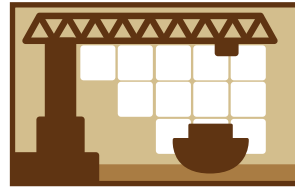


iProximity™



Collision
Avoidance
Solution



World's First 2D Radar Based Collision Avoidance Solution

- Easy cell based configuration via graphical webinterface iWEB™
- For stackers, shiploaders, reclaimers, cranes, vehicles, etc.
- Collision avoidance under all environmental conditions
- 150 m range, high resolution, highly selective
- Incident blackbox, optional camera snapshot
- Intelligent false alarm mitigation

**indurad**
The Industrial Radar Company

“Every collision brings us massive downtime“

“No more downtime due to bad weather conditions“

“Most incidents are avoidable“

AN INCREASING NUMBER OF CRANE ACCIDENTS

“The most frequent kind of incident, particularly for container ships, is contact incidents between the ship’s crane and a shore gantry crane. This type of incident frequently causes extensive losses, particularly if the gantry crane is seriously damaged and the port is unable to use it for extended periods. This may result in very large loss-of-use claims from the port authority [...]. It is consequently important for owners to be aware of this and take appropriate actions to minimise the risk of damage.“

Martin Hemqvist

Swedish Club Loss Prevention Manager

EXPENSIVE CLAIMS MAJORITY OF COLLISIONS

„Collisions dominate the picture when looking at the most expensive claims [...]. 12 of 12 occurred during the dark hours of the day [...] 3 of 12 occurred in very poor visibility [...] 11 of 12 occurred with experienced people on the bridge [...] It is difficult to tackle the causes of these accidents with traditional training. Navigating and ship handling skills were not the problem. Nor the rules and regulations [...]“

Fredrik Olsson

Swedish Club Claims Executive

Benny Johansson

Swedish Club Technical Manager

SCOPE OF APPLICATIONS



Boom Luff Protection
full collision avoidance
adjustable collision zones



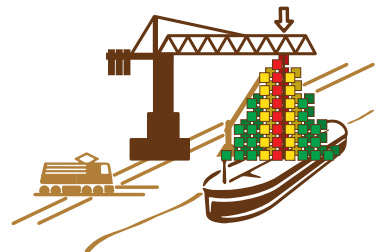
Boom Slewing Protection
collision avoidance in x-y plane
adjustable collision zones



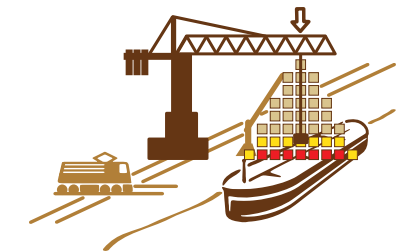
Counterweight Protection
definable collision avoidance zone
ahead of x-z plane



Linear Travel Protection
moving and static objects
definable collision zones



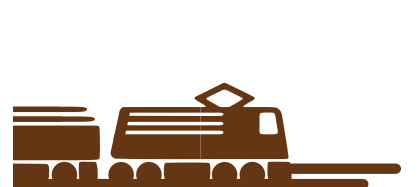
Chute to Hatch Protection
1-3 sensors depending on diameter
definable collision zones



Bin Level Control
optimize load distribution in hatch
adjustable level zones



Electronic Fence
between different loading structures
automatic stop



Additional Scenarios
cell based multi collision zone
reliable collision avoidance

sea spray

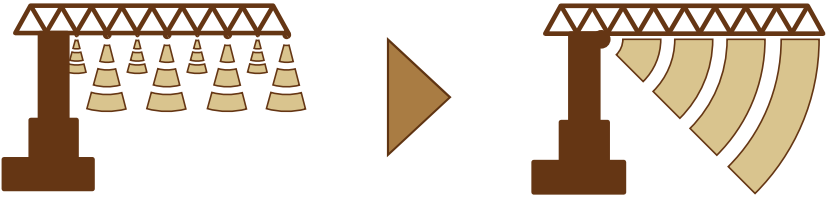
dust

rain







TECHNOLOGY AND COMPARISON

The **indurad iProximity™** is based on the award winning indurad Dual Range Radar **iDRR™** and well ahead of state-of-the-art collision avoidance products. The **iProximity™** solution can be applied in numerous setups. indurad offers individual ready to operate **hardware**, **software** and **engineering** solutions which smoothly integrate into any of your existing infrastructure.

STATE-OF-THE-ART	CUTTING-EDGE iDRR
<p style="text-align: center;">1D Radar</p> <ul style="list-style-type: none"> - low measurement range - low focus beam (5-24 GHz) - no angular resolution - irregular shape of detection area - side lobes of radar cause irritation - complex calibration 	<p style="text-align: center;">indurad 2D Radar</p> 
<p>1D radar solutions require a large number of sensors for providing reasonable collision avoidance.</p>	<p>A conventional setup for crane boom collision avoidance consists of a combination of 15 to 20 sensors.</p>
<p>The indurad cutting-edge solution requires only iDRR one sensor per side for full collision avoidance.</p>	

CUSTOMER BENEFITS			
Robust	Operation & Safety	Commissioning	Transparency
<ul style="list-style-type: none"> + operation where laser scanners fail: sea spray, fog, dust, snow,... + passive localization 	<ul style="list-style-type: none"> + less damage + reduce downtime + increase safety + reduce false alarms 	<ul style="list-style-type: none"> + no software installation + small number of sensors + no object tagging + electronic adjustment 	<ul style="list-style-type: none"> + blockage monitoring + object white-listing + incident blackbox + camera addon available

SELECTED REFERENCES			
	<p style="text-align: center;">Stacker</p> <p style="text-align: center;">boom luff protection boom slewing protection</p>	<p style="text-align: center;">Harbor Crane</p> <p style="text-align: center;">electronic fence linear travel protection</p>	<p style="text-align: center;">Shearer Loader</p> <p style="text-align: center;">linear travel protection customized canopy protection</p>
			

<p style="text-align: center;">snow</p> 	<p style="text-align: center;">fog</p> 	<p style="text-align: center;">storm</p> 	
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specification	value
object collision localization	up to 50 m x 150 m
linear crane positioning	1500 m, < 0.1 m error
obstacle detection	passive
sampling rate	15 Hz
temperature range	-40°C to +85°C
mechanical shock	50 g
blackbox memory	4 GB solid state
housing	robust aluminium IP66 enclosure corrosion protection (optional): ISO 12944-2 C5-M
health and safety	non critical complies FCC and ETSI no precautions no safety distance (1% of the peak power of a cellular phone)
classification	R&TTE, CE 0682 health: DIN VDE 0848-1 safety: IEC 60950 radio spectrum: EN 301 091-1/2 FCC Rule Parts 15.253 ACMA LIPD CL 2000 P 48

Where to use iProximity™?

Proven by customers around the world in a wide spectrum of applications the iProximity™ provides real benefits. Reliable collision avoidance is needed most under difficult conditions like dense fog or during heavy storms. While laser scanners fail, the indurad iProximity™ solution is always up and running, not influenced by environmental conditions. Customized solutions are available for:

- shiploaders, cranes
- stackers
- mining machinery

Why iProximity™?

- full collision avoidance not just proximity detection
- operable independent of weather conditions and visibility
- easy to install and to parameterize
- no maintenance
- electronic fence with automatic stop instead of trigger switch or safety lanyard device
- first step to full automation
- positioning and surface profile scanning add-ons available
- combinable with: indurad iBelt™ belt volume scanner, indurad iApron™ solution for car-dumper



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