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Rope access: from early beginnings to the future in the UK and beyond

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This paper is aimed at those who know little about rope access, but would like to have a better understanding of it.

The title sums up what will be covered. We will look at how rope access developed into the safe system of work we have today. We will look at the accident statistics over a nine-year period. We will see how we define rope access and where and when we can use it. And finally we will look at where in the world it is currently being used, and the development of standards and codes of practice.

My first recollection of rope access was in the early sixties, when a colleague used mountaineering techniques to climb brick-built factory chimneys for demolition. In the late seventies or early eighties these techniques were used to help in fitting rockfall prevention netting and for rock stabilisation in France. About the same time, they were used in the UK for the inspection of the outside of cheaply built high-rise apartment blocks that had problems with disintegrating concrete. But true rope access as we know it today started in the early to mid eighties using a technique based on a system developed by cavers (spelunkers) during the late sixties and seventies. The cavers' system was and still is a safe system, with very few accidents since it was fully developed. However, it relied on the use of a single rope.

To make it appropriate for work at a height, the original cavers' system was further developed during the eighties. The main difference was that in the system for work a second back-up security rope was added to provide copper-bottomed safety, so that the system now had two levels of redundancy.

The application of rope access techniques on buildings, bridges and other structures such as radar dishes increased. The techniques transferred naturally to offshore work, where there were difficult access problems on oilrigs in the North Sea. Today, it is standard procedure to use rope access for certain kinds of work, such as inspection, cleaning and painting on the rigs, not only in the North Sea, but all over the world.

In 1987, six companies started the world's first rope access trade association - the UK's Industrial Rope Access Trade Association (IRATA). The UK's Government health and safety authority, the Health and Safety Executive (HSE), were involved from the outset and were a prime mover in ensuring that rope access would be a safe system of work.

In the beginning, rope access operatives were usually from a climbing or caving background, who had to learn the work skills. Today, the base has broadened to include many individuals who do not have such a background. They are tradesmen who have learned rope access techniques to carry out their skills.

It is recognized that the safety record of rope access in the UK is the best in the construction industry. This is probably because most rope access workers are trained to the strict IRATA standards. We will take a look at some statistics later, but first let us explore some of the fundamental reasons why rope access is such a safe system of work.

Techniques, training and supervision: the combination of these three key elements provides the answer. Of course, the provision of appropriate specialized equipment plays a major part, too, but for today I would like to concentrate on the first three, and I repeat: techniques, training and supervision.

Rope access work can only be carried out in a reliably safe manner where people are competent, suitably trained and experienced, capable of inspection of their own equipment and under appropriate levels of supervision.

Techniques

What follows describes a typical rope access system:

The system consists of two ropes or lines: a working line and a back-up safety line. Each is independently anchored and arranged so that any abrasion will be avoided. The ropes used are not just any kind of rope but are designed for personal protection and meet the requirements of

European Standard EN 1891. Low stretch kernmantel ropes. Low stretch ropes are used because they are more efficient in use than dynamic ropes, which have more stretch.

The harness needs to have a low central attachment point for efficiency. It will meet the requirements of an appropriate European Standard such as EN 813 Sit harnesses (for work positioning).

When ascending the working line, two rope clamps or grabs (ascending devices) are used. Both are connected to the harness; one directly (which is sometimes called the chest ascender because it lies against the chest) and one indirectly (usually called the foot ascender) via a lanyard and a footloop, which is used to aid climbing the line. A chest strap or harness is used solely to keep the chest ascender correctly orientated

To climb the working line, the weight of the person is taken on the chest ascender, which is connected directly to the sit harness so that the sit harness takes all the weight of the person. The foot ascender is pushed up the line. This causes the leg to bend at the knee and it is then possible to step up, using the footloop. As this happens the rope moves automatically through the chest ascender. At the end of the step-up, the weight is again taken on the chest ascender and the process starts all over again.

The short lanyard connecting the foot ascender to the harness provides some safety back-up.

When both ascending and descending, the operative is connected not only to the working line, but also to the safety line, via a short lanyard and back-up device, which is a type of rope clamp. The back-up device is not really a fall arrest device. In its design and the way in which it is used, it is a more of a fall prevention device. It is moved up and down the line manually so that it is always above the attachment point on the harness. The device is always kept above the attachment point on the harness and should be kept as high as possible. In the unlikely event of a catastrophic failure of the working line system, a fall will be prevented. Another prime requirement of the back-up device is that it can be released under load, to facilitate rescue procedures.

Descending is also carried out on the same working line. Only descenders that will stop or allow only a slow automatically controlled descent in the hands-off position are used, so that in an emergency the operative will not plummet to the ground.

When the operative reaches the work position, a workseat can be connected to the working line to provide some extra comfort and safety. The harness remains and is always the primary attachment point to the working and safety lines.

This describes a typical system for pure rope access, which is a work-positioning system. If the operative wishes to climb the structure, a fall arrest system is usually required. Then the sit harness is combined with a chest harness to meet the high attachment point requirement for a fall arrest harness, for example EN 361.

Ropes and other equipment are used to keep any potential fall as short as possible and impact forces to a minimum.

Note that it is absolutely essential that the attachment point for fall arrest is at the front of the harness. Otherwise, it is not possible to change safely and quickly from a work-positioning system to a fall arrest system, and in the case of a fall, self-rescue is almost impossible.

Training

Training is a vital element in providing a safe system in any work situation, not just rope access.

In the IRATA system, there are three levels of rope technician. The criteria for achieving these levels of competence are detailed in IRATA's General Requirements for Certification.

To become a Level 1 requires a five-day intensive training course including a one-day assessment carried out by an independent IRATA qualified assessor.

The training course includes ascending and descending techniques, knots, equipment appreciation and simple rescue techniques. The training does not include the use of any tools or work skills.

A Level 1 (trainee) is defined as a technician who is able to perform a limited range of rope access tasks under the supervision of a level 3.

To achieve level 2, the level 1 has to have completed at least 500 logged hours on rope and have been working in rope access in a wide variety of situations for at least 6 months. It is normal to undergo further training before this assessment, although it is not mandatory. It is a brave person that goes for assessment without further training. The assessment sorts out the sheep from the goats!

A level 2 (lead technician) is defined as a technician who is capable of rigging working lines, undertaking rescues and performing other rope access tasks under the supervision of a level 3.

To achieve level 3, which is supervisor level, the level 2 has to have at least a further 12 months' broad experience in rope access work, with a additional 500 logged hours on rope and be recommended by an IRATA full member company. He/she then undergoes an independent assessment where competency in advance rescue techniques and good knowledge of legislation will have to be demonstrated. It is usual to have further training before this assessment, but again, it is not mandatory.

A level 3 is defined as a technician who is capable of complete responsibility for work projects; is able to demonstrate the skills and knowledge required of levels 1 and 2; is conversant with relevant work techniques and legislation; has a comprehensive knowledge of advanced rescue techniques; holds a current first aid certificate and has knowledge of the IRATA certification scheme.

Training is carried out either by specialised training companies or in-house by operator companies. Trainers have to be level 3.

Assessors are independent and must be level 3. In order to become an assessor, the Level 3 must be sponsored by two IRATA assessors, then approved by the training committee after a thorough vetting procedure, where competence in all aspects of rope access and the ability to assess must be demonstrated. Finally the appointment has to be confirmed by the executive committee.

Supervision

It is essential to have good supervision on any worksite.

In the IRATA system, only level 3 technicians, with their broad experience of working on ropes, can be supervisors.

Every site has to have a level 3 supervisor. The supervisor's role is to ensure that the work and the workers proceed in accordance with IRATA guidelines: that is to aim for zero accidents, zero waste and zero defects. The number of supervisors per site will be appropriate to the work situation and the numbers and skills of the work team. This will be decided at the time of the mandatory risk assessment, which takes place before the start of the job and typically each day thereafter. The supervisor will be knowledgeable of relevant legislation. Very importantly, he or she will, together with the rest of the team, have a rescue plan in place.

Any level 1s on site will be carefully monitored and assessed by the supervisor, and only gradually introduced to the work, until the supervisor is satisfied that they have achieved a satisfactory level of competence.

The IRATA technical rules are covered by the IRATA Guidelines, which give advice and recommendations for the safe use of rope access methods for industrial purposes.   All member companies and the qualified technicians have to work to these rules as a condition of membership/certification.

The guidelines are commended by the Health and Safety Executive. It should be emphasised that commendations are not given lightly by HSE, and that this is a rare accolade indeed. It shows that Britain's government health and safety authority considers IRATA methods to be a safe system of work.

The guidelines were first published in 1994 and revised in 1997 and again in January 2000.

Input to the guidelines was by member companies, that is operators, trainers and suppliers, technicians and the HSE.

The combination of good techniques, good and regular training and good supervision has resulted in much envied accident statistics.

Over 5 million hours of work ON ROPE have been carried out without a single fatality.

Over a period of nine years - from 1989 to 1998, there were approximately 85 reported accidents on rope by IRATA members.

A summary of the figures for the nine years period shows a steady and enviable incident rate per 100,000 hours of around 4.7.

43% of the injuries were to lower parts of the arm, 18% to the leg or foot, 18% to the eyes and 10% to back, chest or stomach. Only 13% of all these injuries were reportable (i.e. the injured person had more than 3 days off work as a result of them) and none involved a major injury. Typically, the injuries were caused by the use of tools, not the actual rope access techniques. There were only two cases of injury caused by a fall or slip while on the rope.

What is rope access?

1. Work type

Rope access is a type of suspended access system. Others are boatswain's chairs and cradles.

The main differences between rope access and other types of suspended access is that in rope access:

- a harness is incorporated as the primary means of attachment to the person;
- the person is suspended directly by the rope, not indirectly as in the other two types;
- the system uses two separately secured systems, one as a means of access, egress and work positioning, and the other as back-up security;
- In addition to being a suspended access system, the system is also a personal protective system;
- the working line and safety line are static, i.e. the operative moves up and down the lines and is not raised or lowered by them.

2. Fall protection system

There are three types of fall protection system:

1. Work restraint (travel restriction). Stop the person reaching zones where the risk of a fall exists. Intended to prevent a fall.
2. Work positioning. Primarily to hold the operative in tension or suspension while working, but usually has some fall protection element incorporated intended to prevent a fall but which will hold a fall of limited length and force.
3. Fall arrest. A system intended to stop a person hitting the ground or structure when a fall occurs.

In the fall protection hierarchy, rope access is usually a form of work positioning and uses work-positioning equipment. Occasionally, it becomes a type of fall arrest system, when fall arrest equipment is used.

3. Risk hierarchy

If we consider the risk hierarchy to be in four levels, i.e.

1. Eliminate the risk, e.g. at the structure design stage. (Highest level.)
2. Use platforms, e.g. scaffolding. (Protect the site.)
3. Use personal suspension equipment. (Protect the site and the person.)
4. Use fall arrest equipment . (Protect the person.) (Lowest level.)

… then rope access is normally at level 3 in the hierarchy.

It would be very convenient if everything slotted neatly into one of our created categories.

Unfortunately, life is never that simple. For example, there can be times when the operative needs to climb up the structure to gain access to the work site. In this case, the system uses fall arrest equipment. This would lower its position in the risk hierarchy, as shown above, to level 4.

When to use rope access

Rope access techniques are ideal for sites where access is difficult or impossible by other means and/or where there are no in-situ cradles or scaffolding or other platforms, and where the type of work to be done is suitable for the application of such techniques. Examples are:

- High-rise buildings
- Bridges
- Road-side cliffs
- Shafts
- Masts and towers
- Satellite and radar tracking installations
- Atria

What to use rope access for

Rope access is best used for light to medium tasks. Examples are:

- Inspection and testing
  - surveys
  - non-destructive testing
- Maintenance and repair
  - sealant installation and re-instatement
  - replacement cladding and glazing panels
- Cleaning and painting
  - jet spray
  - spray/roller/brush painting
- Window cleaning
- Geotechnical (civil engineering)
  - rockfall prevention netting
  - pressure pointing

The benefits of rope access

- Establishment of the system is quick to assemble and disassemble and requires a small number of personnel for a short time. Thus the number of man-risk hours is kept to a minimum.
- Because the installation and dismantling of the system is rapid, there is minimal disruption to building occupants, pedestrians and traffic flow. The system can be dismantled at the end of each shift, minimising the potential for vandalism and theft.
- Cost. Lower than most other access methods, for example scaffolding.

Rope access world-wide

Rope access is carried out all over the world.

It is interesting to note the contrasting attitude of the authorities to rope access throughout the world. This varies from the positive steps in Europe with the new (draft) Temporary Work at Height Directive, which accepts the use of rope access techniques, through the 'pretend it is not happening but it is' approach currently in Germany to an outright ban in Hong Kong. The negative approaches are usually based on a lack of understanding.

There are IRATA qualified rope access technicians based or working in 20 countries: Australia, Brunei, Canada, China, Dubai France, Germany, Holland, Indonesia, New Zealand, Norway, Sarawak, Singapore, South Africa, Thailand, UK, USA, Vietnam, Venezuela and Zimbabwe.

So IRATA and rope access are truly international.

In addition, some of these countries have set up their own national rope access associations. Examples are Australia, France, Germany, New Zealand, Norway, South Africa and the USA.

Standards and codes of practice

In Britain, IRATA is considered to be the lead body for rope access and the IRATA guidelines are widely used. An international version, stripped of references to UK law, is being prepared.

A British Standards code of practice for rope access is at an advanced draft stage.

There are European Standards in place for low-stretch rope and sit harnesses for rope access, and a draft standard for ascenders, descenders and back-up devices is at an advanced stage.

In Norway, SOFT, the Norwegian rope access trade association, is preparing its own code of practice.

In Australia and New Zealand, there is a suite of standards covering industrial rope access systems published jointly by Standards Australia and Standards New Zealand.

The German rope access association, FISAT, has its own code of practice.

In South Africa, the South African Bureau of Standards has published a standard in two parts: Industrial rope access: Worksite Procedures and Training and Certification Procedures.

And finally, at international standards level, rope access will be a work item within the International Standards Organisation (ISO) under the convenorship of Peter Ferguson of Australia.

That concludes this presentation. In it we have looked at:

- the history of rope access
- at the techniques, training and supervision needed to provide a safe system of work
- the accident statistics over nine years
- what is meant by rope access
- its position in the work equipment, fall protection and risk hierarchies;
- the benefits of using rope access
- where and when rope access can be used
- where in the world it is used currently
- standards and codes of practice

If there is one final message, it is that when the techniques are carried out properly by well-trained and competent persons with good supervision, rope access has a place in industry and has proved to be a valuable and safe system of work.

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