FINGRID

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Safety on the lines

Fingrid's occupational safety publication for service providers

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Contact us!

We are continuously striving to improve our operations concerning occupational safety. Occupational safety affects us all, and we wish to improve safety in cooperation with suppliers. All feedback is important. Please send any ideas for articles, tips for development and feedback on the magazine to

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Quality creates occupational safety

Long-term investment in occupational safety and quality is bearing fruit. Fingrid has just received its first ISO 55001 certificate. The auditors noted that the company has especially invested in occupational safety for several years. They also thought that NordSafety is an excellent tool. On the other hand, they observed that several different systems have been launched at the same time, due to which not all of their useful features have been fully adopted yet. So, we continue, at a steady pace, taking new features into use.

Occupational safety is quality. We set certain requirements for our employees: In addition to passing Fingrid's online school, we require that transmission line inspectors have acquired an inspection licence, testers a protection qualification and substation maintenance suppliers their own qualifications. This way, we ensure the competence of our employees and the quality of the work; at the same time, the work is seen as having higher value. Doing the work with high quality the first time prevents occupational accidents.

Suppliers of basic maintenance at substations with three-year agreements (a total of 80 people) have taken different modules in qualification examinations according to Fingrid's quality levels, permitting them to carry out different tasks. For example, people on call must have passed six different modules in order to be included in the on-call group.

One area of high-quality work is tidiness. Tools, equipment and other items should always be put in the correct places. The danger of tripping, slipping and crushing increases significantly with diminishing daylight, and especially as snow will soon cover the ground.

The aim of zero accidents has been set for the construction and maintenance of Fingrid's grid. The interim aim of the combined lost-time injury frequency for this year is under seven injuries / one million work hours. At the end of August, the situation was around 6, so reaching the target is possible.

Let's work together to further improve our quality!

Jari Helander
Manager, regional operation and maintenance, Fingrid Oyj

LEARNING LESSONS

An overview of occupational safety

Text **Karri Koskinen**
Photo **Karri Koskinen**

The level of occupational safety has developed in the right direction this year. There is still some room for improvement, however, as accidents and even serious near misses are still occurring.

The level of occupational safety has improved from last year. An active approach from service providers in proactive occupational safety work has contributed to the positive development. The number of dangerous situation notifications submitted was several times more than last year's figures and it is a joy to notice that some suppliers have begun to hold regular safety toolbox talks. Indeed, we hope for all suppliers to hold safety toolbox talks and report them using the NordSafety reporting system.

Fingrid organised a safety observation campaign from 1.–30.9.2016. A separate summary of the campaign will be drawn up. It is extremely positive that suppliers are active in making safety observations. We hope that making observations will remain a part of everyday routine on worksites. Safety observations can be submitted while logged in to the NordSafety reporting system or without user credentials at the address www.fingrid.fi/havainto. Near misses and accidents involving or caused by external parties can be reported to NordSafety using the dangerous situation notification form.

The monthly reporting of working hours has got off to a smooth start, meaning that we are now able to continuously monitor the lost-time injury frequency. Fingrid's target with regard to a combined lost-time injury frequency for its own personnel and service providers in 2016 is below 7, and as of August this figure has not been exceeded. Please remember to report the working hours for each month no later than on the 15th of the following month.

OCCUPATIONAL ACCIDENTS AND SERIOUS NEAR MISSES

By September, six lost-time injuries had occurred on Fingrid's sites. Two involved slipping, one on the ground and one in a tower. The incident in the tower was caused by climbing

REPORT A SAFETY OBSERVATION!
www.fingrid.fi/havainto

Infratek Finland Oy's Tauno Nieminen (left) and Fingrid's Seppo Rautio at the Petäjäskoski substation, where Infratek operates as the main contractor in the substation expansion project.

irons slipping on the earth wire peak. Three occupational accidents involved crushing; hands were injured in two of the incidents and a leg was injured in the third. In one accident, a worker also received an electric shock in the right wrist from a terminal block on the side of a cabinet when connecting a relay cable.

Near misses have been reported actively. Unfortunately, we have not been able to avoid serious near misses. There have been six incidents in severity category A, of which two involved electricity. In June, an oily paper caught fire while a transformer was being demolished. However, the fire could not have caused any danger to the conductors above as the leftover fire load within the transformer box was so small. The fire department put out the fire. The suspected culprit of the fire was a spark from the bucket of the excavator used in the demolition work. The fact that the oily paper was not prevented from catching fire can be considered an indirect cause of the fire. The risk of fire was considered minor since no hot work was carried out at the site. The risk had, nevertheless, been identified and preparations had been made in the form of fire extinguishing equipment. The fire extinguishing equipment was not, however, sufficient to put out the fire. In future transformer demolition work, oily paper will be foamed. A dangerous situation also occurred at a reserve power plant when overfilled gas cylinders caused a serious risk of explosion when the cylinders were heated.

At the start of the year, another serious dangerous situation occurred in connection with lifting work, when a tower fell to the ground when a crane line broke mid-lift. The dangerous situation was caused by insufficient lifting plans and deviation from the plans mid-lift. A base machine was attached to the tower mid-lift and this caused the lateral crane line to jerk and snap. A dangerous situation occurred in one of Fingrid's customer's projects, which involved the construction of two 110 kV shared tower lines also owned by Fingrid. Fingrid investigated the matter as we were familiar with the line contractor and were actively involved in the project's support groups.

One incident that occurred outside of the main contractor's authority was archived as a serious dangerous situation in order to be included in the investigation process. The incident happened to a transportation company's employee while en route to a Fingrid construction site. The driver's leg was crushed in the incident. He was installing ice chains underneath the truck when another driver moved the vehicle forward, and the wheel of the truck ran over the leg of the driver installing the chains and crushed it severely.

A near miss which posed significant danger took place in one of Fingrid's transmission line projects, when a 400/110 kV tower to be erected began to bend mid-lift and the bolts in the lowest flange coupling broke, causing the tower to collapse. The tower was being erected using a method known as the crab method. A temporary side guy wire was installed on the tower to ensure that the tower would not fall onto the adjacent, live line. As a result of the incident, the tower and the insulation chain and cable wheels were broken, but luckily, no personal injury occurred as the members of the work group were outside of the immediate danger area when the incident occurred. Before lifting work began, a start-up meeting for the work phase had been held to ensure lifting was carried out safely, and it examined the lifting plans and risk assessments. The reason that the tower broke was a lifting point which did not comply with the lifting instructions, which meant that the bending of the foot and the pressure on it were greater than planned. The work group deviated from the working instructions, even though the employees were aware of how to carry out the work in a way which complied with the instructions. The work group's own assumption of the terrain's effect on the forces acting on the tower was incorrect. This dangerous situation could also have been avoided by following working instructions.

The themes in the dangerous situations and accidents which have occurred this year are the same as those that have occurred in previous years. So please continue to pay particular attention to the following:

- Induced voltage and the dangers of electricity
- Risk-taking and attitudes towards safety
- Work plans and risk assessments
- Slipping and tripping
- Crushing between heavy objects

LEARNING LESSONS

Remember electrical safety!

Text **Pasi Lehtonen**
Photo **Marker Creative**

This year we have managed to avoid serious electrical accidents. However, there have been several near misses relating to electricity.

As of early August, 2016 has been a moderate year with regard to electrical safety. The grading is based on reported incidents involving main grid and reserve power plant work which have resulted in an electrical accident or for which an electrical accident was recorded as being one possible consequence.

ELECTRICAL ACCIDENTS

In two accidents, electrical industry professionals received a minor electric shock. Of these, one led to one day of absence, mainly to monitor the patient's condition. This teaches us to remember the danger caused by unscrewed, live terminal strips in e.g. incomplete distribution boards, relay cabinets, etc. It is easy to come into contact with these strips when connecting cable wires in confined spaces, as the strips can often extend up to the protective wall.

The second electrical accident did not result in any absence due to illness. The electric shock was so mild that the person was able to disconnect himself from the circuit caused by induced voltage. In this case, the risk materialised as the lineman disconnected two wires in a situation in which only some of the additional or auxiliary earthing required by instructions was connected.

NEAR MISSES

A total of 28 work-related situations were reported involving the danger of electrical accident. As examples, here are two things which are very different but each pose a significant occupational safety risk. Several different dangerous situation notifications were submitted concerning both. Both are encountered in many tasks carried out within the substation fencing.

Disconnected cable heads in substation and reserve power plant cable spaces cause dangerous situations. Without detailed investigation, it is impossible to know whether the wires within the cables are energised or dead. These are usually low-voltage cables whose disassembly was included in previous work, but the disassembly was not fully completed. These pose a significant electrical safety risk, since when disconnecting the cables again, for example, some cables were mistakenly considered to be dead, when in fact they were energised. The situation is made even more dangerous as the person dealing with the cable is often standing on a conductive base. In addition, not all wiring or other pictures have been updated. Of these live wires, it is impossible to know whether voltage was left in some of the wires during disassembly or if the voltage was connected unintentionally as a result of some other work or troubleshooting. In any case, there are many partially disassembled cables.

Charting the disconnected cables is on the agenda, and we have found more live cables. The local extent of the phenomenon will become clear shortly, but it will take time before the final disassembly of the cables is complete.

Disassembly work at substation switchyards between the transmission line portal and the switchgear's busbar also caused significant dangerous situations. The danger of electric shock was large since not all of the additional earthing required by instructions had been connected to discharge the induced voltage fed by the transmission line to the disassembly site.

Let's improve safety together – reform responsibly!

How to work safely:

All dangerous terminal strips must either be protected using barriers or tightened sufficiently. The same must also be carried out for all back-up strips before work is handed over.

Supplementary disassembly work on disconnected cables must be coordinated so that it is carried out in combination with other suitable work. If a disconnected cable is noticed at a worksite, it must by default be considered live. Once the voltage status of the cable has been confirmed, act in accordance with the established voltage status. All new cable disassembly work will be carried out in its entirety, and disconnected cables may only be left if separately agreed with a Fingrid representative. At the same time, procedures to ensure safety will be agreed, such as short-circuiting wire ends, marking the voltage status, and other records.

When disconnecting or connecting wires, make sure that all additional earthing rules are followed, also when in the disconnected state. In addition, the voltage difference between disconnected wire ends should be removed by short-circuiting the disconnection site for the duration of disconnection or connection.

When disassembling substation switchyards, additional earthing must be planned so that even after any component whatsoever is disconnected, at least two earthing devices to remove induced voltage remain connected in the direction of the transmission line, unless there is an open switching device in between. If there is an open switching device in between, follow the rules for additional earthing at substations set out in instructions. Where possible, main and additional earthing at disassembly sites must be planned and connected so that it does not need to be moved as work progresses. Discuss and agree together with the client on the best places to connect earthing devices, so that at the same time we can be sure of the sufficiency of earthing. ■

Ville Peijariniemi (left), Antti Keskinen and Tomi Salonen know that it takes time to form the right kind of attitude towards occupational safety.

Zero accidents is possible
– case Lavianvuori

Text **Meri Viikari**
Photo **Hannu Heikkinen**

The Lavianvuori transformer substation construction project carried out by Empower PN Oy was seen through to completion without a single lost-time injury. What was behind the success?

In 2012, Fingrid made an investment decision on the construction of a new transformer substation in Lavianvuori near Valkeakoski to improve the main grid's system security in Pirkanmaa, especially in the Tampere and Valkeakoski areas. The decision was made to build a transformer substation on the 400 kilovolt Hikiä–Kangasala transmission line, as close to consumption as possible. The substation's new 400/110 kilovolt transformer provides significant savings on loss and ensures that there is a sufficient supply of electricity in the area.

Empower PN Oy carried out the Lavianvuori substation project as a turnkey project priced at approximately nine million euros. Only the procurement of the transformer, the excavation work, and construction of the road leading to the substation were not included in the contract. Work on the substation contract began in autumn 2013 under the leadership of Vice President **Antti Keskinen**, who acted as project manager, and Site Manager **Tomi Salonen**, and the substation was completed on schedule in late 2015. The substation project progressed safely and as planned, and not a single accident leading to absence occurred during the project. It is, therefore, possible to achieve the zero-accidents target. How was the target achieved in the Lavianvuori project?

According to Fingrid's Project Manager **Hannu Heikkinen**, there has been a significant change in the approach to occupational safety in the last five years. As a contractor, Empower has been a trailblazer in occupational safety matters and has invested in the development of occupational safety. Antti Keskinen confirms that occupational safety is Empower's top

priority. For example, meetings always begin with occupational safety matters. In addition, the company has set clear goals for occupational safety and made sure that everyone is aware of them. Tomi Salonen believes that good groundwork pays off on site. There is no need to go over basic matters when arriving on site; instead the employees are familiarised with the conditions particular to the worksite. "We prepare as much as we can before going to the site, since it takes time to form the right kind of attitude towards occupational safety. Creating the right attitude and providing the necessary information to employees is a long process," explains Salonen.

Workers on the Lavianvuori project were committed to safe working methods right from the start. Empower promoted occupational safety through safety campaigns and encouraging the submission of safety observations, among other things. Investments were also made in substation-specific orientation at Lavianvuori, and an orientation notebook was made for each employee to carry with them containing key contact details, instructions in case of accidents and other instructions and information relating to worksite safety. Workers who completed orientation received a sticker for their hard hat indicating that they had received orientation.

EMPLOYEES' IDEAS ARE WELCOME

At Empower, employees are encouraged to brainstorm and be innovative, including with regard to occupational safety, and many ideas are implemented for development purposes. "Occupational safety all comes down to attitude. Innovations are born when everyone thinks about possible work-related risks and methods to carry out work better and more safely," says Antti Keskinen. For example, separate frames for the assembly of disconnectors was made at Lavianvuori and was found to work well and improve work ergonomics.

One of Empower's operating principles is never to compromise when it comes to occupational safety. Keskinen says that the site manager plays a significant role in setting an example and monitoring compliance with instructions. "It is important for success that we intervene in all problems," he emphasises. In extreme circumstances, the site manager can suspend work or issue an economic sanction for endangering occupational safety.

Keskinen adds that the example set by the client and occupational safety requirements are essential when deploying occupational safety throughout the entire supply chain. "If the client is indifferent, safety cannot be deployed in the field." Fingrid's Safety Expert **Karri Koskinen**'s deployment on site has received a positive reception, as has the NordSafety reporting system which Empower piloted in the Lavianvuori project. Use of the system facilitated and guided operations; for example, it allowed for mobile MVR measurements to be carried out. "Even then the reporting system was surprisingly ready for use in the field, and dialogue with Fingrid concerning system development worked well," says Site Manager Tomi Salonen. "Cooperation on-site is important otherwise, too. By coordinating and organising work, we can make sure that different work phases are not carried out next to each other at the same time, which can result in dangerous situations," adds Salonen.

> **It is important for success that we intervene in all problems.**

Keskinen and Salonen believe that the most essential thing in achieving the zero-accidents target is to encourage the Home Safely attitude to take root. "If the workplace has a positive approach towards occupational safety, it increases the desire to make the worksite better and safer," says Keskinen. The deployment of occupational safety, nevertheless, requires perseverence. "Hard work is needed to promote the issue. It begins with everyone understanding the importance of the matter themselves," says Fingrid's Project Manager Hannu Heikkinen. "This is all a matter of attitude. And it continues to improve as time goes on. Younger workers are very understanding and constructively receptive to information." ■

Occupational safety at shared workplaces and construction sites

When there are several different employers' employees working at a single site, it is important to make sure that work is coordinated and that the division of responsibility is clear.

Text **Karri Koskinen**
Photos **Henri Luoma**

All of Fingrid's sites can be considered to be either shared workplaces or shared construction sites. The definition of a shared workplace comes from the Occupational Health and Safety Act (738/2002). At a shared workplace, one employer exercises the main authority, and several employers work at the site either simultaneously or consecutively such that work can affect other employees' health or safety. A site is considered to be a shared construction site if, in addition to the above, construction work is carried out. This is enacted in the Government Decree on the Safety of Construction Work (205/2009).

When working at a shared workplace or construction site, work carried out simultaneously and consecutively poses a particular risk. In such cases, the coordination of work plays a significant role in the prevention of accidents and dangerous situations. It is important that a single party is responsible for coordination and that responsibilities and tasks are clear to all parties.

Fingrid's contract terms concerning safety and other occupational safety requirements are in force at both shared workplaces and construction sites. The aim is to maintain a high level of occupational safety at all worksites.

SHARED WORKPLACE

A shared workplace is formed when one or more suppliers are working in a Fingrid area (e.g. at a substation) and construction work is not being done in the same area, or the assigned construction site area located in the same area is physically separate from the other area. In this case, Fingrid operates in the non-assigned area as the employer exercising the main authority.

When acting as the employer exercising the main authority, Fingrid is responsible for matters including

- Orientation concerning the following (given either by Fingrid or a supplier of basic maintenance)
  - Workplace risk factors and inconveniences
  - Operating instructions concerning workplace and work safety
  - Measures relating to fire prevention, first aid and evacuation at the workplace, and the persons appointed for these functions.
- The coordination of the functions of employers and independent performers of work operating at the workplace
- Arrangements for workplace traffic and moving about
- General arrangements for health, safety and cleanliness at the workplace
- Other general workplace planning
- General health and safety for work conditions and the work environment.

The abovementioned obligations of the employer exercising the main authority are taken from the Occupational Health and Safety Act. In a shared workplace, suppliers must operate in accordance with the law, contract terms concerning safety, and other Fingrid requirements. In accordance with the Occupational Health and Safety Act and other legislation, suppliers and subcontractors are responsible for the health and safety of their own employees. Each supplier and subcontractor working at a shared workplace must for its own part, through sufficient mutual cooperation and communication, ensure that its operations do not jeopardise the health and safety of employees.

Among other things, a supplier will

- make a safety plan
- submit a safety declaration and SMS notification
- carry out a risk assessment of its own work (can be part of the safety declaration)
- be responsible for the cleanliness of its work area.

Every supplier working in the area is responsible for the professional skill of its own employees.

SHARED CONSTRUCTION SITE

When working on a shared construction site, Fingrid acts as the client/developer, specifies the contract area and appoints a main executor for the construction site. In this case, the construction site area is assigned to the control of the main executor, and the main executor takes care of the tasks which are the responsibility of the employer exercising the main authority. The main executor ensures that all those working in the area, including subcontractors and nominated subcontractors, observe the client's contract terms concerning safety, other Fingrid requirements, and legislation.

In cases of disturbances or faults, Fingrid's maintenance suppliers and its own personnel have the right to move around substation and transmission line areas, including assigned construction site areas.

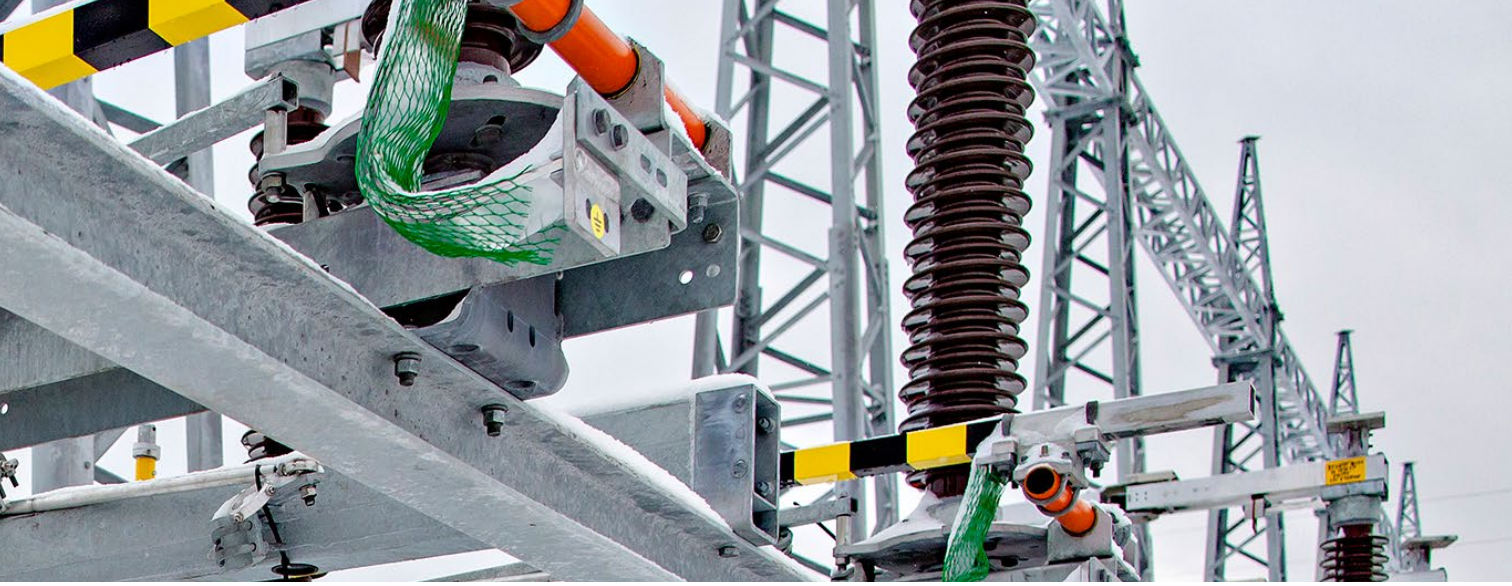
- If the main executor for an assigned site is present on-site, report to the person responsible for the worksite.
- If the main executor for an assigned site is not present on-site, ensure that it is safe to move and work in the area and report to the main executor where possible.

In order to clarify responsibility, Fingrid has defined construction work as follows:

The following are
classed as construction work

- Substation and transmission line projects, and the construction of HVDC connections
- The transportation of construction materials by a transport service on the construction site using construction machinery, trucks or other equipment
- Various substation maintenance work in connection with investment projects
- Transmission line maintenance
- Basic maintenance of transformers
- Annual maintenance relating to HVDC maintenance
- Maintenance on devices which serve the property in general and which relate to substation maintenance

Maintenance and renovation work that is ordered separately will be assessed on a case-specific basis to ascertain whether or not it should be classed as construction work.



The following are

NOT classed as construction work

- Basic maintenance of substations
- Basic and special maintenance of secondary devices
- HVDC maintenance
- FACTS maintenance
- Special maintenance of transformers
- Special maintenance of switching devices
- Maintenance of vegetation in transmission line areas
- Investment project-related local supervision carried out by Fingrid's own personnel as well as separately ordered planning and supervision work
- Separately ordered subsoil surveys and earthwork planning for substations
- Separately ordered general planning for transmission lines
- Substation pre-planning carried out by Fingrid personnel
- The transportation of construction materials to or from the construction site.

FROM THE SERVICE PROVIDER

Infratek's Jani Gratschev: **Occupational safety and quality are a natural part of our work**

Text **Jani Gratschev**
Photo **Karri Koskinen**

"Occupational safety right from the Board room to the depths of remote Finnish forests plays a significant role in our everyday work," says Unit Manager **Jani Gratschev** from Infratek Finland Oy. When training its employees, the company relies on real-life examples.

Infratek companies employ 250 members of staff in Finland and a total of 1,400 in the Nordic countries. Safety and quality matters are just as much a part of our professional expertise as technical competence. It is important to us that every employee returns home safe and sound each and every workday.

Our company follows shared operating methods and rules to promote occupational safety. We comply with Finnish occupational safety legislation and act in accordance with the company's quality and safety processes. We record safety-related obligations in customer agreements and carry out the necessary safety training and other training at regular intervals.

In daily working life, however, it is not enough to simply have things well planned on paper. Process diagrams, documents and laws alone do not guarantee occupational safety or quality. That's why we've adopted a new, practical approach to safety and quality matters. Quality and safety are not a separate part of work; instead, they come as a consequence of technical routines and employee competence while carrying out the work. We always approach the matter by thinking what kind of technical competence an employee should have, how work should really be carried out, and what the best way to teach correct working methods is.

TRAINING BASED ON PRACTICAL EXPERIENCE

We have begun technical training relating to maintenance work and equipment at our own maintenance centre and substations, where we approach things through practical examples rather than mandatory regulations and possible sanctions. Our trainers are experienced equipment specialists who have themselves worked on numerous worksites for decades installing, maintaining, repairing and managing the tasks dealt with in the training. Over the years, the trainers have faced and solved several challenging practical situations in their own area of expertise. Experience-based training has proven successful: participants in this year's transformer and circuit breaker training listened intently as the trainers shared even unpleasant experiences of what happens when work is not carried out correctly.

"In training, real-life examples from experienced equipment specialists are an efficient reminder of the significance of occupational safety," says Jani Gratschev from Infratek (left). Also participating in the site tour at the Espoo substation is Infratek's Site Manager Janne Ketola.

The employees value experienced trainers who, over the course of their careers, have worked on, seen and experienced almost everything the industry can throw at them. Real-life examples have been observed to be significantly more effective as a training method than PowerPoint presentations. Written material is also necessary, but it alone cannot ensure quality and safety. Combined with contractual documents, acts and laws, our employees' competence, attitude and awareness of the correct working methods make us an all-round high-quality supplier.

In training, we have encouraged our employees to reassess work-specific risks whenever conditions change as work progresses. In that moment, a single employee or work group is the only party present on-site and able to consider the risks of the work in a changed situation.

DEALING WITH BRUISES AND ACCIDENTS OPENLY

If quality and safety are automatic working methods, and the organisation is transparent in that regard, challenging feedback and matters which require reporting are also dealt with openly. Our customers also demand openness and transparency.

We have succeeded moderately well in valuing occupational safety. This year, a few minor bumps and bruises have occurred on our worksites, but the most recent absence caused by an occupational accident at Infratek Finland Oy occurred in spring 2015. The accident, which led to one day of absence, occurred during mechanical demolition work. The bruises and the aforementioned accident have been dealt with and we have learnt from them. ■

To everyone in the industry: have a safe day at work!

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