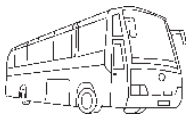
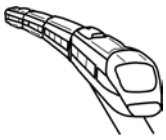
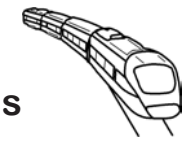
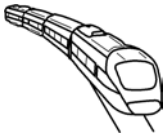
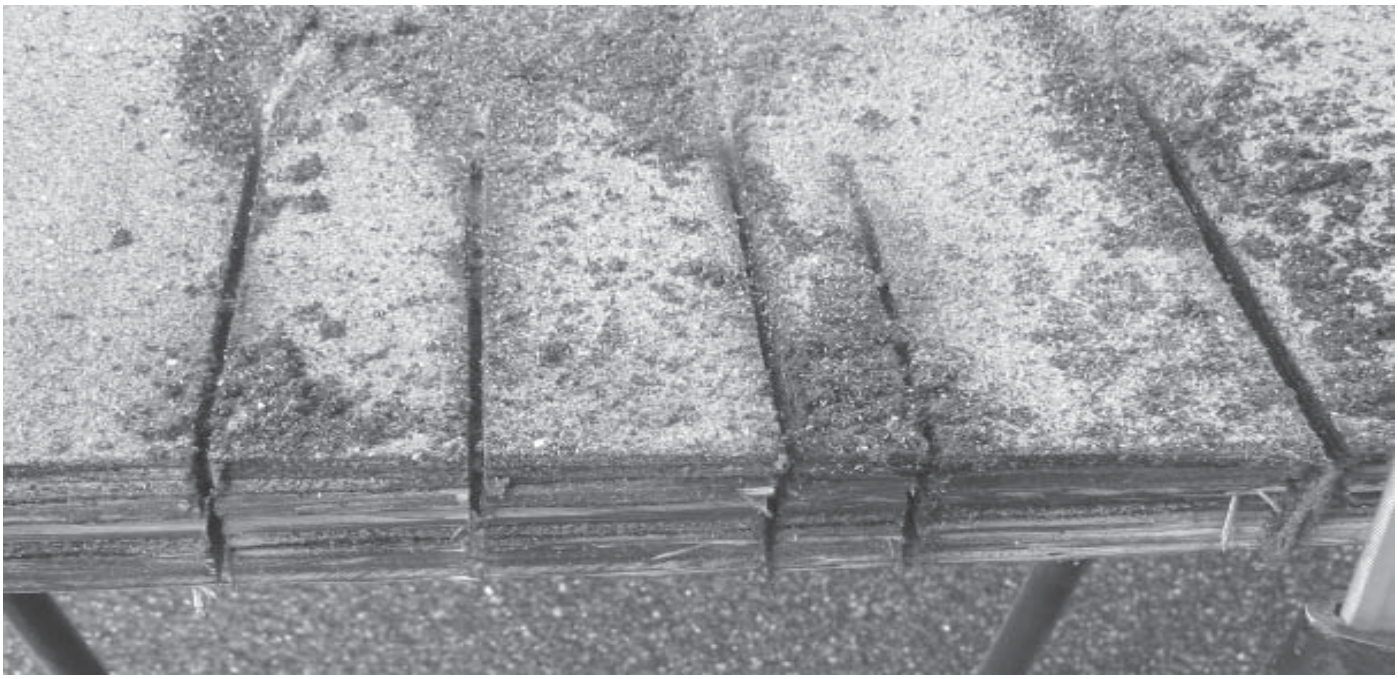
Twin Saw®

Operating scope of Double Cut Saws in Rescue Operations

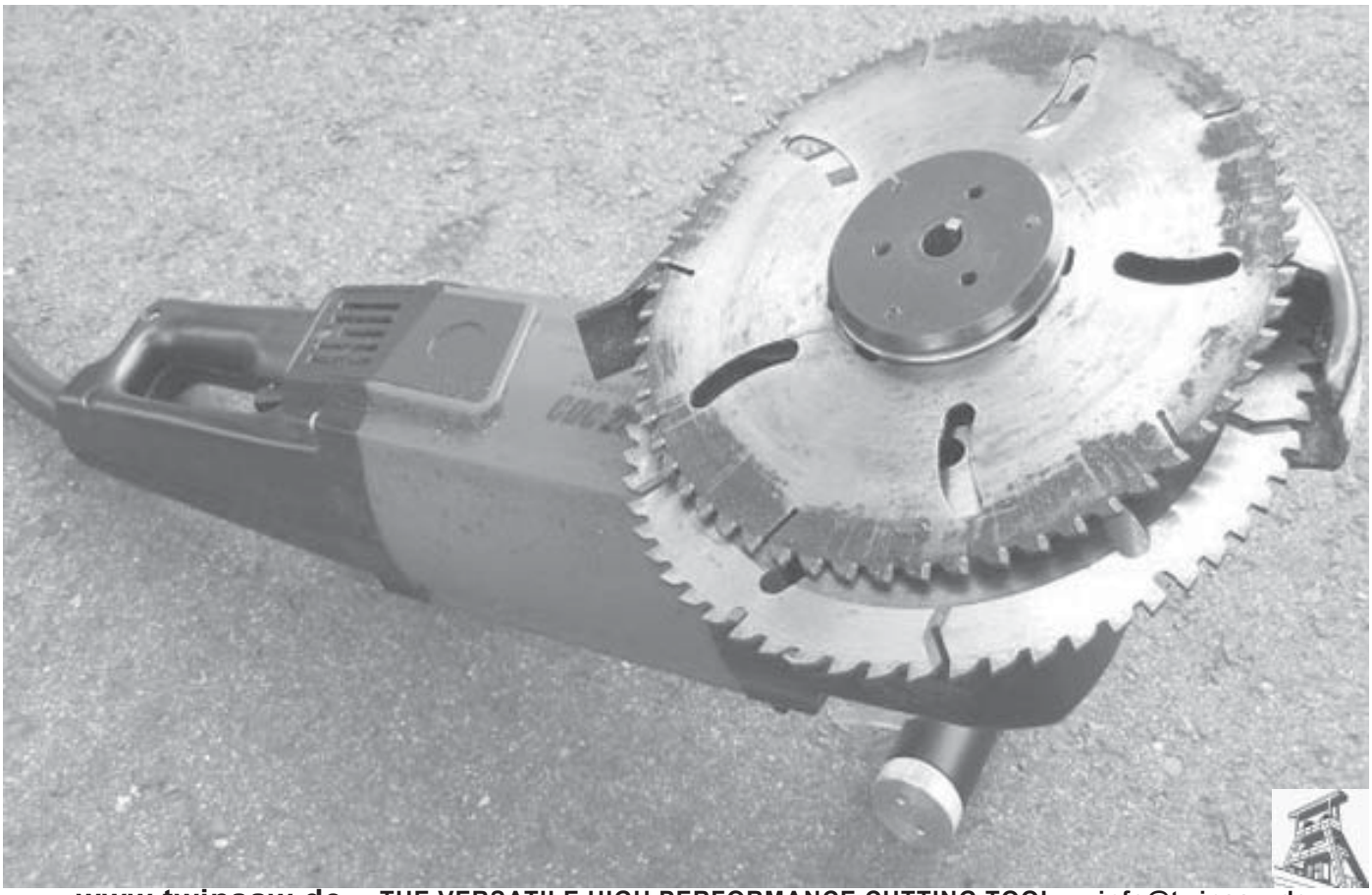
Category designation	Symbol	Types of operation (e.g.)
EB-R 1 Fire Fighting Forced Entry		Cutting roof openings Fire doors Accidents at work
EB-R 2.1 Road transport Street furniture		Crash barriers Traffic-light masts Traffic signs
EB-R 2.2 Road transport Private vehicles		Wing panels and side impact bars ; multiple pile-ups Preparations for hydraulic forcing tools
EB-R 2.3 Road transport Heavy goods vehicles		Stress relief cutting (chassis) Preparations for hydraulic forcing tools
EB-R 2.4 Road transport Busses and coaches		Freeing drivers and passengers Cutting access holes Freeing trapped accident victims
EB-R 3.1 Rail transport Passenger trains		Cutting in confined spaces Cutting rescue openings Freeing trapped accident victims Cutting in very dangerous situations
EB-R 3.2 Rail transport High-speed/intercity trains		Cutting rescue openings Freeing trapped accident victims Cutting in very dangerous situations Cutting in very difficult materials
EB-R 3.3 Rail transport Goods trains		Cutting open containers in fire hazard situations Making openings in burning containers Cutting open fuel tanks
EB-R 4.1 Air transport Passenger aircraft		Cutting rescue openings Freeing trapped accident victims Cutting in very dangerous situations Cutting in very difficult materials
EB-R 4.2 Air transport Military aircraft		Cutting open the fuselage Cutting open cockpits Rescuing pilots

EB-R1 FIRE FIGHTING FORCED ENTRY



The ultimate test: 21st September 2004:
Vejle Fire Brigade, Denmark
68 mm depth of cut with
35 mm of newly-laid asphalted roofing felt laid on soft wood

Working from the roof edge and centre with a plunge cut



EB-R1 FIRE FIGHTING FORCED ENTRY

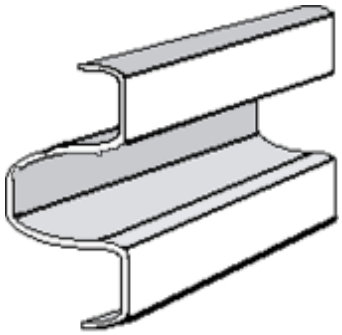
Fire doors – the toughest of all challenges

Forced entry to buildings is usually associated with the outbreak of fire. With their cold-cutting potential and reaction-free operation TwinSaw machines offer a real alternative to conventional cutting appliances. While fences, gratings and doors (see small photos right) usually present no problems, cutting through fire doors (main photo) requires to saw operator to work carefully in a series of defined stages. Barriers of this type usually contain tough, temperature-resistant steel inserts beneath the main steel panels. The way in which these inserts react to the cutting process is quite different from that of the surrounding filler material and panel covers. Cuts have to be made using a very smooth action and the saw has to be withdrawn from the cut at repeated intervals. This helps clear the saw chips and gives the saw teeth time to cool down between the high-vibration cutting phases. The most effective approach is to remove the door outer skin first and then to tackle the frame sections.

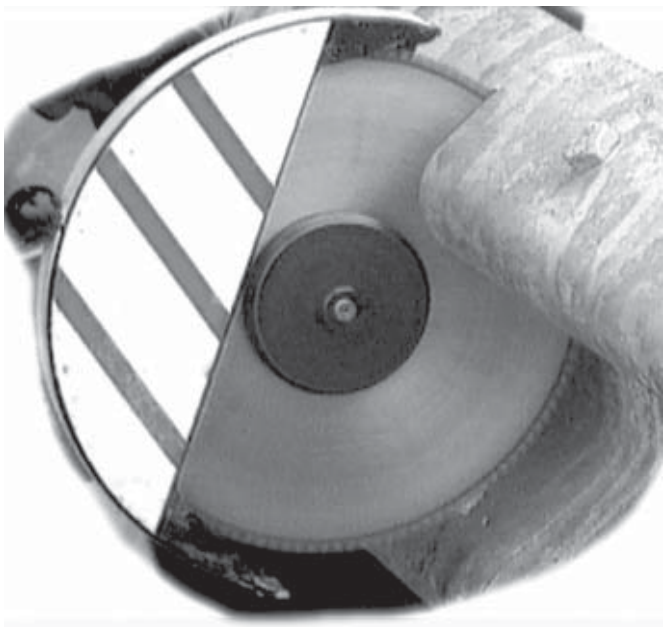
For applications of this type we propose the following set-up:

1 2224 020	**TwinSaw CDC 2224 Universal Rescue** for cutting normal steel, wood, glass or plastic railings and fences in conjunction with
1 2224 300	CSH 235 special-grade TIN blades for tough materials and
1 0010 102	Opta+ special-grade lubricants for hard metals

EB-R2.1 Traffic signs

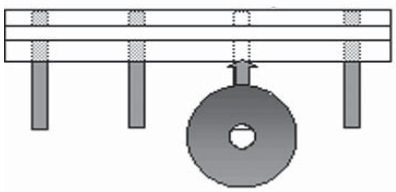


German Crash Bar

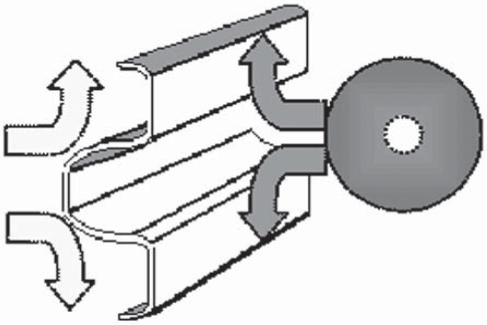


Crash barriers are designed to decelerate objects travelling at high momentum. The transfer of energy that occurs, for example, when a car strikes the barrier results in deformation and stress in the material. No matter what the design of the barrier structure, the supporting posts are now placed closer together in order to prevent the barrier from being ruptured and the vehicle in question from breaking through to the opposite carriageway. However, the joints where the sections of barrier meet continue to be set the same distance apart. This means that the energy-dissipating deformation is transferred backwards and the stress absorption is increased significantly – a fact that imposes even greater demands on those whose job is to cut through the supporting posts. The operation therefore consists of a) detaching the support posts and then b) very carefully cutting through the actual crash barriers, so as to prevent any jamming of the machine.
One effective method for removing the crash barrier at the scene of a crash is depicted below:

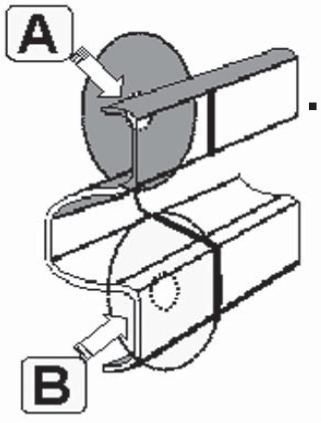
Step 1:
Cuts through support post in order to relieve the stress acting on the barrier



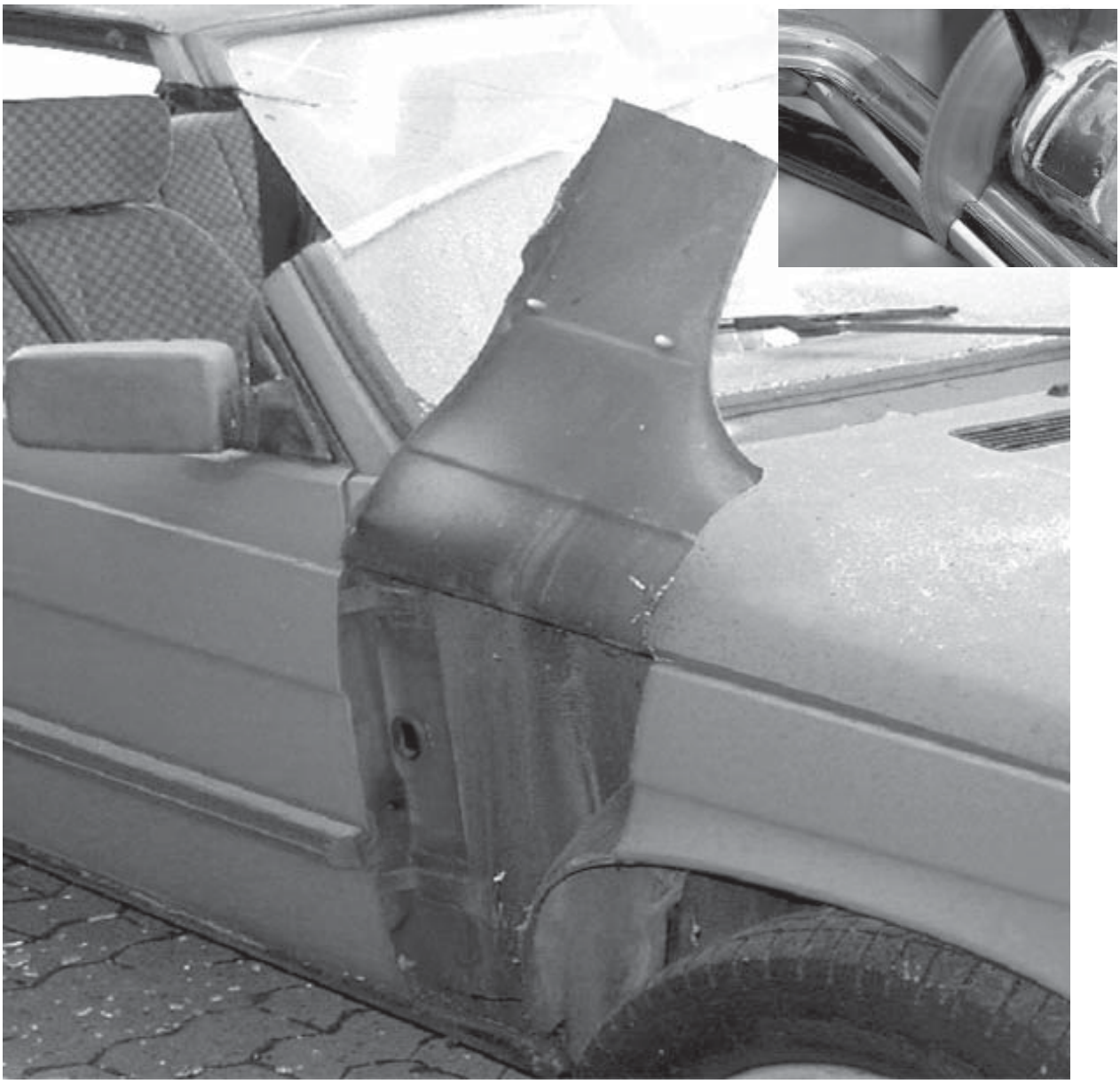
Step 2
Saw through the vertical faces of the barrier from the centre point outwards



Step 3
Cut through the centre section of the barrier, withdrawing the saw repeatedly and working both sides in turn.



EB-R 2.2 Rescue from private vehicles - cars



Removing the front door of a car door by combined use of a TwinSaw CDC 2530 and hydraulic forcing tools/ jaws of life

Irrespective of the condition of the front section of the car or doors the cuts shown in the photo can be used on any vehicle of this type to expose the door mountings, which can then be removed by means of shears or forcing tools. While it is technically possible to cut right through the mountings, it is preferable to save wear and tear on the saw blades – especially when more than one vehicle has to be dealt with. The door posts (top of photo) and windscreen should only be cut through in an emergency situation (when no hydraulic appliances are available, or when dealing with multiple pile-ups), so as to avoid any risk of injury to the accident victims due to flying chips. . It is beneficial in such cases to remove the outer door skins in order to expose the internal frame sections. Despite the thin-section panels the saw should still be withdrawn slightly from the cut at repeated intervals. Cutting directly into the door tends to be less effective, as the saw operator will not be familiar with its construction, and the presence of rebates and protruding plates can prove problematic.

Equipmet proposal: Rescue Set CDC 2530 Combo 1 2530 080

EB-R 2.3 Rescue from heavy goods vehicles - trucks

Momentum = m x v = mass times velocity
An HGV has a momentum = 38,000 kg x 90 km/h ~ 950,000 kg = 950 tonnes
A car has a momentum = 1,500 kg x 140 km/h ~ 58,333 kg = 58 tonnes

Disaster 1: Car crashing into HGV
the car wedges itself beneath the HGV and comes to a stop when its energy is dissipated against the high-strength frame sections of the larger vehicle. Result: crushing of the vehicle structure and torn metal mean that access to car driver/passengers is very difficult; frame components on HGV are under stress. Situation is similar to that of a rail crash. Under such circumstances the twin-blade saw has the advantage of allowing the rescuer to cut at arm's length into areas that would not normally be accessible to cutting tools. The photo (top left) shows an HGV frame post that has been cut through using a CDC 2530 TwinSaw machine (Dortmund Fire Brigade).

Disaster 2: HGV rear-end collision - a very common type of incident
In such events the driver is often wedged beneath the dashboard. Here stress-relieving cuts have to be made into footboard of the HGV so that the steering column can be removed using the rescue ram. If the driver is trapped in the cab he/she can be gently and efficiently cut free with the saw.

For applications of this type we propose the following set-up:

1 2530 080 **TwinSaw CDC 2530 Combo Rescue** (including training equipment)
for cutting normal steel, wood, glass or plastic railings and fences

in conjunction with

1 2224 110 CSMB 235 special-grade blades with quick-detaching system
1 0010 102 Opta+ special-grade lubricants for hard metals

EB-R 2.4 Rescue from busses and coaches

Cutting an opening of a passenger bus for rescue by
Danish Rescue and Fire Fighting School Tinglev in june 2004

The **CDC 2530 TwinSaw** machine can be used for making horizontal cuts in the bodywork of a passenger coach in order to create an opening large enough to extract trapped passengers.
The saw can be ergonomically cradled on the arm and is continuously pushed forwards along the saw cut at a rate of about 1 metre a minute. This technique is easy on the rescuer, who is the most important person at the scene of the accident. First the outer skin is cut away, followed by the inner lining. This significantly reduces the quantity of flying chips entering the passenger compartment and also produces a much cleaner cut. The top of the photo shows a perfect opening that has already been cut. This takes between 8 and 15 minutes, depending on operator experience. As the edges of the cut are burr-free and do not have to be protected the rescue operation can commence immediately. Perfect!

For applications of this type we propose the following set-up:

1 2530 080 **TwinSaw CDC 2530 Combo Rescue** (including training equipment)
for cutting normal steel, wood, glass or plastic railings and fences

EB-R 2.3 Rescue from normal passenger trains

The photo shows an opening that has been cut in the side of a **conventional passenger train** using **TwinSaw CDC 2224** during a training exercise at the Niedersachen Fire Servicie Training School in Celle.

As with the coach, the outer panel is first removed, followed by the inner lining of the carriage. The horizontal framework at the bottom of the cut conceals the heating system, which can also be removed with the saw. The same applies to the passenger seats. A useable opening can therefore be created within the space of about 12 minutes. The saw has also been used here to cut away the window panes. The most effective approach is to remove the window complete with its frame, which can be achieved either by drilling out the frame pins (recommended) or by cutting away the entire frame.

TwinSaw has developped a special set/equipment for these rescue tasks. These set includes all spare parts except a generator, a small rescue team needs for acting individually and efficient.

TwinSaw Special Sets Train 040

Art. 1 2224 040 with CDC 2224 - **Art. 1 2530 060** with CDC 2530 - **Art. 1 4030 060** with CDF 4030 each set has a standardized content:

2 pairs of normal blades CSM, 2 pairs of CSH-Blades for hard cuts, 2 l lubricant Cool+ and so on. The CDC 2530 and the CDF 4030 sets do have additional 2 pairs of diam. 235mm CSHB blades with quick-change-system for close spaces.

EB-R 2.3 Rescue from passenger trains Disaster of Göppingen 04-12-04

CDC 2224 TwinSaw machine in action at the scene of the Göppingen rail crash

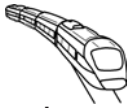
The collision of the two trains resulted in three fatalities. The photo shows the successful efforts of the rescue team to cut an opening for access to the interior of the crushed carriages. The saw is shown in action and the stressed metal is being severed without difficulty. Here the saw operator is able to deploy the machine without holding the front grip, as the saw can cut through the material without any backlash. The cloud of fumes visible above the saw has been caused by the unsuccessful attempt to deploy a plasma cutting appliance. The real test for the TwinSaw - SUCCESSFULL!!!

Wide range of materials and composites?
Materials to be cut subject to high/unknown levels of stress?
Rescue teams subject to high levels of strain and stress?
Cramped working conditions?
Cutting required close to the accident victims?
People trapped in wreckage?
Burr-free edges and clean cuts required?
Risk of fire due to flammable materials?

Experience shows that there is only one solution:

THE TWINSAW COUNTER-BLADE RESCUE SAW

PROPOSAL: SEE SIDE BEFORRE



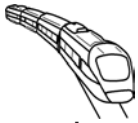
EB-R 2.3 Rescue from passenger trains Disaster of Süssen - 05-04-04

CDC 2224 TwinSaw model in action at the scene of a rail crash - cutting inside the damaged area to get the train leader out - successfully!

Few situations are as complex as a train crash when it comes to dealing with materials and composites under high stress, with the added complication of working in cramped conditions. After a series of unsuccessful attempts to carry out the operation with various types of tools and appliances, the rescue teams were ultimately able to complete all the cuts required using a twin-blade cutting saw. The high-performance machine proved its worth in the cramped conditions of the crash scene and as a result the work of the rescue teams was made much easier and safer.

HIGH-PERFOMANCE CUTS IN CLOSE SPACES AND DIFFERENT MATERIALS. PERFECT RESCUE!

SEE EQUIPMENT PROPOSAL ON PAGE 10



EB-R 3.2 Trans Grand Vitesse

World Record 515,3 km/h 18.05.1990

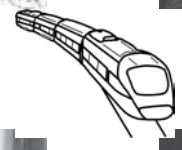
France: TGV Atlantique

Between Lille Europe and Roissy CDG the TGV averages a speed of 254.5km/h or 158mph, second highest sheduled speed in the world. Still other TGV services often have very high average speeds often over 200km/h or 125mph. Note for comparison: The general average speed of the car is accepted as 45mph or 72km/h

But what happens, if...

England Intercity 250

Germany ICE-T2



United States USTGV

Japan Shinkansen

EB-R 3.2 Rescue from Fastrunner-Trains ICE-Transrapid-TGV

TGV-Accident
Lucky passengers

Eschede 1998
The Disaster

The ICE T2 - Project

Carrying out emergency rescues from ICE trains is currently the TwinSaw's most important and demanding project. A perfect solution is growing...

Unlike conventional passenger trains, high-speed trains are constructed using self-supporting assemblies with extremely smooth surfaces composed of high-grade materials and composites – which are therefore very difficult to cut. The overall train structure can be broken down into five distinct sections (from top to bottom:)

1 Top roof: aluminium with strengthened frames and massive electric powered cables.
2 Roof section: an aluminium framework with cables and pipes for airconditioning etc.
3 Glass section: 4 x 8 mm toughened glass with high-rupture strength bonding sheets
4 Substructure: an aluminium framework coated with bitumen
5 Chassis: this section is composed of extremely tough, solid steel members

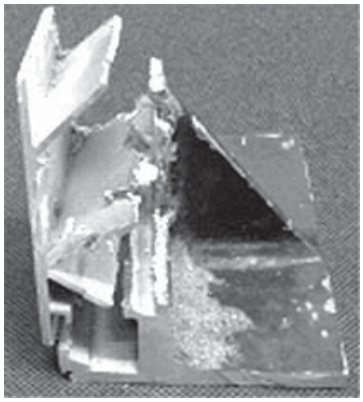
Sections 2 and 3 tend to be the main focus of attention when it comes to rescue work, as this is where the trapped passengers will be located.
Openings rarely have to be made in the roof section, which can be treated very much like the substructure as far as cutting is concerned. The train chassis, which is very solidly built, only ever has to be cut or detached as part of the accident dismantling work. A universal cutting machine designed for cutting through this type of vehicle, with its various component materials and composites, therefore has to be able to deal with two main types of material:

glass section

8mm glass
1 mm bonding sheets
8mm glass
2 mm air
8mm glass
1 mm bonding sheets
8mm glass

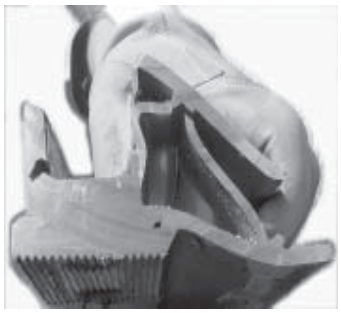
frame section

Forward section:
cut with CDC 2530



EB-R 3.2 Rescue from modern Fastrunners

Eschede 1998



Cut by TwinSaw
through damaged ICE

Eschede 1998

Requirements for ICE rescue work

THE EQUIPMENT MUST ALWAYS BE CAPABLE OF CUTTING ALL MATERIAL ZONES

IT MUST BE POSSIBLE TO CREATE THE OPENINGS EFFICIENTLY AND AT ANY POINT ON THE TRAIN AS REQUIRED (APART FROM THE CHASSIS)

THE RESCUE PERSONNEL MUST BE PROTECTED AT ALL COSTS AND MUST HAVE THE BEST POSSIBLE BACK-UP SO THAT THEY CAN OPERATE FOR LONG PERIODS ON END

THE CUTTING TOOLS MUST BE DESIGNED TO OPERATE IN EXTREME CUTTING POSITIONS, E.G. AT ARM'S LENGTH OR CLOSE TO THE OPERATOR'S BODY

THE PRODUCTION OF GLASS DUST MUST BE AVOIDED AT ALL COSTS

THE EDGES OF THE CUTS MUST NOT BE SHARP

TRAPPED ACCIDENT VICTIMS HAVE TO BE EXTRICATED GENTLY AND WITH MINIMUM FUSS

THE CUTTING APPLIANCES SHOULD NOT BE HEAVY OR UNWIELDY AND MUST BE DESIGNED FOR RAPID DEPLOYMENT

LOW CUTTING TEMPERATURES ARE ESSENTIAL, DUE TO THE RISK OF FIRE

MACHINE WEAR SHOULD BE AS LOW AS POSSIBLE IN ORDER TO ENSURE A HIGH UTILISATION FACTORAND HIGH LIABILTIY

RAPID TOOL CHANGE MUST BE POSSIBLE, WHERE NECESSARY

THE APPLIANCE SHOULD BE EASY TO OPERATE, SO THAT IT CAN BE USED BY AS MANY MEMBERS OF THE RESCUE TEAM AS POSSIBLE

THE APPLIANCE SHOULD BE CAPABLE OF CUTTING MATERIALS UNDER HIGH STRESS

IT MUST BE SUITABLE FOR USE IN COMBINATION WITH MEDIUM AND HEAVY-DUTY RESCUE EQUIPMENT

EB-R 4.1 Rescue from PASSENGER AIRCRAFTS

Cutting open the fuselage of a DC-9 aircraft Airport Fire Service, Copenhagen, Denmark

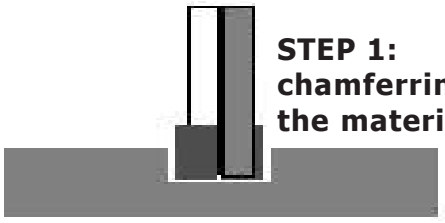
The opening shown in the photo was made in two stages using a TwinSaw CDC 2530 model. Stage one involved making a long flat cut through the outer skin; this was followed by a deep cut through the stringers and filling layers constituting the framework, which contain the pipe work and insulation material. There was no risk of ignition at any time. The saw was allowed to rest on the arm and the cut was made at a rate of about 1 metre a minute with short withdrawal movements. When cutting the soft aluminium it is important to flush continuously with the pump unit and also to use titan-nitrate coated CSW blades.

Special set-up for this type of application:

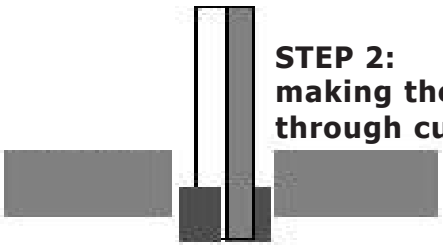
1 2530 060 **TwinSaw CDC 2530 Special Set Aircraft**
with 2 pairs of CWH 310 TIN blades and 2 pairs of CSH 310 TIN blades

EB-R 2.3 Rescue from SPECIAL-PURPOSE AIRCRAFT

In low-altitude attack mode or when taking-off and landing the pilot cannot deploy the ejector seat below a certain altitude. In the event of a crash he then has to be rescued from the cockpit. Modern cockpits are usually constructed from reinforced plexiglass 25 to 35 mm thick. The photo right shows a plexiglass cockpit being cut open with a CDC 2224 model. Here it is important to cut through the plastic in two stages:

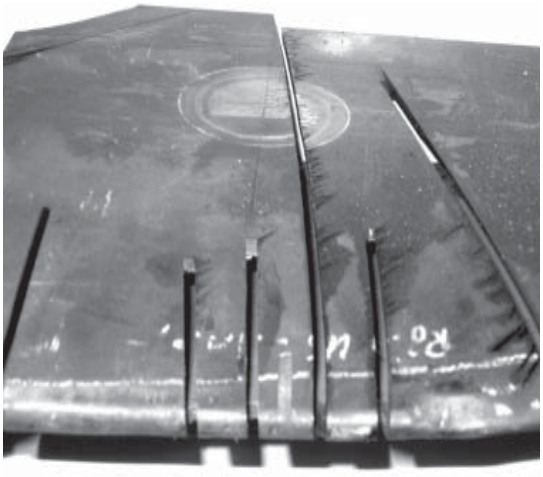


STEP 1: chamferring the material



STEP 2: making the through cut

Carbon-fibre alloy: *the material of the future...*



The photo shows a section of wing from a helicopter that has been cut using TwinSaw models CDC 2224 and CDC 2530.

Carbon-fibre alloy has a special role to play in that it will be the basic material for aircraft construction in the years to come.

Aluminium carbon-fibre alloys are about five times stronger than steel and weighs only some 25% of this conventional material.
This section in question was cut at the EADS works, where the new large-capacity Airbus A-380 aircraft is being developed. The material will be the basic one...

Special set-up for this type of application:

1 2530 060 **TwinSaw CDC 2530 Special Set Aircraft**
with 2 pairs of CWH 310 TIN blades and 2 pairs of CSH 310 TIN blades

TwinSaw teams up with other rescue equipment

...teaming up with Hydraulic Tools/ Jaws of Life

Twin-blade saws can greatly extend the operating scope of hydraulic forcing tools. When openings have to be made in smooth surfaces, or where force application points have to be created for hydraulic tools, the TBS (twin-blade saw) can provide vital backup. For its part, the hydraulic tool has the advantage of being able to exert large forces between two solid abutment points. What is more, the hydraulic system is very quiet and there are no flying chips. Having a tool that can separate cleanly means that the TBS can be used for applications where the cut material must not move about.
Twin-blade saws can also be deployed at very short notice and offer a wide range of cutting capabilities. The standard procedure described below illustrates how both types of equipment can be employed to best effect:
On arriving at the scene of the incident the leader of the rescue team decides where the cutting operation should commence. At the same time the technician starts-up the generator and the TBS operator takes the saw from the rescue vehicle, gives the power connection to the technician and joins the team leader. The latter then indicates exactly where the cut is to be made. This may involve detaching the wing of a vehicle, for example, in order to expose the door mounting points. While cutting is under way the hydraulic equipment is kept ready and the accident victim is stabilised. The rescue operation can then take place.

...teaming up with Angle-Grinders

While the angle-grinder continues to be the standard support too for rotary cutting work, it is now being superseded in many areas by the TwinSaw - which is safer and more flexible, produces fewe sparks and most importantly can operatewithno backlash. The advantage of the angle-grinder is that cuts can be produced at very little cost. It should therefore always be deployed in areas where there are no persons in the immediate vicinity. The new high-performance cutting disks- high-performance cutting disks are to serve as a prototype for the new TwinSaw diamond saw blades, with the result that the advantages of the TBS can be extended to include the cutting of glass and concrete.

...teaming up with Chain Saw Equipment

Chain saws of the latest generation are capable of very high chain travel speeds and allow a wide variety of cuts to be made in different types of material. One drawback with this type of machine is the potential risk factor, as the unavoidable kickback of the chain produces jerking at the cutting teeth. While this has little effect when cutting wood, there is a serious problem of tooth loss in harder materials. The chain saw should always be used in place of the TBS when the depth of cut required cannot be achieved in a single pass – or even in several passes – with the twin-blade machine. Using a chain saw safely requires hours of training. Moreover, saws of this type should never – repeat never – be employed for rescuing accident victims

Proposal for the teaming with the TwinSaw DoubleCut Saws:
Cutters Edge fast running Chain Saws on www.cuttersedge.com