with the other two it shows where the tracks slipped.

- ✓ **The map.** Position logged continuously in the site's survey frame, so the record shows the ground the tool worked rather than the ground somebody planned.
- ✓ **Machine state.** The tool fitted, whether the rotor turned, the depth setting, ground speed, attitude and the authority the machine was under.
- ✓ **Video.** What the machine saw, timestamped to where it was and what it was doing.
- ✓ **Reports.** The task as authorized, the task as carried out, and the difference between them.

The record earns its cost in the gaps: the strip where the head came up early, the metre where the tool was lifted over an obstacle, the stretch where the tracks slipped. With nobody in the area the machine is the only witness, and it records the passes that went badly at the fidelity of the ones that went well.

08 · GUIDANCE AND THE DOCTRINE

THE FLEET CARRIES NO RADIO AND NO GPS. CLEARANCE IS THE ONE RULED EXCEPTION.

The two mine clearance configurations, KAOS-MC Land and KMM-01, carry GNSS and a command link, because clearance is bounded, supervised and recorded work.



Clearance is done inside a boundary the customer set, on ground whose perimeter the customer controls and has surveyed, under a named supervisor who is watching, and it has to produce a record an authority audits afterwards in the frame the site was surveyed in. Satellite positioning is the frame that deliverable exists in.

The base KAOS carrier is commanded down an optical fibre from a stand-off station. A clearance machine walks kilometres of lane and drives over the ground behind it, so this configuration carries a dual-redundant command link, with radio, satellite and mesh as its options.

DOCTRINE

THE LINK CARRIES THE SUPERVISION. IT NEVER CARRIES THE SAFETY.

A lost link is a defined degraded state that stops the machine or returns it, settled before the task starts. The brakes are held off by power and close on their own springs whether the link is there or not.

09 · AUTHORITY

EVERY LANE IS A PERSON'S DECISION.
THE MACHINE ONLY WORKS INSIDE IT.

Nothing on this machine moves on its own word. A task is a boundary, a lane pattern, a depth, a speed band and a fitted tool, and each is a person's decision before it is the machine's behaviour.

THE CONDITION	WHAT THE MACHINE DOES
The link is lost	Goes to the state defined before the task began: it stops, or it returns to the entry point
The authorized boundary is reached	Traction stops at the boundary the supervisor set
A person enters the protective field	Holds, then goes to a safe stop
The rotor stalls or the tool faults	The work circuit isolates on its own, and the machine still drives
A stop station is pressed	Traction inhibited and the brakes applied on a wired path; a person clears it at the machine
Perception disagrees with the plan	The machine narrows to command and hands the decision to the person at the station

- ✓ It never decides to act on a hazardous object.
- ✓ It never grants itself a boundary, a depth, a speed band or a tool it was not authorized for.
- ✓ It never resumes after a stop on its own or on a timer.
- ✓ It never treats a lost link as permission to carry on.

10 · CONFIGURATIONS

TWO ROTORS, ONE WIDTH, THREE MODES.
ONE CARRIER UNDER ALL OF THEM.

What changes between tasks is the tool on the arms and the way the machine is controlled.

FLAIL IT STRIKES AND THROWS Chains and hammers on a rotor across the working width, struck into the ground to the depth the head is set to. The hammers are consumables, changed on pins in sets.	TILLER IT CUTS AND TURNS A second rotor on the same mount and drive. Flail or tiller is a soil and threat decision taken by the people who surveyed the ground.
WORKING WIDTH 3.0 M, CONFIGURABLE The machine is 3.2 m across, so lanes are planned to overlap. A head wider than the carrier puts the tracks inside the worked lane, with more rotor to turn and more mass on the arms.	CONTROL AUTONOMOUS, SUPERVISED OR REMOTE In all three the cab is empty while the tool works, and a named person at a station outside the hazardous area holds the authority and the stop.

11 · DOCTRINE AND SAFETY

THE LINK IS THE EXCEPTION. SAFETY NEVER DEPENDS ON IT.

The lines that hold on this configuration, for every customer.

- ✓ Carriers, not munitions: nothing on the machine operates a weapon, in any configuration, and it never decides to act on a hazardous object; the find belongs to qualified people under the authority that owns the ground.
- ✓ No radio and no GPS aboard the fleet, with the one ruled exception: the two mine clearance configurations, KAOS-MC Land and KMM-01, carry GNSS and a command link. A lost link stops the machine or returns it, and the machine never keeps working unsupervised.
- ✓ Human safety comes first, on every line: nobody is in the hazardous area while the tool works, a person authorizes every lane, and the brakes close on their own springs when power goes.

THE CONVERSATION

BRING THE SURVEYED AREA AND ITS BOUNDARY. SAY WHAT THE LAND HAS TO BE FIT FOR.

A first conversation is about the ground: the area as your own survey has narrowed it, who controls the perimeter, what the soil is, and what the land must be fit for afterwards.

Start a screened enquiry at cdnshield.ca/enquiries.

DOCUMENT	CDN-PROD-SPC-006 · KAOS-MC Land · Specification sheet
REVISION	R1.0 · issued 2026-09-10
WEB VERSION	cdnshield.ca/cdns-ground-engagement/spec-sheets/kaos-mc-land · carries the current revision
RELATED SHEETS	KAOS
ISSUED BY	Canadian Shield · cdnshield.ca

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