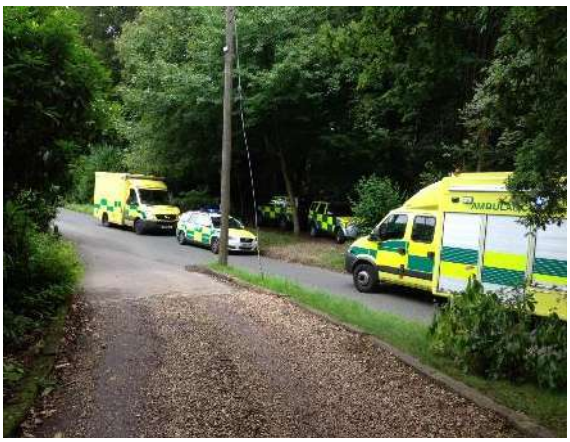
Chapter Five:

SAFETY BY DESIGN (Designing safety & reliability in)

Responsibility. The more people involved with the design of the whole system (in-situ machine) the harder it is defining manufacture responsibility. This puts greater focus on the owner should loss or injury occur and action is taken.

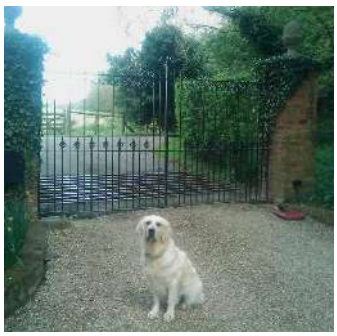
It is the owner's duty to insure the whole system is maintained to a safe state both manually and powered.

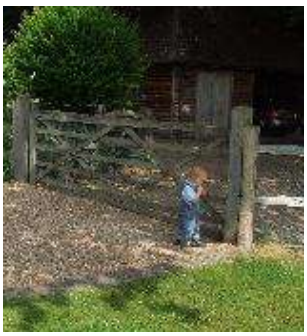
To aid owners with this legal responsibility it is advised that all systems be designed, installed and maintained by qualified and established companies willing to take charge of all elements and parts of the system as is reasonably practical to do so.

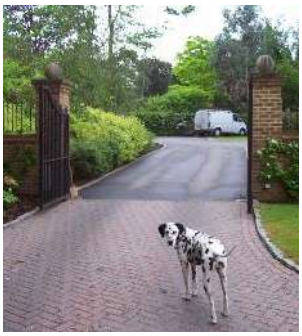


Safety. Every system should be designed to be as safe as practical in all aspects, and for all users, bystanders, pedestrians, vehicles or otherwise. Safety requirements can change according to the location and the number and type of users. An example of this is a gate that may be used by the public (untrained), or just by a limited group of users (trained).

A focus on reliability and safety first, is always necessary with the objective of addressing security, cosmetic etc. needs as reasonably practical.







Sometimes, the safe operation of a system may be secondary to its continued functionality, as the overall operation of the system could provide a greater safety requirement than an individual aspect that would otherwise appear less safe than it could be! **Example**: It is arguably of higher importance that a level crossing gate closes, with less regard of personal injury than that of a train hitting a vehicle or pedestrian!

The same may be said of gates securing other areas of potential danger, such as a water works, military site, or power station, etc. Main roads and child safety can also be issues that require responsible decision making.

The global overview is very important when selecting and proposing the best safety products and solutions for any system, as well as their performance and implications on the system in use. The reliability of the product within its working environment is once again of great importance.

Seasonal or consequential changes may need to be taken into consideration as well as any activity or event held locally that is not normal or usual. This is typified by such events as the 'Notting Hill Carnival' and the extra crowds of people that are attracted. Local football matches, school events and other activities could bring additional risk issues to a system that would otherwise go un-considered.

These issues may be short lived and rare but an effect on the risk and associated recommendations will need to be considered by all parties. If a potential risk is identified, however small, it must be dealt with or shown to be a negligible risk.

Safety maybe split but not limited to two main categories of consequence: each must have a consideration toward pedestrian and vehicular or other users (pets, livestock etc.)

'A' Major & Serious Risk Potential

'B' Minor & Not Serious Risk Potential

'A' Major or Serious is the likelihood of serious or life threatening injury from any part of the system whether operational or otherwise. Most commonly these areas of concern may involve exposure to dangerous voltages, excessive force or loads, or any cause that would seriously injure with an irreversible consequence.

These areas of risk require total protection whereby suitable and appropriate safety measures or products are to be strongly recommended without fail.

'B' Minor or Not Serious is the likelihood of minor temporary injury, such as bruising or scratching. Although not as serious they should still be prioritised with suitable recommendations made.

The **manual operation** of a system is equally as important when forming a risk assessment and recommendations for the activation and operation of the gates manually need to be considered accordingly.

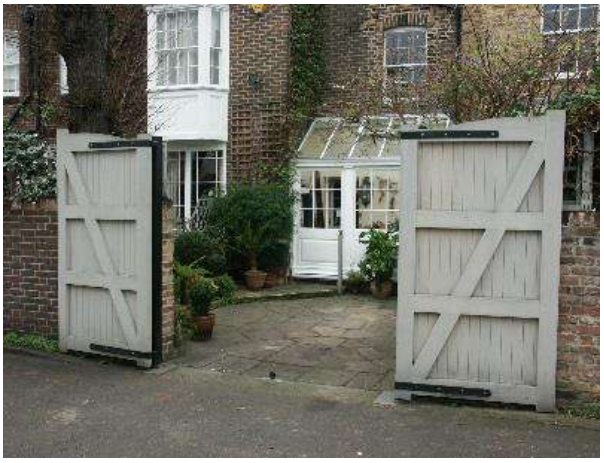
Associated equipment may also have an influence on the safe design of a system, for example, poor lighting or other such electrically supplied product that may be located near to, or affected by the system.

Hazard consideration through the design and build of all systems.

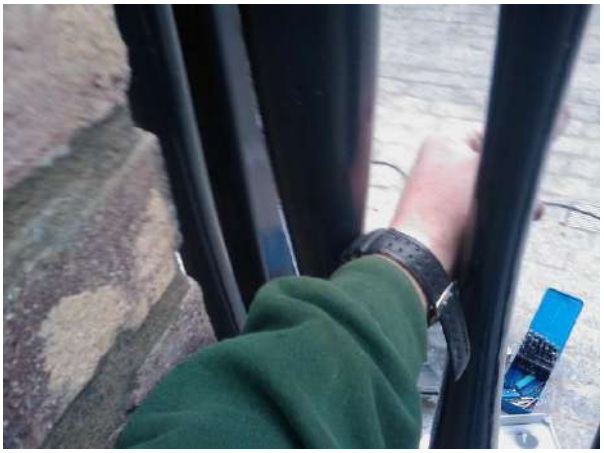
Considerations for Both Opening & Closing!

***Consequential*:** During use of the system is there any area or part of the system that may cause injury as a consequence of operation.

E.g. A gate pushing somebody into or over a hazard, such as a low wall, or into a sharp object, or a door that opens out into the highway or over a footpath, etc.

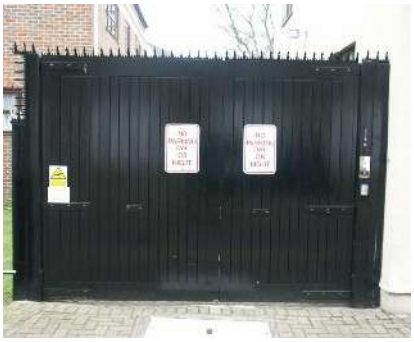


***Crushing*:** Can the system cause injury by crushing?



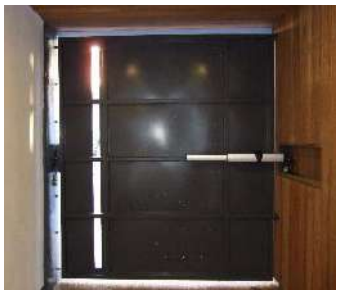
***Cutting*:** Can the system cause injury by cutting?

***Sharps*:** Are there any sharp areas of the system that can cause injury?

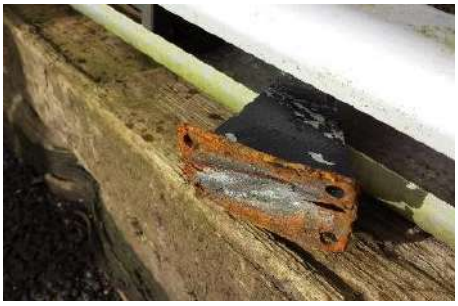


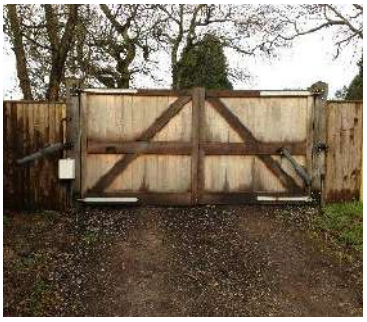
***Dragging*:** Could someone be dragged along by the system or into it causing injury directly or otherwise?

***Entrapment*:** Can somebody get trapped by the system (in or behind etc)?

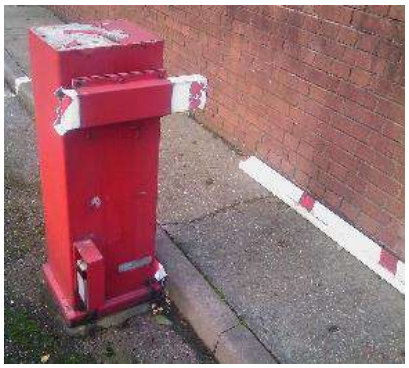
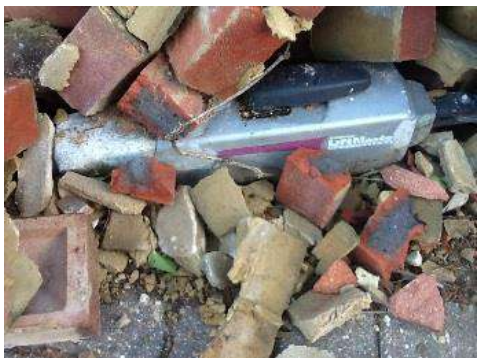
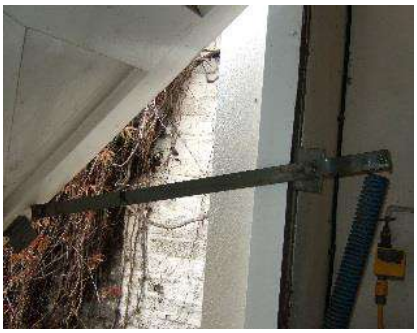


***Force*:** Is injury likely to be caused by the force of the system in either direction?





***Impact*:** Is impact likely to cause injury during operation of the system? A barrier beam, lift gate or door coming down?


***Loose or worn*:** Are there any areas of the system that could cause potential injury now or in the near future?

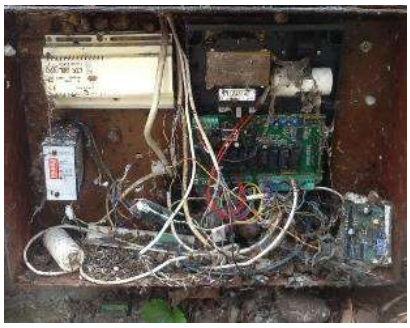
E.g. worn hinges or suspect support structures, loose components or damaged areas, including faulty parts etc.

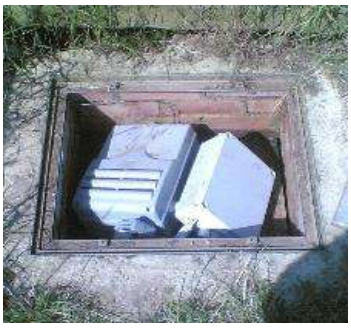


***Falling*:** Could any part of the system fall causing injury or damage?

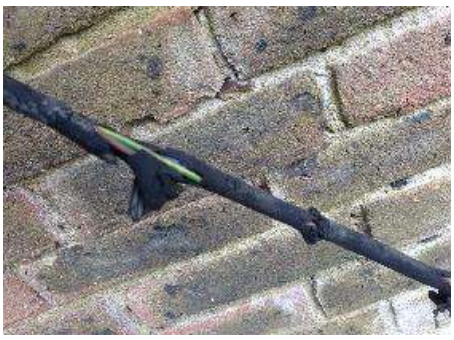


***Mains power*:** Any risk of injury from mains power exposure? Are all electrical connections fit for purpose? Is the system isolated and is there a working RCB safety trip installed?

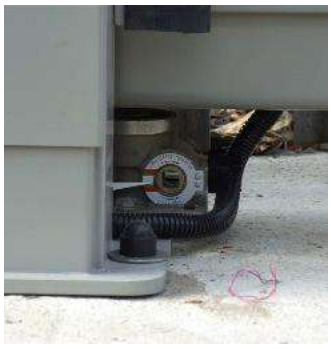


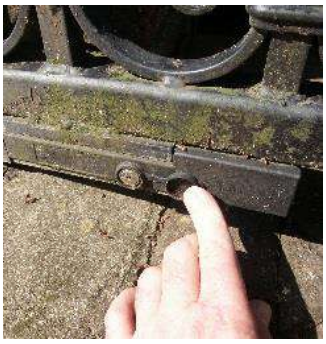


***System cabling*:** Is there any risk of injury from the electrical integrity of the system at any time?

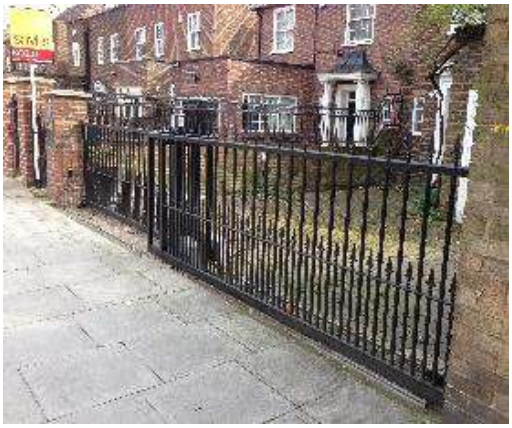
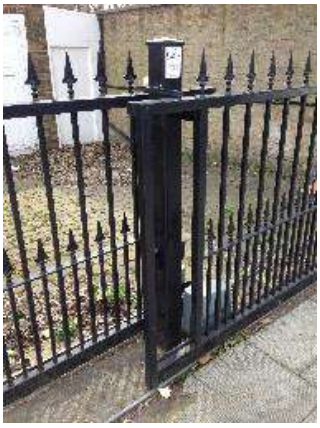


***Manual setting*:** Is manual operation easy to access, reliable & safe?
Could the use of the manual release cause injury?
Are suitable physical limits in place?

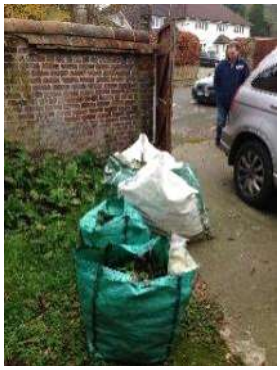
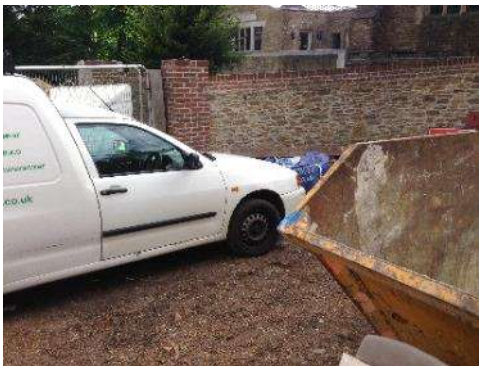




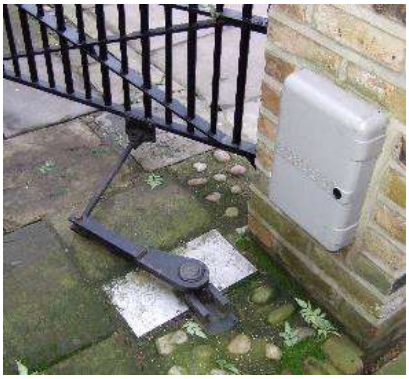
***Shearing*:** Are there any shearing points during operation that could cause injury?

Temporary: The location of a temporary obstacle could cause reason for concern? A skip or pile of building materials left by the gate could become a temporary hazard and require attending to?

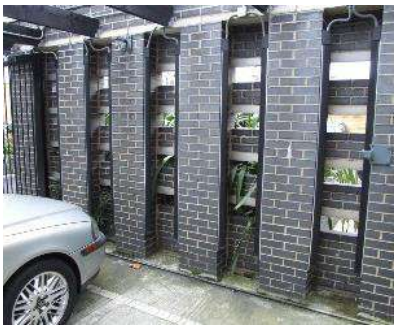




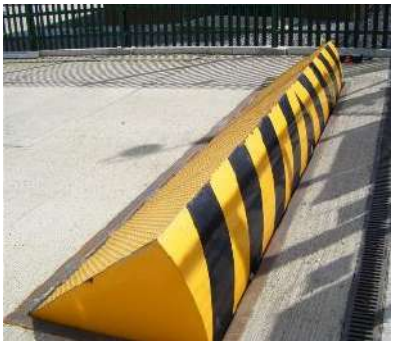
Trip: Trip hazards should be avoided within the system design where possible (swing gate stops, etc., may be a necessity so their size, shape and location should be designed with this in mind). A separate pedestrian access is always to be recommended with pedestrians encouraged to use it.

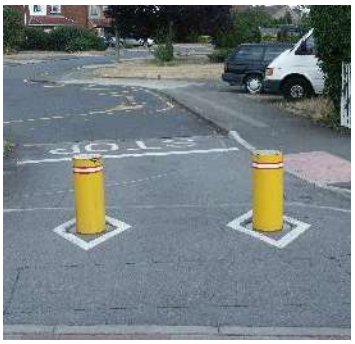


Hazard: Does the system create a hazard in use or during operation?
This may be explained by its sudden unexpected operation and the possibility of consequences arising (an example being that of a rising bollard or such like, running up without suitable warning for all and being hit causing damage or injury).



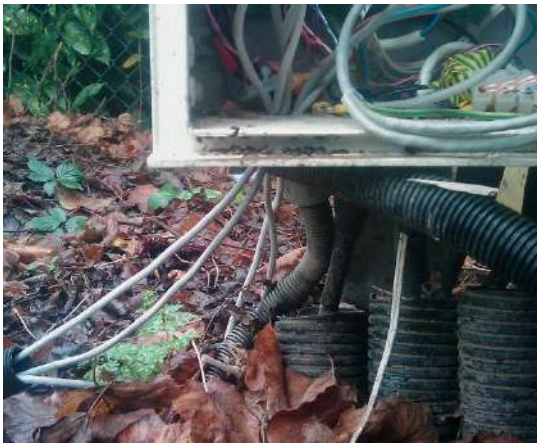






Lack of service: A lack of routine inspection, testing, servicing or maintenance can result in deterioration of all sorts of items, controls and equipment, that could increase the likelihood of injury or damage. Regular product support is highly recommended, regardless of system type or installation quality.



Safety Hazard risk reduction.

The risk of injury to persons or damage to property should be regarded as having a similar need. Although personal injury carries the naturally obvious focus, it is however true that personal injury may be caused within a vehicle impacting or avoiding impact with a gate system.

Safety can be provided and perform in differing fundamental ways:

By Design:	Designing the installation to suit safe use
Physical:	Materials that restrict access to areas of safety risk
Noncontact Reactive:	Products or devices that react without contact
Contact Reactive:	Products or devices that react upon contact
Warning:	Control or flashing lights and signage etc.
Informing:	CCTV, monitoring and alike.

The type and location of each of these solutions may be reliant upon the users, environment, reason-for-purpose, or the objective(s) of the system.

Often greater benefit can be achieved with each of the above in order as shown. **Design** should be the first consideration. **Physical** would usually be seen next, followed by **Non-contact reactive**, before **Contact reactive**. **Warning and informing** would then follow, however some sites required a different priority and for good reason.

For example, Bollards and Blockers need Warning high up the list and high security sites may need Informing as a priority. Each site has to be assessed around its own requirements and owners directive.

NB. *Contact reactive could still cause consequential injury, while performing to the required standard.* ***Example****; A baby could be flung from a pram when a career is unaware of a closing sliding gate, while walking through the opening, even though the gate reacted immediately !*