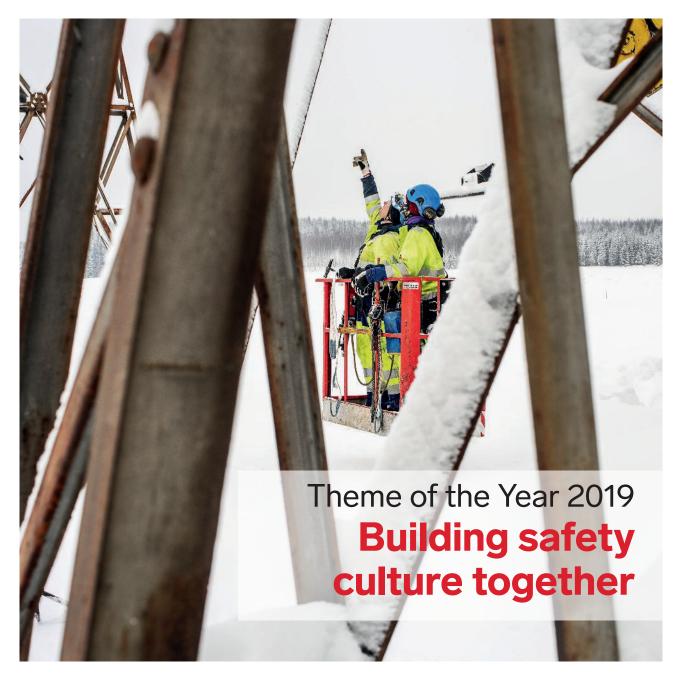
O1 2019

Safety on the lines



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Safety on the lines

Fingrid's occupational safety publication 1/2019

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Contact us!

Occupational safety affects us all, and we want 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 Karri Koskinen. Please don't hesitate to get in touch if you have any questions about occupational safety.



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FINGRID



Building safety culture together

he Safety on the Lines magazine is boldly moving in a new direction. Our first magazine was published in 2013, and this is the 11th occupational safety publication for service providers. Occupational safety is Fingrid's number one priority in all its activities, and that's why we decided to link Safety on the Lines to our customer magazine.

Our occupational safety theme for 2019 is: **Building safety culture together**. Developing and maintaining occupational safety at worksites requires broad-based cooperation with service providers, customers and other stakeholders. As a result, it's natural to distribute the Safety on the Lines magazine at worksites and also more widely to other stakeholders.

Our primary emotion regarding 2018 is a sense of gratitude. This means gratitude for all the people working in Fingrid investments and maintenance, who have made an outstanding effort to develop and maintain occupational safety. We're also grateful that Fingrid worksites are safe places to work which did not experience a single serious occupational accident last year. In terms of occupational safety, 2018 was a great success according to many indicators, both lagging and leading. We achieved the combined target set for lost-time injury frequency (<5 lost-time injuries / one million working

hours). The combined lost-time injury frequency for 2018 was 3.2

Although 2018 went well as a whole, there is always room for improvement. Approximately 120 near miss situations were reported, 4 of which were classified as serious. However, we're particularly happy that a record number of safety observations — more than 500 — were made. I would like to encourage everyone to continue submitting observations so that we can identify risk factors in advance.

Our challenging goal for 2019 is to maintain a high level of occupational safety while moving towards the target of zero accidents. Occupational accidents are rarely caused by technical issues such as equipment failure. The cause is more likely to be human actions, and that's why occupational safety is all about attitude. Let's all work safely, avoid taking risks, and intervene immediately in unsafe activities. Intervention means caring about co-workers and it is everyone's right and responsibility. Let's continue developing and maintaining occupational safety together in accordance with the theme for 2019.

Karri Koskinen

Expert, Safety



The level of occupational safety improved noticeably in 2018. The credit for this goes to all the people who work in Fingrid's investments and maintenance. We clearly achieved the intermediate target set for lost-time injury frequency in 2018, and we can also be satisfied with this result.

TEXT| KARRI KOSKINEN PHOTO | JOHANNES WIEHN

he combined lost-time injury frequency in 2018 was 3.2, and our target was to get below 5. It is especially noteworthy that we did not have a single serious workplace accident leading to more than 30 days of absence. The level of occupational safety has not improved all by itself, and a lot of work has gone into this achievement.

Four lost-time injuries occurred in 2018, two of which involved slipping or tripping. One employee suffered a wound on the arm during base casting and in March an employee fell from a height of 2-3 meters in conjunction with installation of an overhead ground wire. The employee was lifted into the air when the overhead ground wire detached from the excavator. A total of 12 occupational accidents occurred at Fingrid worksites in 2018, and they did not cause any absence from work.

700 DANGEROUS SITUATION NOTIFICATIONS

Development of the occupational safety level at Fingrid worksites is also monitored by means of leading indicators that measure the amount of work done to promote occupational safety. These indicators show that we clearly improved our result in comparison to previous years. A record number of dangerous situation notifications were submitted: approximately 700 when the target was to obtain at least 400. Dangerous situation notifications include both safety observations and near miss notifications. It is positive that more than 500 of these were safety observations. Safety observations allow us to gain information about hidden risk factors and involve everyone in developing occupational safety.

About 120 of the dangerous situation notifications were near miss situations, 4 of which were classified in the most severe A category. Two of these were associated with equipment failures in high-voltage devices at substations. In one case, the operating voltage was connected to a transmission line too early while in the other construction work

was being performed above live parts. Eighteen near miss situations were classified in the medium-serious B category. They were associated with electrical safety, personal boom lifts, work-related travel, conductor mounting, falling objects, harmful substances, and process separations at reserve power plants.

IMPORTANT SAFETY TOOLBOX TALKS AND RISK ASSESSMENT DAYS

Safety toolbox talks were implemented at Fingrid in 2015. The requirement to hold them regularly at Fingrid worksites was added to the contract terms concerning safety in 2017. The number of toolbox talks has increased every year, and more than 500 were held at Fingrid worksites in 2018. A toolbox talk is a short event of approximately 15 minutes dealing with current occupational safety matters. A toolbox talk can be given by, for example, a supervisor, the person responsible for the worksite, another person appointed by the main contractor, or a client representative. The goal of toolbox talks is to improve occupational safety knowledge and attitudes and to ensure that all employees are informed of matters such as worksite risk factors, changes in occupational safety rules, and accidents and dangerous situations that have occurred earlier.

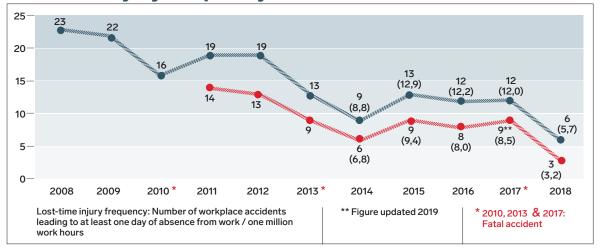
Occupational safety work has to be proactive in order for us to achieve the 0-accident target. Risks and hazardous factors must be identified in advance so that people can prepare for and prevent accidents. In 2018, Fingrid held a risk assessment day for many investment projects and at every transmission line and substation basic maintenance work area. The aim of a risk assessment day is to improve the participants' awareness of risks and identify the jobs and work locations that involve a special risk and for which the supplier performs risk assessments. The day also involves practicing how to perform risk assessments for work.

At Fingrid worksites, the main contractor is responsible for planning occupational safety and for daily monitoring, while Fingrid ensures that the occupational safety requirements are fulfilled. In 2018. Fingrid conducted several responsibility audits and management reviews. In addition, visits to assure occupational safety were made by safety coordinators, local supervisors, regional managers and safety experts.

The outstanding occupational safety results achieved in 2018 were the result of close cooperation between Fingrid and suppliers. In 2018, occupational safety was developed together with the suppliers during, for example, an occupational safety seminar held at the beginning of the year, a management occupational safety discussion held in conjunction with the asset management development days, the suppliers' occupational safety group, safety supervisor meeting, project kick-off meetings, and worksite meetings. Safety culture is built together with suppliers, and achieving the 0-accident target requires every person's genuine commitment to the development and maintenance of occupational safety. Occupational safety is all about attitude!

Person-years	2018	2017	2016	2015	2014	2013	2012	2011
Fingrid personnel, person-years	330	321	305	287	275	258	250	243
Service providers, person-years	413	440	580	593	533	639	593	624
Total person-years	743	761	865	880	808	897	843	867

Lost-time injury frequency: Target 2018: combined lost-time injury frequency < 5



w Lost-time injury frequency for service providers 🛛 🐠 Combined lost-time injury frequency (Fingrid personnel & service providers)

A year marked by equipment failures

An equipment failure that posed a serious risk to occupational safety occurred when a reactor circuit breaker broke in August. Fortunately this caused no personal injury.

TEXT | PASI LEHTONEN

wo instrument transformer explosions occurred on high-voltage devices at Fingrid substations in 2018. Some equipment failures without explosions also took place. In addition to presenting a system security problem, all these events involved significant occupational safety risks. The risks are much larger when a device explodes, causing large pieces to fly distances of several dozen meters at high speed. Furthermore, an explosion nearly always causes a local or, in the worst case, more widespread

The device explosion in March happened on a 110 kilovolt voltage transformer and caused a local fire in addition to the disturbance. The explosion of a 400 kilovolt current transformer in July was the most damaging in financial terms. A spreading fire caused significant damage, because it extended beyond a single substation bay and affected the entire switchyard and its exterior.

The main grid averages one high-voltage device explosion each year.

An equipment failure that posed a serious risk to occupational safety occurred when a reactor circuit breaker broke on an August night. Following an insulator failure, the live parts of the gas circuit breaker and associated insulators were lying on top of the circuit breaker controller within touching distance of the work surface. Another event resulting in a similar risk occurred in the autumn without an equipment failure. In that case, two of the subconductors on a 20-kilovolt feed burned through completely. Since two were still functional and the dangling subconductors did not cause a fault, the problem could only be observed visually.

The positive side is that none of these events caused personal injury – and the same applies to device explosions that have happened earlier.

The main grid averages one high-voltage device explosion each year. However, when an explosion has happened, there have been several during the same years. This was also the case in 2018.

Maintenance has already been developed and this development work is continuing all the time. In addition, we're also striving to reduce the consequences of damage by means of clarifications related to construction. Equipment is gradually becoming safer as, for example, the amount of oil in instrument transformers decreases and surface materials

In addition to structural safety, it's good to remember that we can also promote safety through our own actions. Avoid risks by utilising all your senses when moving around switchyards and only spend the necessary amount of time near high-voltage devices.

Working at a switchyard

Remember these safety matters:

- Use all the personal protective equipment, work methods and tools required in the work.
- Use the switchyard lighting in the dark and also spotlights if necessary.
- Monitor the environment. For example, there might be a hole in the ground, a block of ice, or a detached conductor hanging in the air.
- Smell, listen and look: if you observe something unexpected, such as the smell of rotten egg or an oil leak, move farther away and contact an expert.
- Ensure the coordination of safety matters if you notice other parties operating in the area.
- Plan the work and related safety matters thoroughly.

A campaign to encourage safety observations

We wanted to make reporting safety observations as easy as possible during the campaign. Actively submitting safety observations is worthwhile because each person's safety thinking improves when they pay more attention to the matter.

TEXT | MARKKU PÖYSTI PHOTOS | PANU RISSANEN



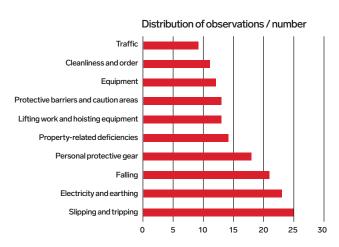
At the transmission line worksite between Hikiä and Orimattila people were activated to notice flaws during the campaign.

ingrid organised a 9-week safety observation campaign at the end of last year. The campaign was intended for representatives of all the suppliers working at our worksites and for Fingrid's own personnel. Our goal was to get as many people as possible to make as many observations as possible. We wanted to make the reporting process even easier and simpler, and to increase each person's own safety thinking. The main theme of the campaign was "Think for yourself, report it yourself". For the first time, we also tried notifications submitted via WhatsApp, which in practice gives everyone the possibility to make observations and contribute to improving safety at our worksites.

During the campaign, 130 different people made a total of over 250 observations related to safety. This included 232 safety observations, 15 near miss notifications and 8 observations concerning damage caused to outside parties or damage caused to us by an outside party. The number of positive observations was 46. Our suppliers submitted 62% and Fingrid employees 38% of all the observations.

WHAT IS MAKING SAFETY OBSERVATIONS BENEFICIAL?

Fingrid reads every safety observation and near miss notification. After this, the near miss notifications are classified into the A, B and C severity categories. Observations in the A and B categories are examined in more detail by Fingrid or the supplier.



The 10 observation categories in which the most observations were made during the campaign.

During the campaign, we received three near miss observations in the B severity category. All of these were studied, revealing hazards related to asbestos, the condition of equipment, and chemicals.

Some of the observations escalate into actions to improve safety. Implementation of these actions is monitored via the Quentic electronic system. A summary of everything, including the observations made during the campaign, is compiled every two months. This summary is available to all the suppliers. This is how we try to ensure that people learn from the observations.

During the campaign, 130 different people made a total of over 250 observations related to safety.

In terms of numbers, safety observations were most common. After being processed by the contact person for the contract and the supplier, corrective actions are specified. The greatest number of safety observations concerned hazards related to slipping, tripping or falling from a low height. A lot of observations were also made about deficiencies related to electrical work, earthing and personal protective equipment.

After submitting an observation, the most important thing is to eliminate the immediate danger if possible. The observations can be classified according to event type, such as slipping and tripping. Classification helps us to find safety-related trends and thus identify risk types and areas and intervene promptly. A good example is when several safety observations are made about slipperiness and sanding at the same worksite. Several observations made about a topic that doesn't seem very serious may signal a hidden and larger risk, which allows us to focus attention on it and perform the actions needed to eliminate the danger, such as sanding.

A second important point is summed up in the campaign theme "Think for yourself, report it yourself". Submitting safety observations about risks that may seem insignificant is a way to develop your own safety thinking.



Safety Supervisor Sami Rautio from Empower PN says that the safety observation campaign plays an important role in activating employees.

Alert all the time

TEXT | PÄIVI LEINONEN

Making safety observations is part of the job for Empower PN's **Sami Rautio**. He is currently a Safety Supervisor at the transmission line worksite between Hikiä and Orimattila.

Rautio believes that campaigns activate people to notice flaws. In many cases, the situation may have continued for a long time without anyone taking action. Rautio is one of the observers recognised during the autumn campaign.

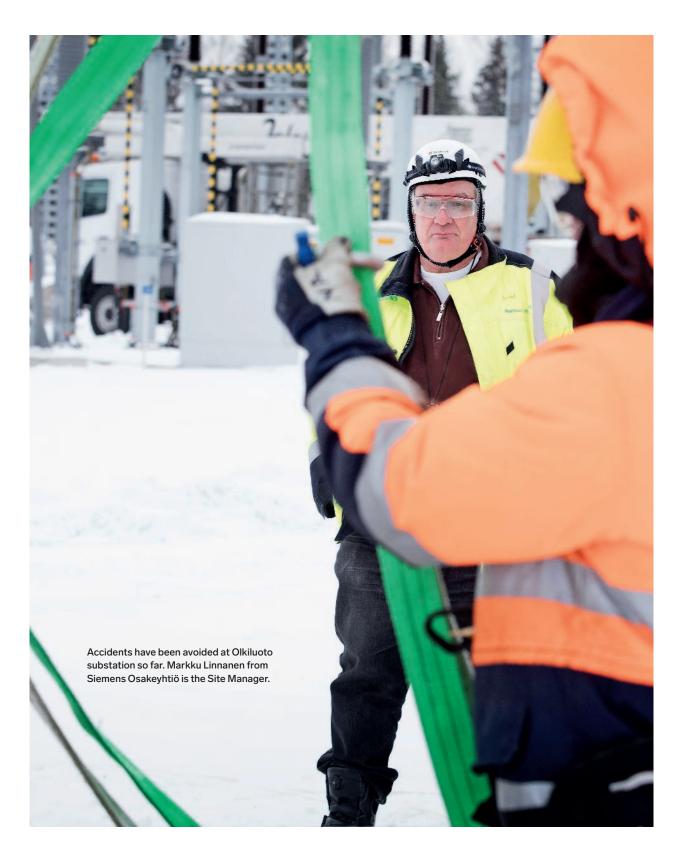
"I noticed that concrete slabs being stored at the worksite were piled too high and clearly leaning over. I recorded the observation in the system and advised the driver to leave the stacks lower in the future."

A safety supervisor's job description includes promoting safety at all times. Rautio holds toolbox talks and actively addresses problems.

"I often notice that people tend to forget to put their safety glasses on again after taking a break. Another area that regularly needs attention is lifting slings that are in poor condition."

The purpose of the campaign is to also activate employees whose job description doesn't specifically call for them to monitor safety.

Another target is to lower the threshold to submitting a notification via text message, WhatsApp or a QR code.



Occupational safety is refined in cooperation with partners

Fingrid is building an occupational safety culture in cooperation with its service providers. Proactive occupational safety leads to better work quality in addition to promoting business and a positive employer image. The suppliers' occupational safety group established by Fingrid brings together service providers to develop new and good occupational practices in collaboration with the client.

TEXT | OLLI MANNINEN PHOTOS | SUVI ELO

ite Manager **Markku Linnanen** from Siemens Osakeyhtiö is one of more than 10 members of the occupational safety group. He thinks the group is an excellent way to share ideas and experiences about occupational safety.

"We listen to each other's concerns and share operating methods that each person can apply in their own work. The client gains information about our views and together we can consider and implement improvement proposals," says Linnanen.

Each participant prepares a presentation about a safety-related topic for the group's meetings. These presentations inspire a lot of discussion.

"The meetings help us understand various perspectives, such as the differences and similarities between transmission line and substation work," he says.

Linnanen works at the Olkiluoto substation owned by Fingrid, which is undergoing major renovation work. As the main contractor for the project, Siemens Osakeyhtiö will provide Fingrid with a substation for the site according to the turnkey principle as well as high voltage devices and secondary components. The cooperation also includes substation and equipment development.

A DEMANDING WORK ENVIRONMENT WITH REGARD TO OCCUPATIONAL SAFETY

The Olkiluoto work environment is very demanding in terms of occupational safety. The old substation is being expanded and renovated. So far, accidents have been avoided at the site.

"Working close to energised high-voltage equipment means taking many issues into account, such as voltage distances, reliable earthing the work machines used near voltages. We strive to place cranes and lifts so that they can't touch live parts if an operating fault occurs or they fall over," says Linnanen.

Inducted people working near live parts are under constant supervision by an electrical professional.

"A separate plan is always made for the most challenging work phases of construction and electrical work, such as working at height or the use of additional earthing. The plan is reviewed with the work group and everyone working at the worksite is informed about it," says Linnanen.

During demolition work, it's important to ensure that the structure being taken down is de-energised and earthed. Prior to starting work, employees ensure that gases and oils have been removed and none of the circuit breaker springs are charged. Employees also have to be prepared





Knowledge of the common rules is important when several contractors are working simultaneously at a worksite.

to prevent oil accidents during demolition work and when storing equipment. An asbestos inspection must be performed when demolishing the control buildina.

"The parts in distribution boards and relay cubicles can be still energised. In conjunction with demolition work and new installations, we have to be particularly careful and take measurements regularly."

The auxiliary lifting devices used at the worksite are inspected yearly. The site is inspected weekly with MVRS measurement.

INDUCTION AND DOCUMENTATION

The safety instructions at site are explained during site induction, documented in the local induction form for the substation, and then signed by the employee receiving the induction and the employee giving the induction which usually is the site manager.

"Each person monitors their own occupational safety and also that of others at the same time. All employees are obliged to report deficiencies," emphasises Linnanen.

Each work group has designated persons responsible for occupational safety and electrical safety, and a company-specific list is posted on a bulletin board. Responsible persons are appointed for each separate project in the safety plan, and the contractor has a site manager for the entire site.

Site observations are documented in the weekly MVRS monitoring, and the client provides feedback about them during worksite meetings.

"The client's own supervisors also visit the site. and their feedback is recorded in the minutes of the site meeting," says Linnanen.

Conditions at sites vary and changing situations are taken into account in the safety plan by updating it throughout the project. After a risk survey, mandatory use of a helmet can be waived, for example, when performing secondary wiring work if there is no simultaneous construction work in the control room.

RESPONSIBILITY PROMOTES BUSINESS AND IMPROVES EMPLOYER IMAGE

"When a partner handles safety properly, this is a guarantee that they will also take care of other things. Employees prefer to come to safe sites rather than ones they are uncertain about," says Linnanen.

Occupational safety involves a lot of rules that make it possible for each partner to predict how other parties at the same worksite will operate and behave.

"This creates trust in the client and the employees of other contractors. Occupational safety also encourages anticipation with regard to calculations: since people know that the rules are identical for all suppliers, they don't take risks in hopes of saving money,"

A responsible attitude towards occupational safety improves worksite productivity, which is apparent as more positive business and a better employer image.



The renovation work at Olkiluoto substation includes some challenging phases, such as working at height and additional earthing. A separate plan is always made for these phases. The plan is reviewed with the work group and everyone working at the worksite is informed about it.



Safety on the roads

TEXT| OLLI MANNINEN

A SIGNIFICANT NUMBER of occupational accidents happen when moving around at the worksite or when transferring supplies. Commuting and transport are an important part of occupational safety. Service Manager Mika Moilanen from Eltel Networks drives about 38,000 kilometers each year for work, and he has managed to avoid accidents.

"Working for Eltel requires us to move around according to the worksite from morning until evening, and we're on the road a lot. However, we haven't experienced a single traffic accident in transmission line maintenance," says Moilanen.

He believes this is due to Eltel's systematic instructions, which review the job's safety environment, safe movement at the worksite, and ways to avoid traffic accidents.

"The bulletins that Fingrid distributes about specific worksite locations also provide more good advice about how to anticipate and avoid risks at the sites," continues Moilanen.

According to Moilanen, the most important starting point for moving around a worksite is being sufficiently rested and having the right gear.

"When working on transmission lines, most of our time is spent moving from one place to another while maintaining, repairing and inspecting the lines. Winter conditions are more demanding because it's slippery and dark. Studded tyres on vehicles and personal protective equipment such as studded shoes prevent slipping. While driving in the terrain, it's important to choose the right speed for the situation," he says.

Carefully planning a work trip in advance is another way to prevent accidents.

"Since I travel around Finland a lot, I try to combine the routes in a sensible manner and minimise unnecessary movement," explains Moilanen.



Towards more active occupational safety and health

The biggest safety risks in Fingrid's operations are related to physical work that is mainly performed by main and subcontractors specialised in that field. Occupational safety has always been considered a priority, and is taken into account in the contract agreements.

TEXT | PÄIVI LEINONEN PHOTOS | FORTUM OYJ, FINGRID



The safety equipment used when working on transmission line towers has developed a lot since the time this photo was taken in the 1930s.

ingrid's Construction Manager Keijo Välimaa has been running construction operations since 2000. "In the early 2000s, we mostly relied on the contractor to take responsibility for its operations. We monitored the situation but generally only reacted to events after the fact."

The volume of construction has increased during the 2000s and contractors now use more subcontractors. A lot of new operators have entered the industry, also from other countries. Detailed procedures are agreed upon in the contract agreements.

"Today's agreements are much longer, in part due to the increase in safety requirements."

ACTIVE DEVELOPMENT OF SAFETY

In recent years, the focus of occupational safety has shifted to proactive work. For example, the subject is continuously highlighted during the regular toolbox talks held at worksites. Digital technology, such as a web-based reporting system, also promotes development.

All people working at Fingrid worksites must complete the company's online school, which is available in many languages. Fingrid also offers electrical work safety training for other industry operators. Tests that must be completed in an approved manner are held to ensure that the required qualifications are achieved.

We took a big step forward in 2005 with the decision to equip all new towers with a safety ladder structure. This large investment was considered an important move. We're currently examining car travel from the occupational safety perspective. Experts drive tens of thousands of kilometers between worksites, often in poor conditions.

"It would be logical to spend most of the working hours on expert work rather than driving from place to place."

Occupational safety and health development in Finland

Occupational safety and health in Finland began with industrial inspection activities in the late 1800s. The greatest concern at that time was the use of child labour in factories. Some large industrial companies employed their own doctors in the 1800s.

Employees in an industrialising Finland were increasingly exposed to carbon monoxide poisoning and other chemical hazards. A lack of proper protective equipment caused physical injuries. These concerns led to the founding of the Finnish Institute of Occupational Health in 1945. An occupational safety and health act was passed in 1958 and it included mention of occupational health care. The development of occupational health care legislation began in the 1970s.

Joining the European Union in the 1990s influenced the legislation as some laws are compiled in the EU. The EU also brought with it consideration of the necessity for different monitoring programmes and documentation.

The shift from industrial work to office work has reduced the physical risks. Today, people suffer from problems caused by poor indoor air quality and mental stress.

Digitalisation and the move to online systems decreases the amount of concrete movement at work locations, subsequently reducing the chance of



Foreman Laakso's hoisting group at the base of the Haapajärvi crossover tower in summer 1948.

accidents. Information sharing in the online world is also more efficient in every way. The internet can be utilised in, for example, safety training sessions. The amount of information also involves risks: incorrect information also spreads quickly. The flood of information can cause mental stress.

An important area of development in the electrical industry has been related to working in close proximity to electromagnetic fields. Exposure to these fields has been studied many times since the 1990s. This work resulted led to a Government decree on employees' exposure to electromagnetic fields. Safe working methods and protective equipment were developed at the same time

Expert: Rauno Pääkkönen, D. Sc. (Tech.)

THINGS WEREN'T ALWAYS BETTER IN THE GOOD OLD DAYS

For Worksite Manager **Tauno Nieminen** from Infratek, switching from a building construction worksite to electrical networks meant a change in his occupational safety thinking.

Nieminen's first worksite on the electricity distribution side was the electrification of Rauhalahti peat power plant in 1984.

"Helmet use wasn't compulsory in construction work at that time and aps were a common sight at worksites. We had to wear a helmet at the power plant worksite, and it even saved my life once. Since then, the importance of safety gear has been obvious to me."

Nieminen also remembers the negative attitude towards safety shoes.

"I bought a pair of safety shoes with my own money when I was 15, and the more experienced men laughed at me. I didn't wear the shoes, and of course that resulted in an accident."

Today, Nieminen's job as a worksite manager includes providing induction for new employees. He says that he has received good feedback about his activities at worksites.

"The most important part of safety training is setting an example. It's hard to ask others to do more than you're prepared to do."



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