



CASE FOR CHANGE

CRITICAL INFORMATION
FOR OWNERS AND
OPERATORS OF
LIGHT VEHICLES
UNDER 4.5 TONNE GVM

WE ARE
VEHICLE
SAFETY

THE DEMANDS ON LIGHT VEHICLES OPERATING IN HARSH ENVIRONMENTS CAN WELL EXCEED WHAT THEY WERE ORIGINALLY DESIGNED FOR.

WHY CASE FOR CHANGE

THIS DOCUMENT DETAILS THE REAL RISKS ASSOCIATED WITH LIGHT VEHICLES OPERATING IN HARSH ENVIRONMENTS. IT OUTLINES THE MECHANICS OF A ROLL OVER WHICH RESULT IN ROOF CRUSH, ALONG WITH THE CONSEQUENCES TO THE OCCUPANTS DURING THIS EVENT. MORE IMPORTANTLY, IT PRESENTS A SOLUTION – ROLL OVER PROTECTION SYSTEMS (ROPS).

Roll overs are regarded to be a survivable event if the vehicle's roof structure remains intact and the occupant's compartment is minimally compromised. The reality is however, injuries and fatalities are still populating industry statistics year on year.

Due to their higher centre of gravity (COG) light commercial vehicles, 4x4's and SUV's are more susceptible to roll during an accident than other passenger vehicles in normal conditions. Operating in harsh environments heightens the incidence of roll over.

The fact a ROPS is fitted in a vehicle is often considered, by some operators, a gate pass. Unfortunately not every ROPS is a safe ROPS. This document helps identify the difference between a ROPS that may or may not save your life.

Before you or your company makes a decision about roll over protection for your fleet, ensure you have done your research. Reliable sources of information can be found via your local transport authority, along with regulatory bodies governing the Australian National Code of Practice (NCOP) and Australian Design Rules (ADR's).

Minecorp can also assist by providing relevant ROPS manufacturing and engineering guidelines, summaries and certificates and/or general information. Please contact our Technical and Compliance department on +61 (7) 3723 1000.

CONTENTS

2	BRUTAL REALITY
4	THE RISK FACTORS
6	ROLL OVER MYTHS
8	WRONG PLACE WRONG TIME
10	THE GRIM TRUTH BEHIND A RULE
12	FACTS ABOUT ROLL OVERS
14	SURVIVING A ROLL OVER
16	WILL YOU AND YOUR ROPS SURVIVE A ROLL OVER?
18	SUB-STANDARD PRACTICES
22	THE OPTIMUM SOLUTION
24	MINECORP SAFETY CELL [®] ™ INTERNAL ROPS
26	MINECORP SAFETY CELL [®] ™ EXTERNAL ROPS
28	MINECORP'S STANDARDS

VEHICLE ACCIDENTS ARE THE LARGEST CAUSE OF ALL WORK-RELATED FATALITIES.

Not only do many employees never make it home, they are left with spinal damage, resulting in paraplegia or quadriplegia.

IN THE MINING INDUSTRY ALONE, VEHICLE INCIDENTS CAUSE 31% OF ALL FATALITIES.

(Work Related Traumatic Injury Fatalities, Work Safe Australia)

BRUTAL REALITY

OPERATING VEHICLES IN HARSH ENVIRONMENTS CAN, AND OFTEN DOES, RESULT IN OCCUPANT INJURIES OR FATALITIES. EQUIP YOUR FLEET WITH PROVEN AND TRUSTED SAFETY SOLUTIONS FROM MINECORP.

THE RISK FACTORS

THE TOP 11 CAUSES OF VEHICLE ACCIDENTS IN REMOTE, COMMUTING OR ONSITE ENVIRONMENTS ARE:

- 1 SPEED
- 2 POOR VISIBILITY DUE TO ENVIRONMENTAL CONDITIONS
- 3 FATIGUE
- 4 LOSS OF CONTROL WHEN AVOIDING DEBRIS FROM TRUCKS
- 5 EXCEEDED LOAD CAPACITY
- 6 SKIDDING DUE TO ROAD SURFACE
- 7 LACK OF EDGE PROTECTION
- 8 STEEP GRADES
- 9 DRIVER INEXPERIENCE/UNFAMILIARITY WITH THE VEHICLE
- 10 MECHANICAL FAILURE
- 11 DISTRACTION & MOBILE PHONE USAGE

ANY OF THESE FACTORS CAN EASILY LEAD TO AN ACCIDENT OR A ROLL OVER.

\ MYTH #1

“IT WON’T HAPPEN TO ME”

I am a good driver. I have been driving four wheel drives for many years.

Year on year work site injuries and fatalities continue to occur. Work Safe Australia’s annual ‘Work Related Traumatic Injury Fatalities’ research confirms this.

\ MYTH #2

“I HAVE SRS AIR BAGS, SO I DON’T NEED A ROPS”

Vehicle manufacturers are improving occupant safety through the introduction of SRS (supplementary restraints systems) airbags. Unfortunately, both front and side curtain airbags are not intended to deploy in a roll over (some limited models are fitted with roll sensing side curtain air bags which do in fact deploy). Airbag activation requires severe frontal or side impact. This can be caused by running into a solid object or being struck side on by another vehicle.

Check your vehicles operation manual for this information!

\ MYTH #3

“I HAVE STABILITY CONTROL AND ELECTRONIC SPEED LIMITING, SO I WON’T ROLL”

Safety innovations such as seat belts, head rests, ABS brakes, traction and stability control, airbags, GPS and electronic speed limiting devices, are there to improve occupant safety and help minimise potential incidents. However, when your world goes upside down, none of these features will stop the roof from crushing in and compromising your survival space.

WRONG PLACE WRONG TIME

WHY NOT YOU?

IF THIS IS THE VIEW THROUGH YOUR WINDSCREEN, STATISTICALLY, YOU'RE ALREADY IN THE WRONG PLACE.

Operating light vehicles in harsh environments drastically increases the risk of an accident.

Due to the high centre of gravity (COG) and heavier load carrying requirements, compared to other passenger vehicles, you are three times more likely to roll.

THE GRIM TRUTH BEHIND A RULE

UNFORTUNATELY, IT TAKES
A SERIOUS ACCIDENT OR
FATALITY TO INFLUENCE THE
RULES AND REGULATIONS OF
AN INDUSTRY.

The mining industry has recognised
the high injury rate associated with
light vehicles and is leading the way
in implementing roll over protections
systems and adopting more stringent
OH&S policies.

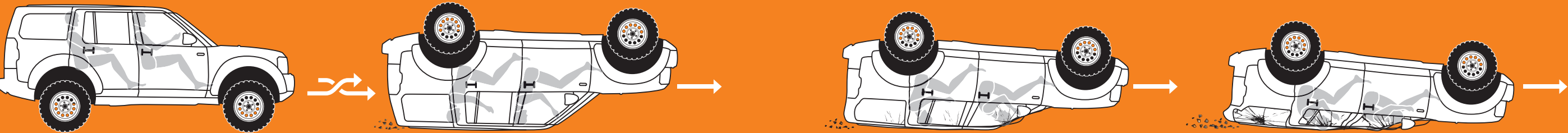
Contractors and service providers often
question the need to install what appears
to be over-the-top safety equipment –
until they, or someone they know, are
involved in an accident.

REMEMBER – SAFETY
PROTOCOLS ARE NOT IN
PLACE TO MAKE YOUR
LIFE DIFFICULT, THEY
ARE THERE TO SAVE IT.



FACTS ABOUT ROLLOVERS

ROOF CRUSH SEQUENCE



- THE VEHICLE'S HIGHER CENTRE OF GRAVITY (COG) AND HEAVIER GVM MEANS A 4WD IS MORE LIKELY TO ROLLOVER THAN A PASSENGER VEHICLE.
- AN OPERATOR MAY LOSE CONTROL OF A VEHICLE, SHOULD HE OR SHE MANOEUVRE SUDDENLY TO DEAL WITH AN UNEXPECTED ROAD CONDITION OR OBSTACLE.

THE VEHICLE ROLLS OVER

WHEN A LIGHT VEHICLE, MOVING IN A FORWARD MOTION ROLLS OVER, IT ATTRACTS LONGITUDINAL FORCES BEFORE LATERAL AND VERTICAL FORCES, HENCE PUSHING THE ROOF AND PILLAR STRUCTURE REARWARD.

- ROOF CRUSH OCCURS WHEN THE VEHICLE'S ROOF AND PILLARS COME INTO CONTACT WITH THE GROUND AND FAIL TO WITHSTAND THE WEIGHT OF THE OVERTURNED VEHICLE, COMPROMISING THE PRECIOUS OCCUPANT SURVIVAL SPACE.

- THE WINDSCREEN AND WINDOWS CAN SMASH, CREATING AN OPPORTUNITY FOR COMPLETE OR PARTIAL OCCUPANT EJECTION (SHOULD SEATBELTS NOT BE WORN).

SURVIVING A ROLL OVER

THE OCCUPANT OF THIS VEHICLE, A MINE'S NIGHT SHIFT WORKER, SURVIVED A ROLL OVER AFTER AVOIDING AN OBSTACLE DURING HIS LATE NIGHT RETURN HOME. HE WALKED AWAY UNINJURED.

THIS VEHICLE WAS FITTED WITH A MINECORP SAFETY CELL® ROPS.

YOU ARE TWICE AS LIKELY TO ROLL IF YOU DRIVE A 4X4 AND 3.4 TIMES MORE LIKELY TO DIE AS A RESULT OF A ROLL OVER.

(4WD Crash Involvement Patterns, RACV Ltd)

The roof structure above the dash height accounts for approximately 3% of the vehicle's GVM which means, in the event of a roll over, the strength to weight ratio of these components are insufficient to sustain the vehicle's integrity.

Approximately 33% of the roof strength comes from the A pillars and the bonded windscreen – usually the first thing to give way when the vehicle's roof first comes in contact with a hard surface. If the vehicle rolls for a second time the results are catastrophic (10% of 4WD or SUV roll overs roll more than once).

Even if your vehicle is ANCAP 5 star rated don't assume you are safe in the event of a roll over. To date, there has been no Australian Design Rules for either roof strength or side curtain air bags.

BUT THERE IS A SOLUTION.

It involves an innovative structure called a Roll Over Protection System (ROPS) which when fitted to a vehicle minimises the effect of roof crush and maintains the occupant's survival space in the event of a roll over.

HOWEVER, NOT EVERY ROPS IS A SAFE ROPS.

WILL YOU AND YOUR ROPS SURVIVE A ROLL OVER?

ROPS ARE NOT JUST A GATE PASS.

DUE TO THE LACK OF DESIGN AND MANUFACTURING STANDARDS GOVERNING ROLL OVER PROTECTION SYSTEMS, SUB-STANDARD PRODUCTS ARE CURRENTLY AVAILABLE IN THE MARKETPLACE.

Traditionally the fitting of an internal ROPS has meant a compromise in head space, ingress and egress, particularly for rear seat passengers.

Exhaust style benders currently being used to produce ROPS don't allow the complex multi-axis bends required to maximise available space in modern vehicles. In many cases these sub standard ROPS are constructed from black pipe or exhaust tube. This material is then covered in insulation or upholstery foam which is not adequate for occupant protection.



EXTERNAL PIPE STRUCTURE BOLTED ONLY TO TUB BODY

During a roll over this structure is likely to be torn from its non conforming mounting.



ALLOY SPORTS BAR

It might look great but it wasn't designed to protect you in a roll over.



INADEQUATE PADDING

This foam is non compliant and will do little to prevent occupant injury.

SUB-STANDARD PRACTICES



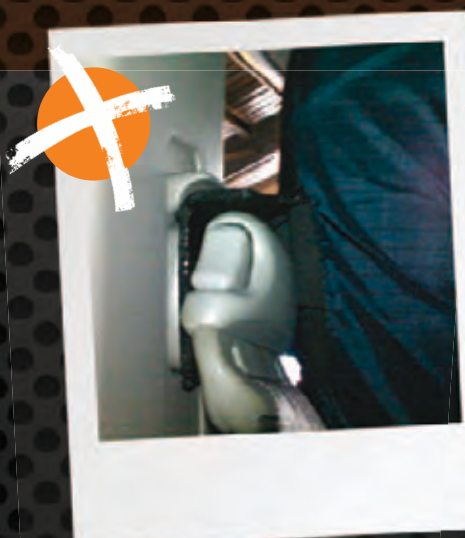
INSERT 1: Note the head position in relation to the outside brace bar and head rest.



INSERT 2: Note the position of the rear hoop forcing the head forward.



INSERT 3: Example of single bolt mounting drilled through the B Pillar.



INSERT 7: Non adjustable seat belt with sharp protrusions.



INSERT 8: Single bolt, through exhaust tube with airconditioning insulation as padding.



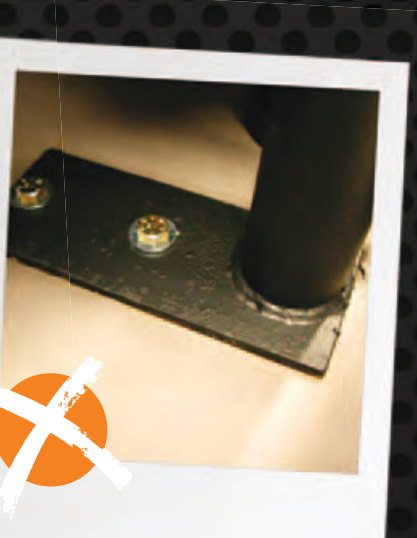
INSERT 9: Example of connection that is not fit for purpose and impedes head space.



INSERT 4: B pillar mounting disables belt height adjustment with unpadded protrusion.



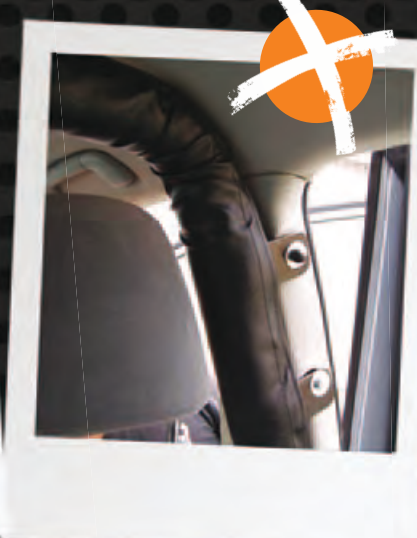
INSERT 5: Seatbelts don't work correctly.



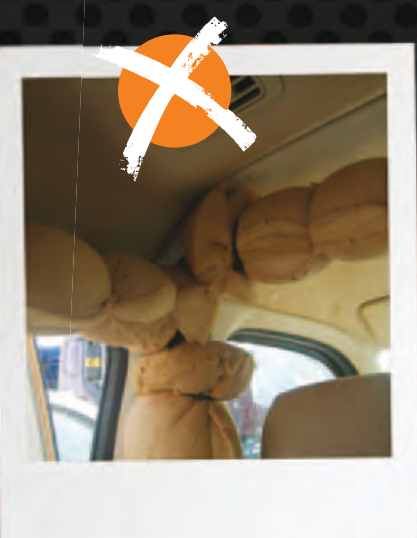
INSERT 6: Exposed foot plate mounted above floor covering could cause injury.



INSERT 10: Non load rated mesh, no rear bracing, no B or C pillar mounting.



INSERT 11: Single hoop mounted only to factory grab handle holes.

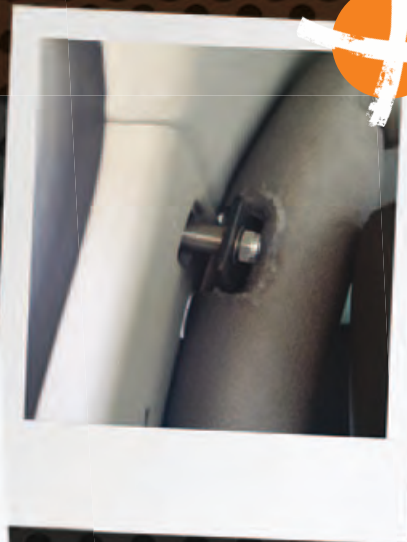


INSERT 12: Non compliant padding.

SUB-STANDARD PRACTICES



INSERT 13: Vinyl wrap without padding to increase head space.



INSERT 14: A bolt through the B pillar shown – note sharp protruding edges.



INSERT 15: Non compliant padding and single bolt floor mounting.



INSERT 19: ROPS not anchored to B or C pillars and moves back and forth.



INSERT 20: Foot plate bolted over carpet with dangerous sharp edges.



INSERT 21: Non rated mesh and non conforming brace coupler.



INSERT 16: Farm style tray body with bolted on chassis bracket. The main hoop should be one continuous length.



INSERT 17: External black pipe structure mounted in tub body only.



INSERT 18: No mesh window protection, black pipe structure bolted only to aluminium tray.



INSERT 22: Black pipe with non approved welding and non rated mesh.



INSERT 23: ROPS is too high, and is only bolted to the tray pedestals.



INSERT 24: Farm style tray with non structural steel head board and no rear braces.

THE OPTIMUM SOLUTION

SAFETY CELL® ROPS MINIMISE THE RISK OF INJURY SHOULD A VEHICLE ROLL OVER. DESIGNED, ENGINEERED, TESTED AND QUALITY ASSURED BY MINECORP'S DEDICATED TEAM, IT'S PURPOSE IS TO MINIMISE ROOF CRUSH AND MAINTAIN THE OCCUPANTS SURVIVAL SPACE IN LIGHT COMMERCIAL VEHICLES OPERATING IN HARSH ENVIRONMENTS. MINECORP'S SAFETY CELL® SYSTEMS FOR COMMERCIAL VEHICLES SET THE STANDARD WORLDWIDE.

Our research into roll over sequence, and comprehensive knowledge of light vehicle construction, enables us to design world leading, fit-for-purpose product. Our commitment to continuous improvement means we work with industry to gain further knowledge. We conduct real life testing in a desire to continue developing market leading solutions that save lives.

The Safety Cell® range includes four point and six point, twin hoop ROPS. Each ROPS is individually designed and tested to integrate with the original equipment manufacturer's (OEM) seats, seatbelts and airbags to fit most makes and models of dual cabs, extra cabs and wagons. We continue to lead the development of ROPS which complement the sensitive side impact airbag technology.

Under ISO 9001 quality control our ROPS are engineered from light weight, high tensile, seamless rollcage tube, and manufactured using the latest computer numeric controlled (CNC) mandrel bending technology. They are assembled in Minecorp's high tech jigs, and fabricated by trade qualified welders.

Our proprietary coupler and high impact padding enhance the performance of our ROPS. Many competitors use sub standard foam, traditionally used in air-conditioning or upholstery industries, to cover their internal ROPS. This product is inadequate to protect the vehicle occupant's head from the metal Roll Over Protection System. Minecorp's patented Safety Cell® padding system exceeds the padding standard for ROPS to provide maximum occupant protection.



4 POINT EXTERNAL SAFETY CELL®
STRUCTURALLY MOUNTED TO CHASSIS AND INCORPORATING REAR BRACES, TO SUIT SINGLE CABS.



4 POINT INTERNAL SAFETY CELL®
TO SUIT EXTRA AND DUAL CABS.



6 POINT INTERNAL SAFETY CELL® WITH MESH LOAD GUARD
TO SUIT WAGONS.



SAFETY CELL® TUBE COUPLER



SAFETY CELL® ROPS PADDING



MINECORP'S INTERNAL SAFETY CELL[®] BOASTS THE INDUSTRY'S BEST SIDE CURTAIN AIRBAG COMPATIBLE ROPS.



Minecorp's range of internal ROPS are designed and tested to integrate with the original equipment manufacturer's (OEM) seats, seatbelts and SRS airbags to fit most dual cabs, extra cabs and wagons.



Under ISO 9001 quality control we manufacture a combination of four point and six point, twin hoop designs, for dual and extra cabs. Wagons incorporate mesh load guards and structural rear braces.



Our ROPS are engineered from light weight, high tensile, seamless rollcage tube, and manufactured using the latest computer numeric controlled (CNC) mandrel bending technology. They are assembled in Minecorp's high tech jigs, and fabricated by trade qualified welders.

MINECORP
SAFETY CELL
INTERNAL ROPS



WORLD FIRST PRIMARY AND SECONDARY HOOP DESIGN WITH RADIAL AND REAR BRACING.



- rear braces are structurally connected to the vehicle's chassis using proprietary clamping systems, couplers and bushes to accommodate chassis flex
- manufacturing and installation compliance plates attached
- no welding or chassis modifications are required when fitting a Minecorp Safety Cell® system



- Minecorp's ROPS compatible drop-side tray body fits harmoniously, and allows for the installation of service boxes and accessories
- integrated mesh load guard as standard
- innovative ratchet strap anchor points are cut into mesh guard assembly



- protective covers for repeater lights
- flags/aerial mounting provisions
- ancillary lighting and equipment mounting provisions as standard
- over cabin halo for structural support

COULD ANOTHER ROPS MANUFACTURER SAY YES TO ALL OF THE FOLLOWING KEY ATTRIBUTES FROM THE MINECORP STANDARDS?

QUALITY SYSTEM

Minecorp manufactures in accordance with ISO 9001

RESEARCH & DEVELOPMENT

Dedicated R&D facility with in-house engineers and CAD design team

DESIGN & ENGINEERING

Safety Cell® ROPS are designed to protect all seated occupants

LIGHT WEIGHT CONSTRUCTION

Material selection and design criteria are chosen to minimise the effect on the vehicles height, laden mass limits, COG and GVM

REAR BRACING

All Safety Cell® systems both internal and external run rear bracing for structural integrity

TESTING

Minecorp carry out finite element analysis (FEA) of all Safety Cell® systems and have extensive real world testing results

CONTINUED IMPROVEMENT

As a result of our post incident reporting new manufacturing technology and innovative thinking we continue to lead the way

VEHICLE INTEGRATION

Minecorp leads the way with integrated SRS and side curtain air bag compliant internal ROPS allowing for OEM seatbelt operation and no sharp protrusions as per ADR42/04

HEAD SPACE

Minecorp only manufacture an internal system if it meets the minimum head and leg requirements of LH8 and LK8/9 of VSB14-NCOP

MATERIAL

ROPS tube that meets AS/ NZS1163:2009 min yield strength of 250mpa and min elongation of 22%

BENDING

CNC mandrill roll bending with minimum 3 times bend radiuses

WELDING

Compliant with AS/ NZS1554.1:2004 structural steel welding

COATING

Finished in a durable powder coat finish to resist the elements and complies with LK8/9 of VSB14 – NCOP

MESH PROTECTION

Rated mesh load guards to AS/NZS4034 protect all occupants in both internal and external ROP systems

PADDING

Compliant with Head Impact Criteria (HIC) of the latest code LK14/15 of VSB14 – NCOP and ADR3/02

INSTALLATION

All Safety Cell® ROPS come with extensive step-by-step fitting instructions as outlined in VSB14-NCOP and are fitted through a network of approved installers. We don't modify or drill your vehicle's chassis or punch external holes in the roof or B pillars.

FASTENERS

High tensile bolts, nuts and washers are used and comply with AS2465, AS1420 and AS1112

COMPLIANCE

All Safety Cell® systems are fitted with both a manufactures and installer's compliance plate in line with the National Code of Practice (NCOP). Each ROPS comes with an engineering certificate and are approved for installation by most Australian transport authorities

E-TRACE

Each system forms part of a traceability record as laid out in VSB14-NCOP

PACKAGING

Each unit is individually and securely boxed, palletised and plastic wrapped ready for global distribution.



DRIVE HOME SAFELY

IF YOUR CURRENT ROPS SUPPLIER IS UNABLE TO PROVIDE YOU PRODUCT THAT MEET THESE MINECORP STANDARDS CONTACT US AT MINECORP.COM.AU/DISTRIBUTORS OR CALL HEAD OFFICE ON +61 7 3723 1000.





WE ARE VEHICLE SAFETY

MINECORP HEAD OFFICE

37 Murdoch Crt
Acacia Ridge QLD 4110
Australia
P +61 1300 922 881
sales@minecorp.com.au
minecorp.com

BRANCHES

Minecorp Perth
27 Tacoma Circuit
Canning Vale WA 6155
P +61 (0)8 9256 7700

Minecorp Tasmania
24 Kelcey Tier Rd
Spreyton Tasmania 7310
P +61 (0)3 6427 2137

Minecorp Adelaide
10-14 Ayfield St
Para Hills West SA 5096
P +61 (0)8 8256 1201

INTERNATIONAL

Minecorp Chile S.A. – Chile
P +562 596 2500
www.minecorp.cl

Toyota Tsusho South Pacific Holdings – Fiji, Vanuatu, Solomon Islands, Samoa, American Samoa, Tonga & New Caledonia
P +61 (0)7 3512 9797
www.toyota.tsusho.com.au

Toyota Tsusho Africa – Angola, Djibouti, Ethiopia, Malawi, Mauritania, Mozambique, Sierra Leone, Tanzania, Zimbabwe, Zambia,
P +27 11 779 6700
www.ttaf.co.za

Rescon Industrial – Laos
P +856 2141 9008
www.resconindustrial.com

ARB Mongolia – Mongolia
P +976 9800 1753
www.arbmongolia.mn

Ela Motors – Papua New Guinea
P +675 322 9400
www.elamotors.com.pg

HBS Machinery – Papua New Guinea
P +675 475 1128
www.hbsmachinery.com.pg

Minecorp Johannesburg – South Africa
P +27 11 672 7902
www.minecorp.co.za

Tyre Plus Company Ltd. – Tanzania
P +255 767 551153
www.trentyre.co.za

Voyagers Rentals Ltd. – Zambia
P +260 212 620 161
www.voyagerszambia.com

For a comprehensive list of local and international Minecorp Distributors visit our website at **minecorp.com**

All information was true and correct at time of printing but could be subject to change without notice due to government legislation or other governing regulatory authorities and company OH&S policies