

iTruck™



Collision
Avoidance
& Productivity
Enhancement



Unique Operator Assistance, not Annoyance

- For haul trucks and light vehicles of all sizes
- Full range collision avoidance
- Increased productivity by operator guidance
- Intelligent false alarm mitigation
- Map overlay server, statistics, reporting


indurad
The Industrial Radar Company


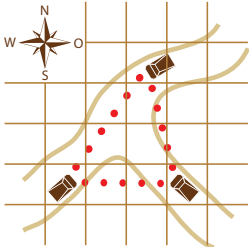


THE iTruck™ CUTTING EDGE SOLUTION

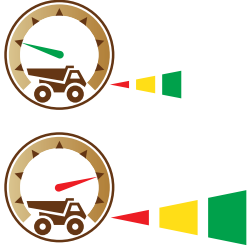


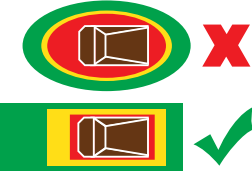
The **indurad iTruck™** is based on an intelligent sensor fusion concept and well ahead of state-of-the-art collision avoidance solutions. Together with the optional Smart Productivity Enhancement **iSPE™** the **iTruck™** additionally offers valuable and unique productivity and monitoring features. The **iTruck™** solution can be applied on all trucks independent of size or manufacturer.

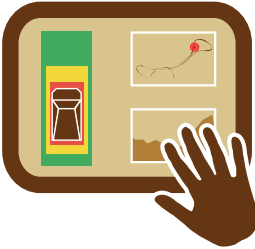



FEATURES

iCAS™ indurad Collision Avoidance Solution *

iSPE™ indurad Smart Productivity Enhancement **

			
Full Collision Avoidance * static and moving objects	Position Broadcast ** by radio modem GPS	Reversing Assistance ** at tiphead and crusher	Lane Assistance ** and fatigue monitoring

			
Speed Adaption * for stopping range zones	Trajectory Adaption ** for object detection	Inclination Adaption ** for stopping range zones	Collision Zone Shape * instead of bubble

			
7-10" Color Touch Screen * signals, sound, camera	Virtual Driving Buddy ** assistance, not annoyance	4GB Blackbox ** data log in case of incident	Digital Picture Snapshot ** triggered in case of incident

CUSTOMER BENEFITS

Collision Avoidance	Productivity	False Alarm Mitigation	Transparency
+ active & passive + multiple supplementary sensors	+ less damage and wear of material + optimize ramp space	+ object tracking + GPS location blacklisting + smart CAS range	+ event logging (speed, incidents, ...) + access via iWEB™

dust

V 2 P

rain

V 2



TECHNOLOGY & COMPARISON

“We are currently removing CAS systems from our trucks due to the amount of false alarms we get (...)
operators are either ignoring them completely or vandalizing the system out of sheer irritation“

“We need some form of intelligence in a radar based system“

DISADVANTAGES OF STAND ALONE TECHNOLOGY

1D Radar ○	Laser ✗	Tags ○	GPS ○	Camera ○
<ul style="list-style-type: none"> - high false alarm rate of 1D radar - no angular resolution - irregular shape of detection area 	<ul style="list-style-type: none"> - sensitive to fog, snow, dust - frequent cleaning required - maintenance of moving parts 	<ul style="list-style-type: none"> - broken or missing tags not identified - no angular resolution - battery depending - sensor blockage 	<ul style="list-style-type: none"> - only for open pit mining - limited coverage in pits - no infrastructure scan 	<ul style="list-style-type: none"> - operator distraction - frequent cleaning required - sensitive to bad visibility

To make mines safe it is crucial that collision avoidance solutions (CAS) provide reliable information at all times. Products with a single physical detection layer are either sensitive to environmental conditions or produce a high number of false alarms. This leads to reduced productivity and operator annoyance. Only a multi sensor concept as implemented in the indurad iTuck™ can meet the high requirements of the mining industry.

iTruck™ TECHNOLOGY: INTELLIGENT SENSOR FUSION ARCHITECTURE

2D RADAR · SPEED RADAR · ETHERNET CAMERA · GPS · ACCELEROMETER · INCLINOMETER

Dual Range Radar
iDRR™

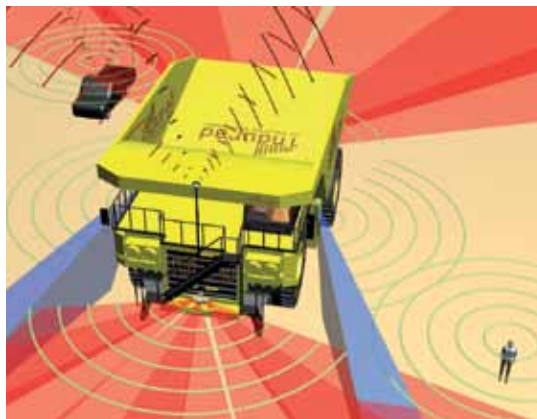
Doppler Velocity Radar
iDVR™

State Measurement Unit
iSMU

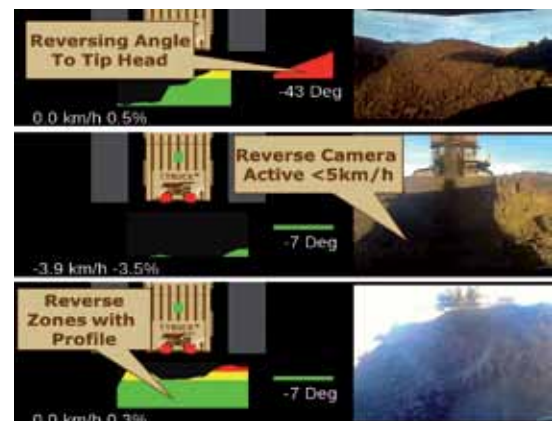
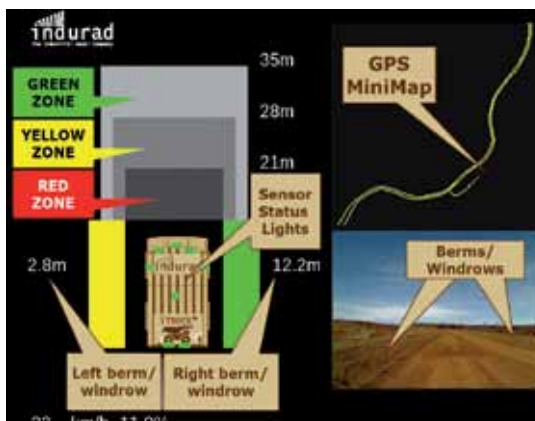
Digital PoE Camera
iCAM™

Radio Position
Broadcasting iRPB™

Becker Mining Tagging
iTAG™



The Radar Processing Unit iRPU™ merges all sensor signals. The information presented to the driver is intelligently condensed to what is crucial in the current situation. The indurad Operator Assistance Unit iOAU™ touch screen clearly visualizes the results.



2 V

snow

V 2 I

fog





specification	value
blackbox	4 GB solid state 60 s pre crash + 60 s post crash
installation time	1 shift
radar sampling rate	15 Hz
temperature range	-40°C to +80°C
accuracy	< 0.1 m
suitable for	mining trucks of all size light vehicles wheel loaders dozers
obstacle detection	passive (+ optional active iTAG™)
collision avoidance	V2P – vehicle to person V2V – vehicle to vehicle V2I – vehicle to infrastructure
type of mine	open mining pit underground mining (by partner Becker Mining)

available packages
<p>iTruck™ iCAS™</p> <ul style="list-style-type: none"> · advanced collision avoidance · fleet data acquisition
<p>iTruck™ iCAS™ + iSPE™ Basic</p> <ul style="list-style-type: none"> · full collision avoidance · fleet data acquisition · reverse assist productivity
<p>iTruck™ iCAS™ + iSPE™ Premium</p> <ul style="list-style-type: none"> · full collision avoidance · full fleet data acquisition and statistics · lane productivity · crusher + reverse assist productivity
<p>iTAG™ add-on</p> <ul style="list-style-type: none"> · Becker Mining Tri Technology · HF tag localization · UHF communication



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