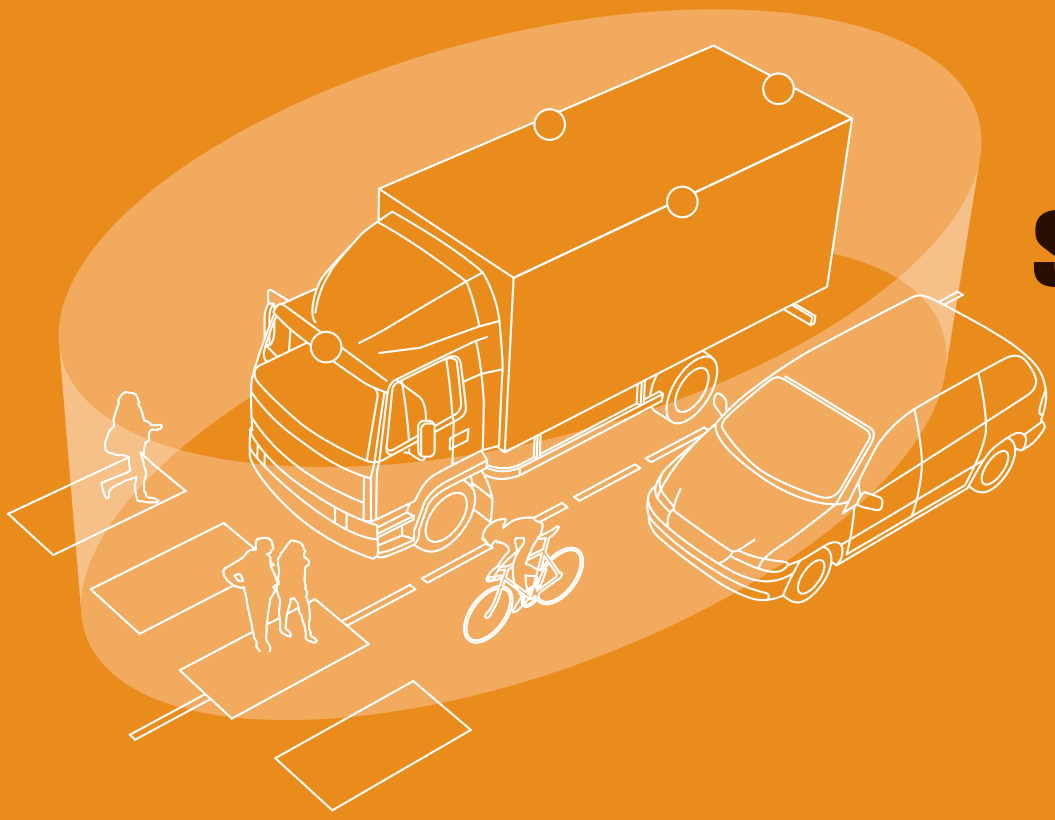
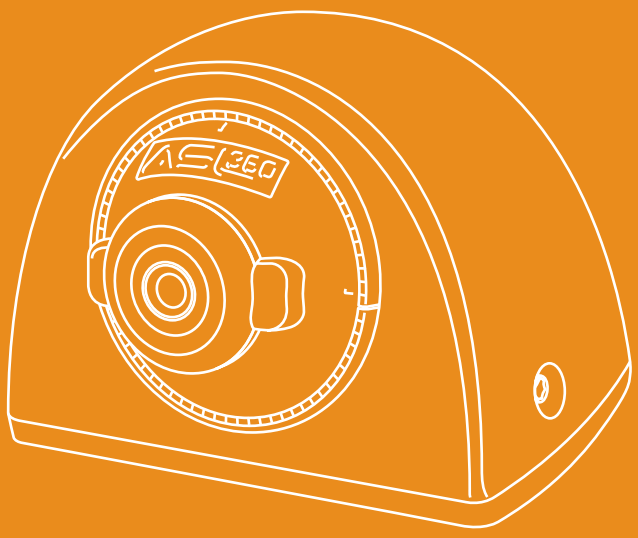
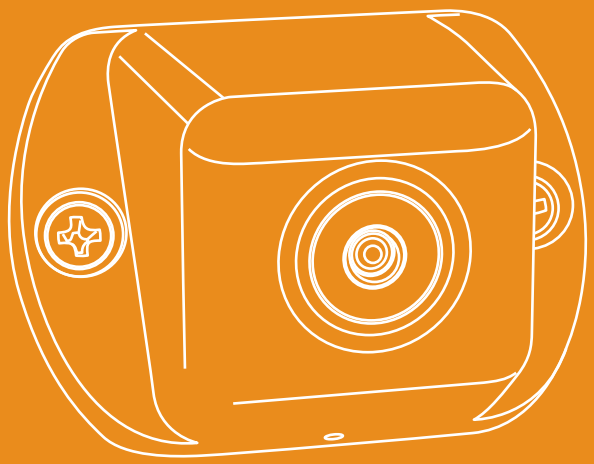
BRIGADE®

Vehicle Safety Solutions







Backeye®360

360° Camera Monitor Systems

Backeye®360

360° Camera Monitor System

The Costly Blind Spot

All vehicles have blind spots, and when a vehicle is in motion they become hazard areas, increasing the risk of costly collisions.

The substantial size and complex shapes of commercial vehicles and machines, and the lack of rear windows all restrict a driver's view, increasing the risk of a collision. The financial impact of property or vehicle damage and the associated downtime can be significant, yet even that is small compared to the emotional and corporate costs for all concerned when personal injury is involved.

Mirrors and single-view cameras help drivers see into these blind spots, but even with this extra assistance, the driver may still not see everything in the vehicle's path. After all, he can only be watching the road, or looking in one monitor or mirror at any given time.

Research shows that in the time it takes to scan[1] four mirrors, assess and then react[2] to hazards, even at speeds as low as 5kph a vehicle could travel as far as 10m.

That's a long way to travel without good visibility. Would you want to risk it?

Distance travelled while assessing and reacting to hazards

	Speed (kph)	
No. of mirrors/ monitors	5 kph	8 kph
1	4.7m	7.5m
2	6.5m	10.4m
3	8.3m	13.2m
4	10.0m	16.0m
5	11.8m	18.9m
6	13.6m	21.7m
7	15.4m	24.6m

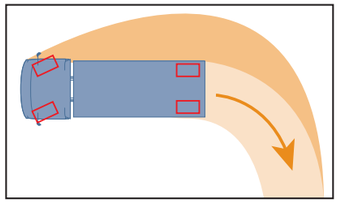
Even when manoeuvring at low speed, a vehicle travels a long way in the time it takes a driver to check all potential hazard areas in turn and then return his eyes to the direction of travel. The vehicle travels even further while any risks are being assessed and reactions are decided on and implemented.

[1]Source: Loughborough University and MIRA Limited, "The Development of Improvements to Drivers' Direct and Indirect Vision from Vehicles – Phase 2", Department for Transport. DfT TTS Project Ref: S0906/V8.
[2]Source: Sivak, M., P. L. Olson, and K. M. Farmer. "Radar Measured Reaction Times of Unalerted Drivers to Brake Signals." Perceptual and Motor Skills 55 (1982):594. 85th percentile.

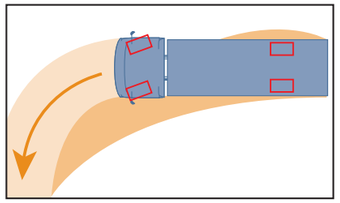
Hazard Zones

Even manoeuvring at slow speed, a driver needs to watch for potential hazards in several areas around the vehicle.

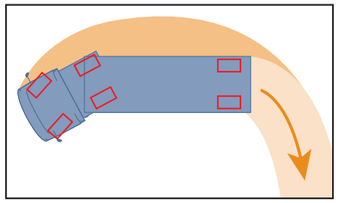
Key: Direction of travel; Collision danger zone



Rigid Body



Rigid Body with rear overhang



Articulated Vehicle

Eliminating the Blind Spot

Brigade has solved the problem of hidden blind spots with Backeye®360, a choice of camera monitor systems that offer the ultimate view of a vehicle for the first time. Using brand new technology they take vehicle safety to the next level.

Backeye®360 Systems are intelligent camera monitor products designed to assist low speed manoeuvrability by providing the driver with a real-time surround view of the vehicle in a single image.

Presenting all-round visibility in one image saves the driver or operator having to process information from several mirrors or monitors in quick succession, making it easier to spot and assess possible hazards.

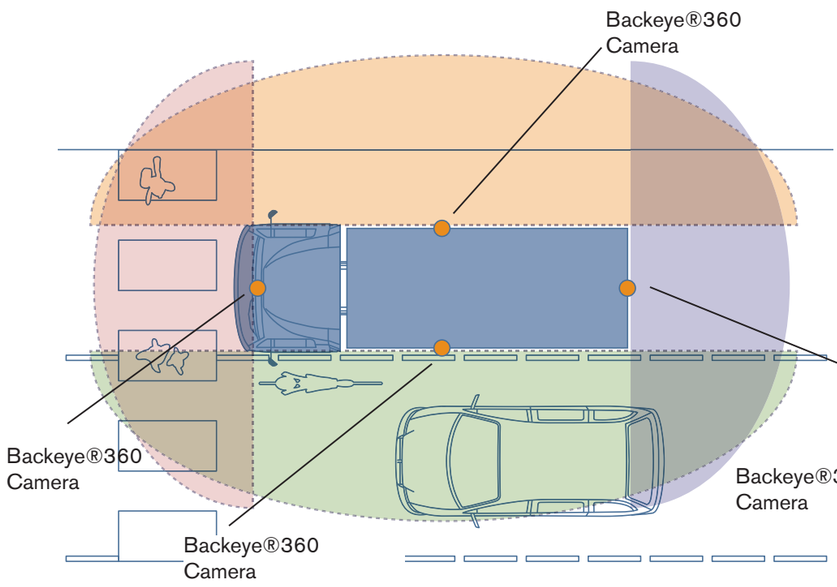
Backeye®360 Systems also help reduce the length of time a driver has to 'travel blind', either switching between mirrors, monitors, windows and the windscreen, or viewing a limited area in a single mirror.

With nearly 1,800 vulnerable road users killed or seriously injured on London's roads alone in 2012[3], there is still work to be done to make our roads safer.

Backeye®360 Systems will help achieve that goal.

[3]Source: Transport for London, Casualties in Greater London 2012. Pedestrians and pedal cyclists suffering fatal or serious injury in road traffic collisions.

- **Eliminates blind spots, improves safety**
- **Comprehensive view of the surrounding area in a single image**
- **Reduces collisions with people and objects**



Actual Backeye®360 image

Backeye®360 Systems

4 cameras
1 image
0 blind spots

Backeye®360 provides the driver with a real-time, 360° 'bird's-eye' view of the vehicle within a single image.

How does it work?

Brigade offers a choice of 360° technologies, both of which work with four ultra wide-angle cameras that each covers one full side of the vehicle with a viewing angle of over 180°. High-mounted on the front, rear and sides, the calibrated cameras capture all of the surrounding area including the blind spots of the vehicle or machine. The four live images are simultaneously sent to an electronic control unit (ECU) where they are instantly processed, combined, blended and stitched. The distortion from the wide-angle camera lens is also corrected before delivering a clear, smooth, real-time image onto the driver's monitor.

A flexible system

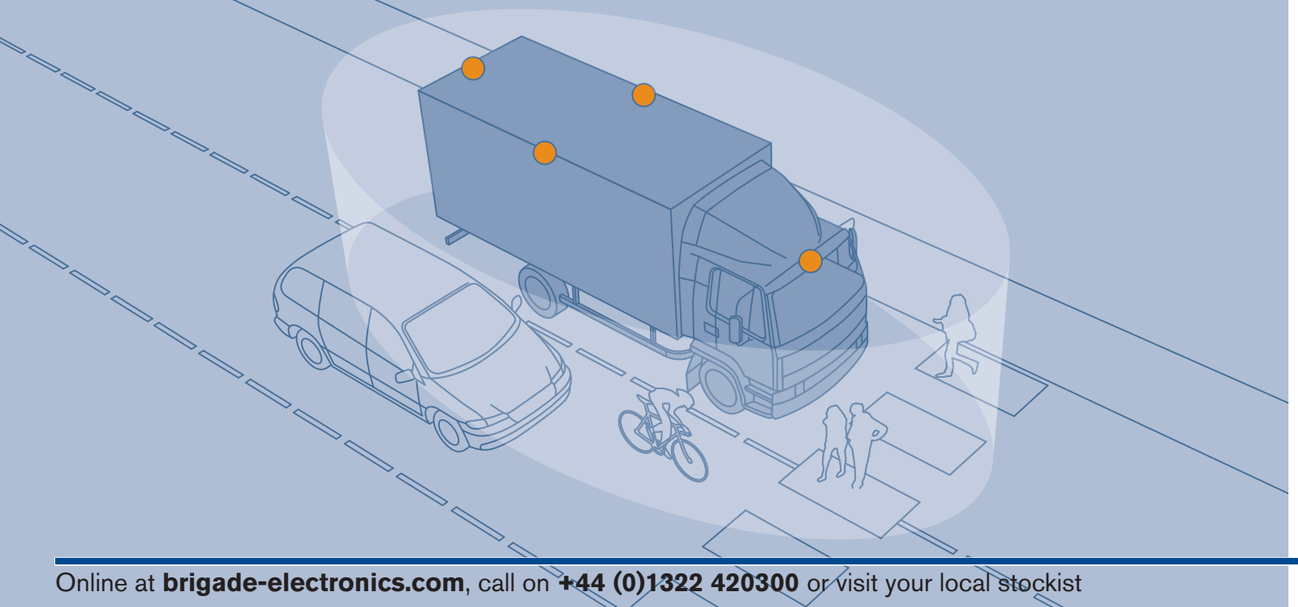
The Backeye®360 systems allow for personalised calibration and each installation is unique. The blending and stitching of the camera views can be configured to meet the requirements of the user and the settings saved to upload to identical vehicles in a fleet.

Backeye®360 will work on virtually any rigid vehicle or machine, large or small. The distance of the viewing area can be set to suit the application. For example, a refuse vehicle may only need to see a distance of 3m, whereas a large dumper at a quarry may require a radius of 40m. The flexibility of the Brigade systems means there are solutions suitable for both on- and off-road applications.

Safety and savings

Benefits of the system extend beyond reducing collisions with people and objects. The comprehensive view of the surroundings aids the driver when manoeuvring at low speed and can minimise tyre damage, as drivers of larger vehicles can see and avoid objects lying on the ground.

Backeye®360 Systems are compatible with Brigade MDR digital recorders, providing 360° footage that can be used in incidents of 'crash for cash', vandalism or false claims. Video evidence can help companies make major cost savings by refuting bogus claims, whilst importantly supporting their drivers.

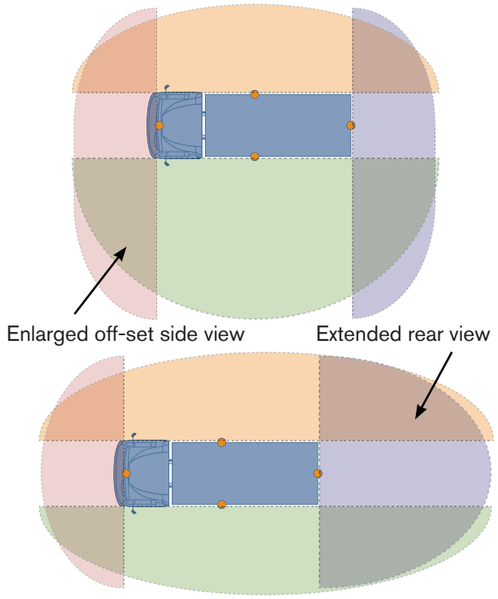


Installation and calibration

Installation

Installing the four cameras symmetrically around the vehicle is ideal, but not essential. The Elite system is particularly flexible and can accommodate almost all irregular vehicle shapes. The 187° camera viewing angle captures the entire face of a vehicle regardless of its position, so the image delivered to the driver's monitor can be calibrated to appear as though the camera is centrally mounted. Backeye®360 Select also has some flexibility, but is better suited to simpler body shapes.

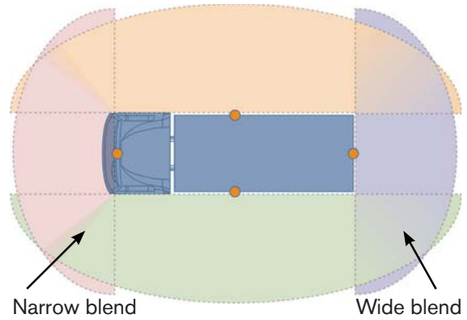
Examples of programmable image regions



Creating the view

When setting the system up, any overlap of two camera views can be blended. The width of the blend can be set from zero (hard-edged join) to the entire overlap. The blended line can also be placed anywhere within the overlap to minimise the impact on critical viewing areas for the driver. Backeye®360 Select allows the front corner pair to be set up independently of the rear corner blends, while the Elite system offers ultimate flexibility with the facility to configure each corner individually.

Examples of customisable blend widths

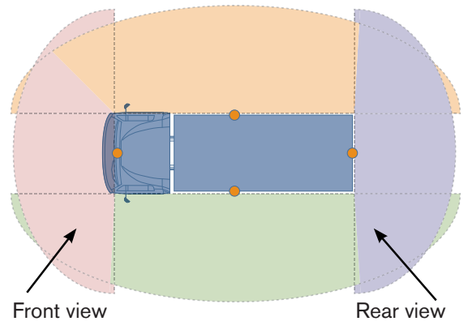


Auto-switching triggers

Each system has programmable triggers. These can be activated to deliver a view better focused on relevant danger areas when manoeuvring, e.g. selecting reverse gear displays a rear view alongside the 360° image, or indicating can add a side view. Additionally, the Backeye®360 Elite system can be triggered to switch off above a certain speed or can activate other ancillary devices.

Installation and calibration can be carried out onsite by a trained engineer, meaning Backeye®360 systems can be fully operational within a single day.

Examples of customisable blend positions



Backeye®360 Systems

Backeye®360 Elite

Backeye®360 Elite is the ultimate surround view system.

Sophisticated image-processing software gives great flexibility, so the 360° image delivered to the driver's monitor can be tailored to suit each individual vehicle, almost no matter how complex the shape.

Where images from two of the system cameras overlap at each corner of the vehicle, the join can be placed to make the critical hazard area as visible as possible. The shape of the join, and the extent the images from the two cameras overlap to provide visibility at height in the blind spot, can be adjusted for each overlap.

Eight output triggers allow combinations of views to suit almost every manoeuvre. The Elite system also has the ability to offer extended rear or side views as part of the 360° image when triggered by indicator or gear selection.

Cameras

ECU

Monitor option

Backeye®360 Select

Backeye®360 Select is an easily configured system offering the safety of a surround view to regular shaped, box body vehicles.

The virtual 'bird's-eye' image is presented alongside the view from one of the individual cameras, determined by the manoeuvre being executed.

The positioning of the camera image joins can be set for the front and rear pairs independently, and three triggers automatically present tailored views to the driver.

Cameras

ECU

Monitor option

Backeye®360 System benefits – Elite and Select

Features	Benefits	Backeye® 360 Elite	Backeye® 360 Select
Surround view in a single image	Easier and quicker to spot and assess hazards, increasing safety	✔	✔
Four cameras with ultra wide-angle lenses	Eliminate blind spots	✔	✔
Real-time 360° view	Fast and smooth image delivery	✔	✔
Self-monitoring of images	No frozen images, only real-time views on monitor	✔	✔
On-site calibration	No third party delays or need for specialist workshop	✔	✔
Configurable viewing distance	Range can be tailored to the work environment	✔	✔
Bespoke vehicle icon	Recognisable vehicle on monitor	✔	✔
E-mark approved	Type approval to ECE Regulation 10 R4	✔	✔
CE and FCC Certification	Tested and passed	✔	✔

Backeye®360 System benefits – choose between Elite and Select

Features	Benefits	Backeye® 360 Elite	Backeye® 360 Select
Customisable triggers	Best view of each manoeuvre	Bespoke views 8 triggers	Fixed views 3 triggers
Dual views on monitor	View the most critical areas	Bespoke image views	Fixed dual views
Customised joins between camera images	Seamless surround image optimised for your vehicle	Extensive	✔
Flexible camera positioning	Backeye®360 System will still be accurate if cameras installed off-centre	Extensive	✔
Full-screen 360° view	Entire screen can be devoted to the 360° view	✔	✘
Automatic light balancing between camera images	Easy to view, balanced image	✔	✘
'Pie dish' effect	Reduced image stretch, so that distant people and objects appear recognisable	✔	✘
Vehicle outline displayed on image	See actual vehicle footprint on screen when cameras fitted within vehicle perimeter	✔	✘

Brigade Monitors

Choose a Brigade monitor to suit your working environment. As a minimum size, a 7" monitor is recommended for use with a Backeye®360 System.

Brigade has a wide range of monitors including the waterproof BE-970WM Extreme, the BE-870LM Elite and the best-selling VBV-770M Select monitor.

For a larger screen size, Brigade has a new 10.4" Select monitor, the VBV-7104FM.

To order or for more information on Brigade's vehicle safety solutions;

brigade-electronics.com

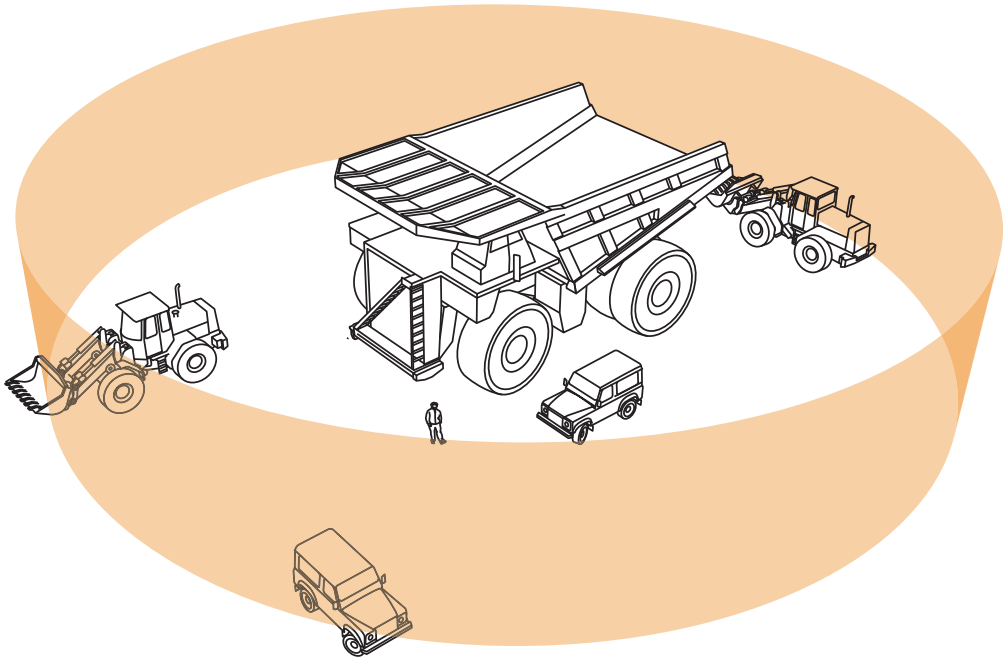
+44 (0)1322 420300

or visit your local stockist

Brigade's extensive portfolio of safety systems includes:

- **Backeye®360 Camera monitor systems**
- **Camera monitor systems**
- **Mobile digital recording**
- **'White sound' reversing and warning alarms**
- **Radar obstacle detection systems**
- **Ultrasonic obstacle detection systems**

Brigade products are designed to improve safety in and around commercial vehicles and mobile plant. Safety systems do not replace driver best practice. Please take care when manoeuvring.



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