

SUSTAINABLE
STAINLESS



Safety and Sustainability Awards 2020



Caring for our people and our planet



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Move for Health Project

Member Company ACERINOX EUROPA S.A.U.
Category safety training

Challenge

This project tries to teach and train to the workers the benefit to achieve a programmed physical activity, focused in work environment. A guide to increase the tolerance to work-related stress, physical and mental fatigue and avoiding occupational muscle-skeletal injuries.

Action

Due to the most common work-related injuries are those related to repetitive movements of wrist, shoulders and back, blood circulation problems in legs, lower back and cervical problems, and these are the leading cause of occupational absenteeism and work incapacity, Acerinox Europe has decided to promote the physical activity focused in a program of physical exercises, specifically designed to solve these problems.



Based on specific training sessions named:

- Retrofitting and postural re-education.
- Physical conditions.

Previously, initial tests of physical conditions and range of motion, and international questionnaires were made.

Outcome

- 30% of participating workers, for a set period, have had significant improvements in all bioimpedance parameters, as well as in the tests of physical conditions and range of motion.
- 100% of participating workers that previously needed physiotherapy sessions, has decreased their attendance in more of the 50% of the sessions.
- In addition, 100% of participating workers have reduced the percentage of body fat mass.



New design of platform to work in steam chamber of slab continuous casting machine

Member company ACERINOX EUROPA S.A.U.
Category workplace improvement

Challenge

To minimize the risks associated with installation and use of a platform to work in the steam chamber of the Slab Continuous Casting machine.

Action

Using the old platform (see pictures of operation), the risk and hazards associated with this work, were very high.

A new platform has been designed to that purpose.

The new platform is hoisted by a crane (with the main hook), without manual handling. The new device has installed wheels* in order to place it through the groove for casting segment.

*same wheels installed in the casting segments.

Outcome

Not only improves the Safety of this work, this new platform, made to be used easily and comfortably, will improve the productivity, reducing the workforce involved in this operation and minimizing machine downtime.



Picture 3: New platform mounted.
Picture courtesy of Acerinox Europa.



Picture 4: Installation of new platform.
Picture courtesy of Acerinox Europa.



Picture 1: Old platform hooked.
Picture courtesy of Acerinox Europa.



Picture 2: Old platform mounted.
Picture courtesy of Acerinox Europa.



New design of platform to work in steam chamber of slab continuous casting machine



Picture 5: Lifting of new platform.
Picture courtesy of Acerinox Europa.



Picture 6: Wheels and lifting lug details during previous test.
Picture courtesy of Acerinox Europa.



Picture 7: Works on the new platform.
Picture courtesy of Acerinox Europa.



Think outside of your chair!

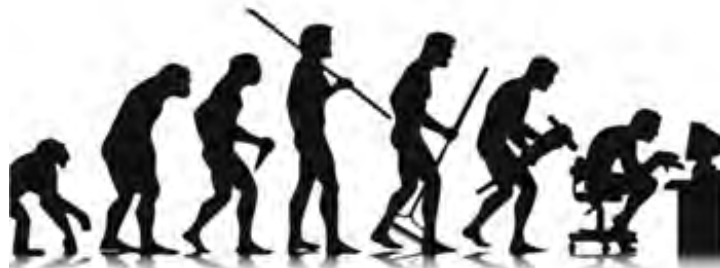
Member company **Aperam**
Category **workplace improvement; skill training**

Challenge



The need to promote of a culture of movement as most of our people (especially white colours) sit too long.

SITTING IS THE NEW SMOKING... but it is not seen as a danger



As a mass phenomenon, sitting is often compared to smoking. The health hazards of smoking were already known in the 1960s, but it was not perceived as a threat. Before the first anti-smoking campaigns were launched, smoking had become a modern mass movement, taking its toll on people's health. We can see some similarities with sitting. The risk is mostly underestimated or ignored. Sitting in the office is commonly viewed as comfortable and appropriate instead of being perceived as a potential threat to health. There are initial long-term studies showing that sitting can reduce life expectancy.

„ **Sitting is and remains the worst posture for the human body.**“
 Surgeon and spinal specialist H. Junghanns

Long periods of sitting have negative impact on all areas of our body: muscles, metabolic processes and brain. It is already known that people who do little exercise have a higher risk of developing illnesses such as diabetes, cardiovascular disease and a number of other problems, due solely to inadequate physical activity.

Anyone who works long hours in an office is exposed to a considerable risk. It is in our hands to do something about it. No investment is required, but only a little discipline. Everyone is responsible for him or herself and everyone can do something. We encourage you to do more for your health. Let's start a new culture of movement!

In this respect, we are pleased to introduce you our new campaign:

“Think outside of your chair!”

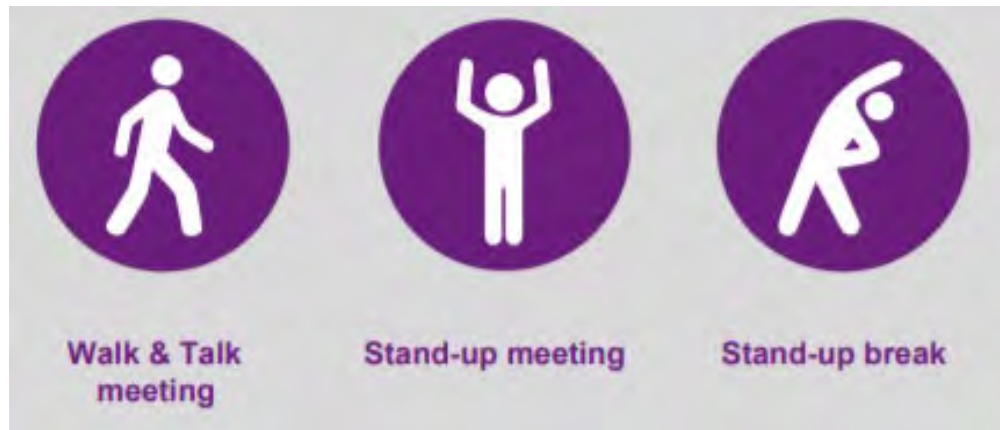
Think outside of your chair!

Action

→ Promotion of a new “meeting culture”

“Let’s start by changing our meeting culture. The regular movement breaks must be an integral part of the agenda of our meetings. Get out of your seats! We should get used to do part of the meeting standing up. Also, if possible, let’s do our discussions in small groups while walking!”

→ Creation of 3 new logos for these 3 kind of activities



→ A series of informative posters have been displayed in all Aperam’s offices and meeting rooms, providing useful tips for healthier office work activities.



These posters have been translated in our 10 different languages.

→ Launch of a communication campaign on that subject with:

- 3 Newsletters distributed in 10 languages to all workers of Aperam over several weeks
- Publication of an interview with the CEO Services and Solutions and Aperam Leadership Team Member, “...Sitting is a very important topic and it affects everyone. We need to promote a culture of movement! I really encourage everybody to stand up and move more!..”
- Sharing of good practices
- Sharing of a test (in 10 languages) for the people to do a self-assessment of their personal risk

Think outside of your chair!

→ Creation of a Web site

Accessible to everyone by Aperam and containing following information:

- General Information on this topic
- Interview and statement
- Risks and numbers
- "What you can do"
- Link to icons and posters

→ Creation of "Health@Work community"

This community is used for the sharing of good practices coming from Aperam and from outside on health issues, and in this case on ideas how to reduce the time sitting.

→ Creation of a video "Fit-Breaks" (still ongoing)

This video shows easy exercises that can be done by everyone before starting work or during stand-up breaks.

→ A lot of local initiatives have been put in place

Purchasing of ergonomic equipment, organisation of trainings, regular exercises... The posters have been put in all meeting rooms.

Outcome

- Much better awareness of the risk of long sitting
- Better awareness of the need to move more - we see more and more people using stairs instead of lift, walking during midday-breaks, stretching regularly...
- New meeting culture with regular stand-up breaks and practice of stand-up meetings
- A lot of sites have already put at least one of this solution:
 - one standing desk at dispoable for several persons


- Sit to stand workstation
- Individual electrically height-adjustable desk
- Increase of the motivation and well being

"I am deeply convinced, that desks with adjustable height, are strongly supporting HEALTH and MOTIVATION of our people". A.K - CEO in Germany


"We all use the standing option every day. It has been a success and we see benefits, especially in reduction in back pain and Sciatic problems". R. C. Director UK & Ireland

SOME GOOD EXAMPLES OF IMPLEMENTATION


Video with exercises for all...




GP 1910 Montevideo Gymnastic activities



GP 1905 Viladecans stretching exercises



GP 1905 Siemianowice - exercises during work



© Aperam 17



Think outside of your chair!

health@work
Check out our new Good practice
ERGONOMICS IN THE OFFICE
on our Google+

Site: APERAM - S&S Germany and S&S UK

Health@work community

aperam

© Aperam 21

Health@Work
Think outside of your chair!
Let's build a new meeting culture

Introduce Stand-up meetings
The 15-Minutes Productivity Injection! The implementation of short stand-up meetings will help to improve the physical well-being of the participants and will also foster the idea generating in the work environment.

Go for Walk & Talk meetings
Walking meetings are best for small groups and it is a great way to integrate physical activity throughout the workday while also boosting the creativity.

Plan Stand-up breaks
At least every 60 minutes!
Standing is proven to be one of the most effective ways to improve memory and focus. It may also help to relieve back pain.

Long periods of sitting have an effect on all areas of our body: muscles, metabolic processes and the brain.
Stand when you want to, walk & move when you can.



Aperam's Health and Safety Cultural Framework

Member company **Aperam**
Category **safety training; skill training**

Challenge

Within Aperam the Health and Safety of all our people is our top priority. Efforts to reduce the number of incidents are continuously undertaken, focusing on different axes going from technical over organizational and process measures. In the last years however we see a stagnation of the results and incident levels have reached a plateau.

In order to reduce further the incident rates and to become a real sustainable safe company, Aperam concluded that other measures are needed, measures that ensure health and safety is front of mind in all our decisions, behaviours and actions.

Action

Together with the Keil Centre, Aperam decided to build and maintain a positive health and safety culture in order to help us and our principal contractors to achieve common safety goals.

What is health and safety culture?

Simply put, health and safety culture is “the way we do things around here.” It can also be described as assumptions, values, attitudes and behaviours related to health and safety which are shared by a group of people in an organisation. Incidents are often associated with failures in health and safety culture. It is widely accepted that a positive health and safety culture is vital to achieve excellent health and safety performance

Why do we focus on behaviours to improve health and safety culture?

Our efforts to improve health and safety culture focus on behaviours because we can define, observe and measure them. We also have the right tools and methods to understand behaviour and reinforce the behaviours we know foster a strong health and safety culture.

What is Aperam doing to improve health and safety culture?

Aperam reviewed health and safety research, lessons from incidents in our industry, and consulted with our people to develop a framework that defines the critical behaviours that characterise a robust health and safety culture. This framework helps everyone at Aperam understand the behaviours they should and should not display to play their part in strengthening our health and safety culture. Aperam's health and safety behaviour framework – Our Health and Safety Culture – is being used as the basis for Aperam's Health and safety culture improvement initiatives.

Some examples of where the framework will be used include: gap analysis, training and development, performance review and incident analysis.

Aperam's Health and Safety Cultural Framework

Overview of the Cultural Framework:



Example of expected behaviours for Supervisors in the theme Standards:

Supervisors' Behaviours

To improve our safety culture ...

	I will	I will not
STANDARDS Ensure compliance	<input type="checkbox"/> SP1.1 Set a good example to the team by following all health and safety rules	<input type="checkbox"/> SN1.5 Set a poor example by breaking rules or standards
	<input type="checkbox"/> SP1.2 Routinely spend time with the team to verify that procedures and work instructions are clearly understood	<input type="checkbox"/> SN1.6 Turn a blind eye to unsafe behaviours or conditions
	<input type="checkbox"/> SP1.3 Ensure the team understands that production pressures should never override Health and Safety	<input type="checkbox"/> SN1.7 Assume that team members are appropriately skilled and competent without checking
	<input type="checkbox"/> SP1.4 Ensure team members have the skills, knowledge and competency required before starting work	<input type="checkbox"/> SN1.8 Imply by words or behaviour that production is more important than Health and Safety

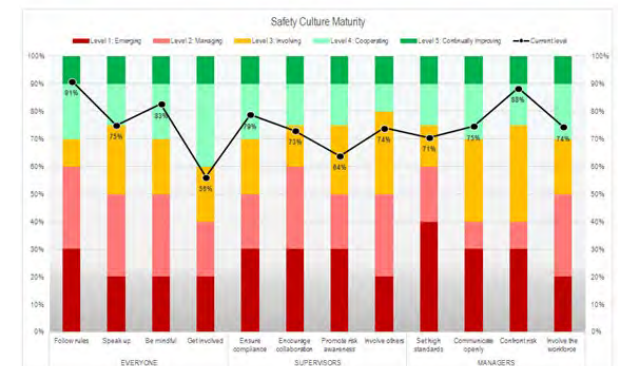
What has been done so far?

Since September 2019, every production site is going to a full review on health and safety, in which we focus on the application of our Aperam H&S standards and in which we perform a so called Cultural Assessment using the above described health and safety behaviour framework.

This Cultural assessment is a real interactive approach in which a minimum of 10 % of a site population, involving operators, supervisors and managers, is participating in interactive workshops in which the health and safety cultural maturity level of the site is being defined. It can be seen as a 360° evaluation of the health and safety culture of a site as the opinion of all levels is taken into account.

Once the cultural level has been defined, a clear and detailed action plan is being put in place, aiming at strengthening the health and safety culture via a more sustainable demonstration of the desired behaviours. An important remark on this is that all actions that are being put in place have been proposed by the people participating in the different workshops, this in order to create a real involvement from everyone in the approach.

Example of an Assessment graph showing the level of Cultural Maturity for each level, for each theme. Action plans are being put in place to raise the level of Maturity:





Aperam's Health and Safety Cultural Framework

Outcome

The project started at the end of Q3, beginning of Q4 2019, so it is too early to be able to show linked results. We however get the feedback from the sites that have gone through the motions of the cultural assessment that afterwards the involvement of all levels in health and safety initiatives is increasing, a more open reporting on incidents, events is increasing and people feel more comfortable to address any health and safety behaviour to observe.

In the longer run, after 1 year, we should clearly start to see the real impact of our effort on our main indicators.

Integrated Safety Scoreboard

Member company **BAHRU STAINLESS SDN BHD.**
Category **accident analysis**

Challenge

To improve the awareness and proactive work behaviour of safety and health among all stakeholders in the company is always post great challenges. Too often evaluation of safety performance was based on various types of indexes such as numbers of case of injury, number of free injury days etc. Although such measurements are important but it always a lag indicators that drive the corrective or reactive in actions. It is necessary to monitor safety performance by using the lead indicators that promote more predictive and anticipate manner so incident inside plant especially work related injuries can be prevented.

Action

There were various initiatives or safety programs being introduced in plant operations. These programs drive to increase safety awareness, ensure compliance to safe work procedure and encourage overall participation to ensure a safe and conducive work environment. These include programs such as "Hazard Hunt", "Behaviour Based Observation (BBO)", "Daily Safety patrol", "Safety Training", "Tool Box Meeting", "5S Practices" etc.

In 2017, idea of **Integrated Safety Score** that evaluate the overall performance of all these safety activities was introduced. This is to ensure all the safety activities being implemented practically and effectively. Based on the number of head count, every department will allocated a Total Safety Ceiling Point. Such ceiling point was based on predefine of total penalty point for every safety noncompliance that could possible for an individual against its total head count in

Business Units	AP/CB	GFL/SKP/ GP/WBX	ZM	MTM	MTU
Total Head Count	54	78	40	34	16
TOTAL SAFETY CEILING POINTS	67,500	97,500	50,000	42,500	20,000
Penalty Point per NCR finding					
PPE non compliance	50				
Unsafe Act / Condition	100				
Not attend training/test	100				
LOTO	100				
Work Permit Compliance	50				
Fire Safety	50				
5S (Red)	250				
BBO participation (RED)	350				
Electrical Hazards	50				
Late Reporting Incident	100				
Others	50				
TOTAL PENALTY POINTS	1,250				

Ceiling Point for AP/CB
= 1,250 x 54 = 67,500

Picture 1: Compute the Safety Ceiling Point from possible noncompliances penalty point.

a department. (Please refer to pic 1 for the explanation)

During month end, every department will be deducted it Ceiling Point allocated to the total non-compliance penalty point, including any "Incident Penalty point" (as per pic 2 shown). Beside the penalty point system, department will also be reward merit point for any good findings or initiative in safety practices.

Incident Penalty Point	
Fatality	7,000
Injuries-LTI	5,000
Injuries -NON LTI	3,000
Property Damage	1,000
Fire Incident	1,000
Environmental	1,000

Picture 2: Deductible incident penalty point



Integrated Safety Scoreboard

The total net score will then be rated for every department in percentage of the Ceiling Point given and such achievement rate is defined as Integrated Safety Score for the department. Department performance will be published and broadcasted in e-bulletin and notice board to ensure such safety performance being proper communicated. (Pic.3)

Outcome

The Integrated Safety Scoreboard program manages to promote safety awareness and improve participation from workers and managers. The safety injury rate had reduced for the past two consecutive years.



Picture 3: Monthly Safety Score Board



Impact Tester Automation

Member company Columbus Stainless Pty Ltd
Category workplace improvement

Challenge

A risk assessment was performed on the impact tester to determine the risks involved.

The risk assessment revealed the following potential risks:

- Exposure to moving machinery
- Ergonomical factors due to the manual operation of the pendulum weight that needed to be lifted in order to latch. This was identified to be a high risk to employees.
- Nip points – Employee may be hit by the Pendulum.



Initial situation

- Columbus Stainless Laboratory conducts impact testing for the releasing of material to international specifications to conform to its accreditation Quality Standards ISO 17025:2017 and ISO 9001:2015.
- The test is conducted manually by means of a pendulum weight (20 kg) that is lifted by hand above the operator's shoulders and then latched.
- This can result in the operator being hit by the pendulum or his/her hand being caught between the pendulum and the specimen.
- Employees may injure their backs due to the reaching activity.
- The operator's position is next to the weight to enable the final lift before latching. As can be seen in the picture, the operator is in the path and leaning forward prior to the latch.
- Once latched the operator places an impact specimen in position and releases the weight to complete the impact test.

Action

- The process was assessed and automated by installing a variable speed drive and a motor / brake / clutch mechanism that lifts the weight until it latches.
- The entire process is carried out remotely and the operator is not in the path of the swinging weight.



Impact Tester Automation



Weight being lifted in auto.



Weight has reached home position and latched.

Outcome

- All Operators, irrespective of their length or physical strength, can operate the machine safely and remotely without the risk of being in the path of a swinging weight. No risk of back injuries.
- An initial External quotation for to replace the machine (€107 100) with an automated unit was withdrawn and the total cost spent on the in-house automation was €4 284.
- The operation of the modified machine was also successfully verified to international standards by an external calibration/verification supplier.



Tilting Link Modification

Member company Columbus Stainless Pty Ltd
Category workplace improvement

Challenge

Transferring of crude and refined molten steel between the refining processes are done using ladles. Transfer ladles are used for transferring the crude molten melt from the EAF to the AOD and teeming ladles for transferring the refined product to the ABS and CCM. Apart from distinct differences on the mouths of these two ladles, transfer ladle has a spout whilst a teeming ladle has a square mouth, the tilting links of the two ladles also differed as shown Figure 1.



Transfer ladle



Teeming ladle



Tilting Link Modification

Action

The aim was to reduce the length of the tilting link at the back of the transfer ladle. It had some extra links that were not needed. This reduced the risk to damage the tilting unit as well as being safer to maintain as the working on heights was eliminated in the process. Cost is saved due to fewer links in use. Please see figure 2 Indicating the section B-B and links to be omitted.

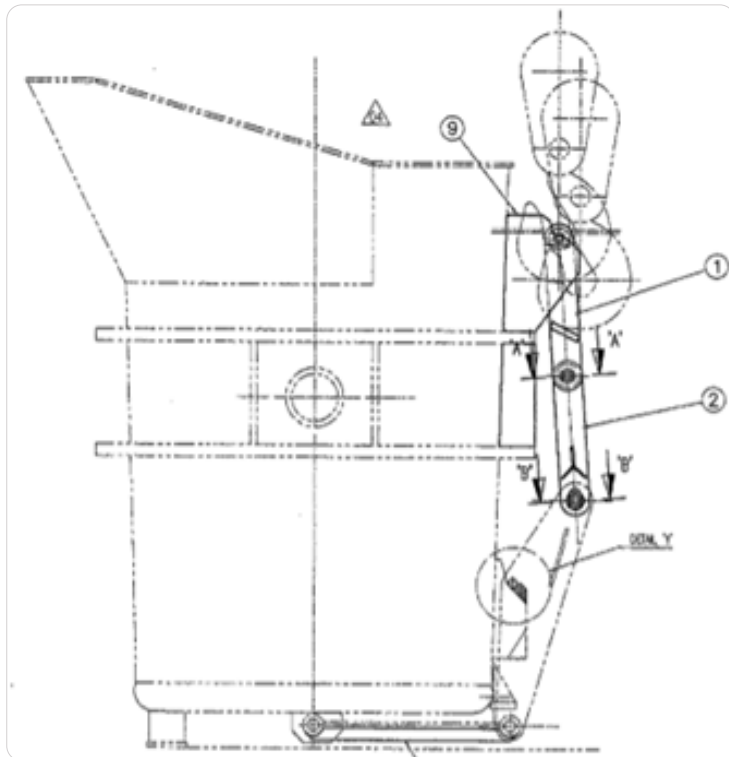


Figure 2: Cross section indicating ladles links to be omitted

Outcome

The Risk Control department did a risk assessment to determine the reduction in risk rating by changing from the long transfer ladle tilting link to the short teeming ladle tilting link as shown in the table below.

	Hazards	Risk	Risk priority
From	Ladle + Tilting link (Long) + Heights + Scaffolding + Maintenance	Performing Maintenance on the Tilting Link is working at heights and require scaffold erection to perform the maintenance and has a cost and time implication	16
To	Ladle + Tilting link (Link) + Maintenance	Performing Maintenance on the short link does not involve working at heights, scaffolding or the cost and time implications	1

Table 1: Risk reduction for maintenance on the proposed ladle link change

Risk reduction from the change of the ladle tilting link will be for the maintenance of the link, working on heights and scaffolding.

Potential to Reduce Injuries

The risks assessed in Table 1 are also related to the potential to reduce injuries. A 94% reduction in potential to reduce injuries was achieved.

Safety Fence (Clear-Vu) with Auto gate closers

Member Company Columbus Stainless Pty Ltd
Category workplace improvement

Challenge

A risk assessment was performed on the access to the safe working areas to determine the risks involved.

The risk assessment revealed the following potential risks:

- Exposure to moving machinery
- Exposure to open pits with risk of falling

The coil car pits are open and deep and thus pose a risk of falling and serious injuries, even a fatality. The coil car pits were enclosed with "clear-vu" fencing to keep unauthorised personnel away from the pits. However the fencing has gates that allow operational personnel to strap coils on the coil car. Operational and maintenance personnel, in their haste, of going about their duties, often leave the gates open thereby exposing the coil car pits.

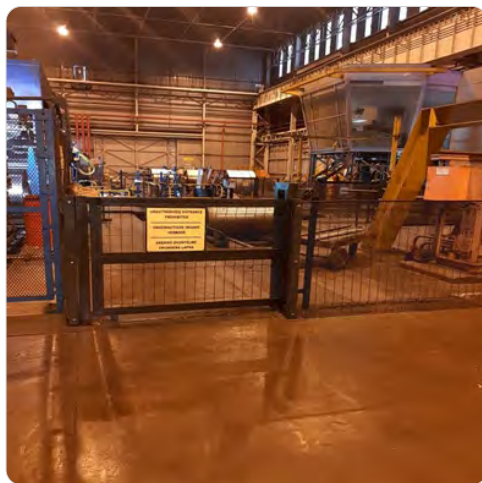


Photo 1. Typical Z-Mill area

Action

Automatic gate closures were made by an artisan to keep the gate closed. A counterweight was attached to the gate allowing the gate to close by itself when released. The person going through the gate only needs to slide open the gate and it will close by itself using the counter weight attached to it. All the spares used were manufactured internally, so the project was done at minimum cost. This installation has low to zero

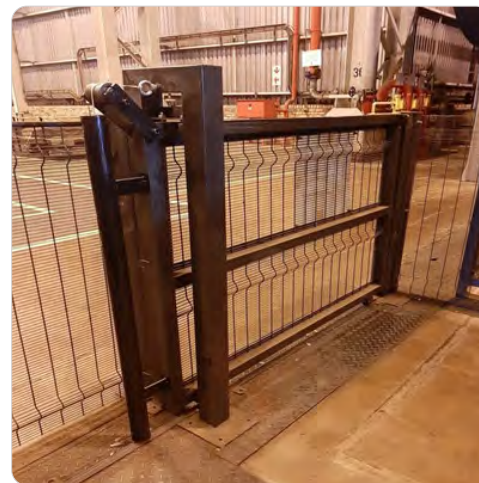


Photo 3. Gate auto closed.



Photo 2. Design of gate closing mechanism.

maintenance and it is very effective. It thus lessens the chance of unauthorized entry significantly.

Outcome

Since the automatic gate closures have been installed, the gates are kept closed and the coil car pits are now safer and free access to these areas have since been prevented.

The use of safety training facilities

Member Company JFE Steel Corporation
Category safety training

Challenge

We regard safety as a culture and provide various education on laws, past disaster cases, etc. to eliminate accidents. However, classroom education requires training because it is difficult to recognize the danger.

Example 1: Safety training facility at JFE Chita Works



Overview description



Description of the experience area

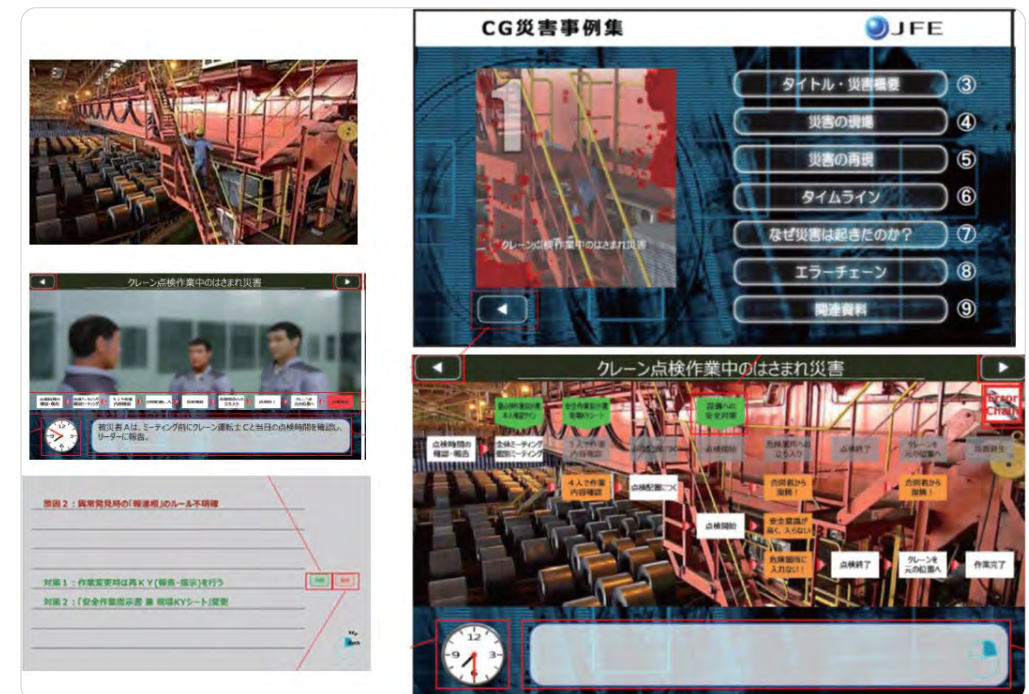
Action

JFE has set up safety training facilities at each steelwork and has established a system for regular use by employees and contractors. This facility includes VR experiences of falling disaster, pinched disaster, electric shock, etc. in addition to past disaster cases by CG.

Outcome

It is now possible to communicate dangers repeatedly while using it widely for inexperienced people, young people, veteran people, etc.

Example 2: Education using past disaster CG images at JFE Keihin Works



Configuration of past disaster CG video: We teach not only disaster situations and causes, but also standards and rules that reflect the lessons learned from the disaster

Safety passage and blind spot camera - Prevention of contact accidents at outdoor loading area

Member Company NIPPON STEEL Stainless Steel Corporation

Category workplace improvement

Challenge

The outdoor loading area is a place where many large logistics vehicles and many loading workers pass for shipping operations. Since such logistics vehicles have a high driving position and a long body, the range of blind spots from the driver's position is wider and the prevention of a contact accident by a logistics vehicle with a loading worker including a vehicle guide has been a serious issue. Once a logistics vehicle makes contact with a loading worker, a serious injury often occurs. Nippon Steel Group companies have also experienced such accidents.

In NIPPON STEEL Stainless Steel, no such accident has occurred so far. However, dangerous cases (near-misses) have occurred and the situation cannot be neglected.

In addition to these cases, Hikari Area Yamaguchi Works of NIPPON STEEL Stainless Steel is currently facing a chronic shortage of workers in Japan and a time of generational change in its workforce. Since these situations are expected to become more frequent in the near future if a general warning only is given, concrete measures have been taken.

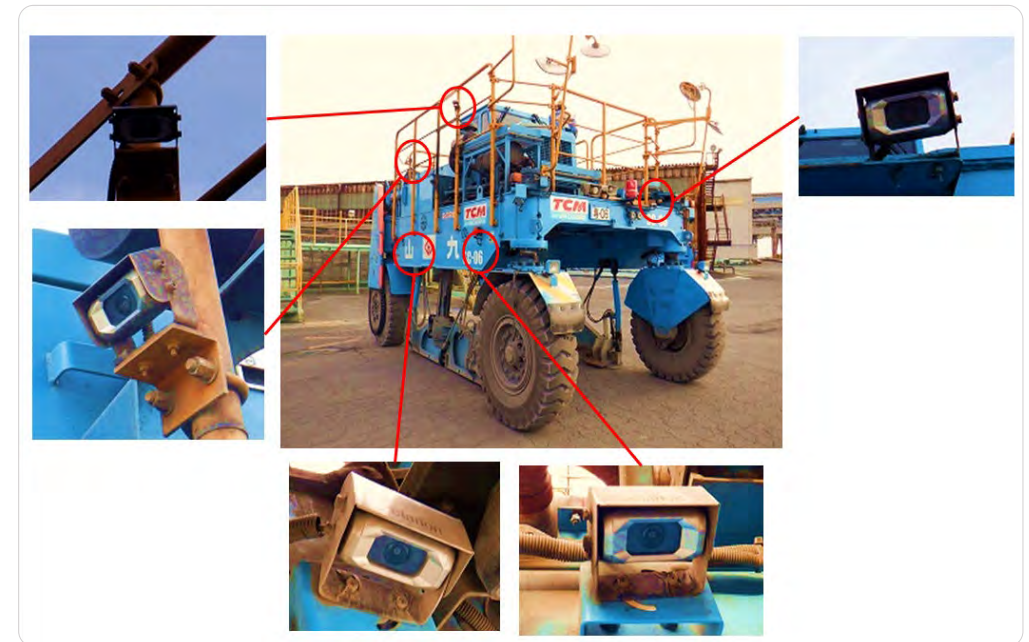
Action

An accident occurs when a logistics vehicle makes contact with a loading worker. Thus, we have mainly taken two measures to prevent such accidents.

As a measure on the worker side, safety passages and traffic rules for workers were established to prevent workers from entering the work area of the vehicles.

When establishing the measures taken, the loading workers and the logistics vehicle drivers discussed the details of their work and mutually confirmed the work area of the vehicles. The route of the safety passages was decided so that both workability and safety were achieved.

As a measure on the vehicle side, in order to eliminate blind spots from the driver's position in all logistics vehicles, five blind spot cameras on the straddle carrier and four blind spot cameras on the pallet car have been installed, and the driver can directly look at the blind spots of the vehicle on the monitor.



Picture 1: Positions of the blind spot cameras on the vehicle



Safety passage and blind spot camera - Prevention of contact accidents at outdoor loading area

Outcome

The total length of the safety passages was over 800 m and the traffic area for logistics vehicles and loading workers has been separated. By painting the passages in green, it is easier for the driver to see the workers on the passage.



Picture 2: The safety passage – Before and after at the shipping quay

Even when the logistics vehicle is not moving, the driver can always check the workers by using the blind spot camera, and the risk of the driver starting the vehicle without noticing the workers has been eliminated.

After these measures were taken, there were no near-misses.

In addition, the workers and the vehicle drivers participated from the planning stage and talked to each other about traffic areas and blind spots. As the result, the safety awareness of inexperienced employees has been improved.

Furthermore, since the driver checks the safety of the surroundings by himself, a vehicle guide is no longer required and labour-savings has become possible.

This project, which has had a great effect on safety, human resource development and labour-savings, is currently under consideration for company-wide activity.



Construction of a multi-purpose building

Member Company **Nippon Yakin Kogyo**
Category **workplace improvement**

Challenge

We have problems in the aspect of environment and welfare system attributed to the factories and facilities used for a long time some of which are over 30 years old. From this viewpoint, we have been making efforts to renew them one by one. However, it is unfair for the operators working in the old factories still existing compared with them in the new ones, leading to the difficulty to secure them along with keeping their motivation. In addition, these are mostly one-story buildings leading to the significant occupation of the land.

Action

To solve the problems relevant to the welfare system, we have constructed a multi-purpose building featuring compactness due to a three-story style resulting in less occupation of the land, which enables investment in the future. The brand new building is sophisticated not only with a modern cafeteria and dressing and bath rooms for the equipment division, but also with the apparatuses for inspections and research and developments. We simultaneously focus on the ecological aspects including the application of the devises with minimized energy consumption resulting in the success in reducing CO2 emission.



Outcome

We have obtained the following outcomes by the construction of the multi-purpose building:

1. Improvements in the welfare system along with assuring safety for the workers.
2. Resulting in the construction space for new investment in the future.
3. Succeeding to promote our stainless steel products by applying them for the exterior material of the multi-purpose building.
4. Reduction in CO2 emission by application of the devises with minimized energy consumption.



JSO Process

Member Company **North American Stainless**
Category **safety training**

Challenge

In 2019 we added the requirement for a vice president to attend incident investigation root cause reviews. During these reviews, the supervisor and group leaders must present documentation to the group for review such as training documents, work instructions, job safety analysis (JSA's) and any other documents that might be useful during the root cause reviews.

After the first couple of reviews it was noted that a JSA was not available or that it was inadequate. We were finding:

- Missing steps
- Hazards not identified
- Hazard precautions did not match the hazards identified
- PPE was not listed or was not correct
- Hazard ranking was not correct

In April, our Vice President of Operations sent out a memo to all of our Operations, Maintenance and Technical Managers setting forth the requirements for the Job Safety Analysis project that was to be completed by August 30th. The project was laid out into four steps:

1. List all tasks performed in each area which was to include every routine job performed in that area. To be complete by May 3, 2019
2. Compare the list of jobs with the current list of JSA's to identify any missing JSA's. To be complete by May 17, 2019.
3. Complete any JSA's that were found missing from the list. To be complete by June 14, 2019

4. Review and update all current and overdue JSA's. A review must be performed and include all operators and employees that perform the task. Must be completed by August 30, 2019.

Once this project was complete we wanted to ensure that the JSA's were as complete as possible and that all steps, hazard and hazard precautions were captured. To assist with this task we then implemented a Job Safety Observation in October of 2019. With this in place we are able to continuously improve our JSA process.

Action

The Job Safety Observation (JSO) program was intended to get more employees involved in reviewing our JSA's line by line to ensure everything was captured. By having employees in the area review the JSA's we could ensure all of the steps were listed and when training new hires we could be comfortable knowing that all steps were captured in the JSA.

In this system they are asked a series of questions:


1. Is there a JSA for this task:
2. What is the JSA number
3. If there is not a JSA, should there be one?
4. Is there a non-routine task form for this task?

If they answer yes to question 3, then they will be required to enter recommendations. They will enter the steps and any other information necessary. Once they submit the JSO the system automatically generates a JSO incident report. This will then be sent to the Supervisor of the area for corrective action.

JSO Process

In addition, anytime a recommendation is made for an existing JSA, a JSO incident report is automatically generated and sent to the Supervisor for corrective action.

The JSO tracking system allows us to run different reports which allow us to track the data that is being entered. We can track who completes a JSO, how many they have completed overall, comments entered for each JSO entered, how many JSO's have been completed for each task and various other reports. JSO incident reports are tracked via our incident reporting system as well, to ensure that they are closed out in a timely manner.

	Policy Number:	Subject:
	007-905-00	Job Safety Observation

1.0 Objectives and Scope

1.1 In an effort to continually improve our safety performance and ensure a safe work place for all of our employees NAS has implemented a Job Safety Observation process in addition to our Behavior Based Safety process.

2.0 Scope

2.1 This policy is intended to establish basic requirements for conducting Job Safety Observations (JSO). This applies to all North American Stainless employees.

3.0 Participants

3.1 All non-exempt mill employees (shift leaders and below) must complete one Job Safety Observation (JSO) per month.

3.2 All maintenance employees, non-exempt group leaders and exempt employees are required to perform one behavior based safety observation (BBO) per month.

3.3 Those required to perform a JSO are no longer required to perform a BBO.

4.0 Procedure

4.1 Before performing the observation, the observer will request to see the Job Safety Analysis (JSA) for the task being performed.

4.1.1 If there is not a JSA for the task, this is to be documented on the JSO form. If the answer is no, then the observer will need to note if one should be created for the task by checking the yes or no box.

4.1.2 If there is not a JSA the observer should check to see if a Take Two form was completed and check either yes or no on the JSO form.

4.2 Only two employees may perform a group JSO.

4.3 The observer will watch the task and compare it to the JSA to identify any missing steps or hazards on the JSO form.

4.4 If there is not a JSA, they will need to observe the task and enter the task information under the Recommendation for JSA Update section.

4.5 Once the review is completed, the observer will meet with the person observed and will review the findings of the JSO.

4.6 The observer will then enter the JSO findings into the JSO Input system on the Safety Page located on the intranet.

4.7 A JSO initiated incident report will be created automatically for any JSO's with recommendations or if the JSO needed box is marked yes.

4.8 Those not completing a JSO during the month will receive a 2% deduction on their personal incentive.

5.0 Recordkeeping

5.1 JSO documentation will be stored electronically on the safety intranet page.

This is an uncontrolled document when printed.
Page | 1

JSO Supporting Documents

Outcome

Since we implemented our JSO tracking system in November 2019, we have had 85 requests for updates or new JSA's. We have also found that employees are asking our Safety personnel more questions about the process and they do not hesitate to point out a change that needs to be made in the process to make it safer. Clear and complete procedures and employee involvement in our continuous improvement of our JSA's will help ensure that we no longer have missing or inadequate JSA's.

Safety - Take Two

Member Company North American Stainless
Category safety training

Challenge

In 2018 we added a new process called a “Non-Routine Task Form.” This form was to be used to assess hazards on jobs that hadn’t been performed within a two-week period or longer. The objective was to have employees stop and think before they began the job.

In 2019 we found we had employees getting injured doing jobs where “something went just a little out of the normal process.” They were performing jobs that they did on a daily basis but one small thing would change the normal into an abnormal process. We decided we needed to make a change to get employees to notice these situations and take time to assess before they continued working. Everybody thought of our non-routine task form as something they used if they only performed the job every so often. We needed to change that thought process.

Action

We took the non-routine task form process and changed it into a “Take Two” task form. The basic change was the thought process. We trained our employees on:

When to take two:

- If there is a variation in your process then you must take two.
- Variation means if the process does not run the way it should and you must intervene to make it run properly. You must take two even if the variation in the process is something that happens frequently.
- If you haven’t performed the task recently, even if it’s a routine task.
- If a task changes in the middle of what you are doing.

TAKE TWO SAFETY ASSESSMENT

Take the extra time to think about your safety and the safety of those around you.

1 Task being performed:









2 Hazards to be aware of:

3 What must I do to protect myself and others?

Date: _____
Name(s): _____
Line/Department: _____

Number: 007-903-00

Safety Checklist

-  Do you have the proper PPE for the job? Do you need a respirator, face shield, cut resistant sleeves, gloves? Make sure your PPE is right for the job.
-  Look at your surroundings - look for uneven walking working surfaces or oily surfaces. Always be aware!
-  Fall Protection - is it needed for this job? Is your fall protection is good condition? Always inspect before use
-  Do you need a permit for the work you are performing? If you do, do you need a fire extinguisher? Has your permit been signed properly?
-  Are you performing any electrical work? If you are - do you have the proper training? Do you have all your PPE?
-  **CAUTION**
Be safe
Lock it
Out
If you are working on equipment - has it been locked out properly? Do you have the correct lock? Lock out, tag out, try out!
-  Will you be working with or around acid? Do you have the proper acid PPE? Do you need an acid work permit?
-  When your job is done - did you clean up your area? Are all guards back in place? Are all combustibles stored properly?

Non-Routine Task Ch

Take Two Supporting Documents



Safety - Take Two

We went further to explain what take two means to us:

T – Talk

- Have I talked to everyone involved with this job?
- Have I asked for help and advice if needed?
- Have I communicated with my Shift Lead?

A – Action

- Do I know the proper action I need to take to do this job safely?
- Have I acted on any hazards that could cause a problem?

K- Knowledge

- Do I know the procedure for this job?
- Do I know the dangers and what to do if there is a problem?
- Am I competent to do this – do I need training/refresher training?

E – Equipment

- Do I have the proper equipment for the job?
- Do I have the proper personal protective equipment (PPE) for this job?

Take Two:

- When variations happen, or before starting a task take two minutes to look around the work area and assess the task.
- Talk with your co-workers, Shift Lead, or Supervisor about any unexpected hazards and conditions and what precautions to take.
- Eliminate the hazards and develop a contingency plan before proceeding with the task.

Outcome

Since we've implemented our take two process we've had well over 400 take two assessment forms submitted each month. From these take two forms we've found issues such as: equipment that needs to be fixed, safety equipment that has needed adjusted, safety equipment that's needed to be added, and work instructions and JSA's that need to be updated and/or written. We've found our employees are engaged in this process and actively participating to help find and solve safety issues.

Hands are not tools

Member Company Categories

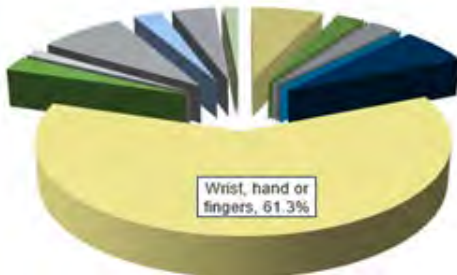
**Outokumpu
workplace improvement; accident
analysis; safety training**

Challenge

After analysing our accident trends over many years it became apparent that Outokumpu's main injuries were to hands and fingers, with 61% of our total accidents relating to this body part. It was decided to focus on hand related initiatives and sites were asked to deliver ideas and plans to address this trend. The Outokumpu site at San Luis Potosi in Mexico had already started a journey of trying to reduce hand injuries in 2017 two years ago and by 2019 they had

developed some unique ways of promoting hand safety and, with the commitment from all levels of management, had succeeded in changing the behaviours and of its employees towards hand and finger hazards and risks.

Injured body part
in case of TRIs, N=75
Outokumpu Group 2019



Action

The journey started in 2017 with the introduction of a “Hands off Policy” which was introduced to minimise the risk associated with being hit and caught between loads and fixed equipment when loading process equipment or moving material for loading and unloading.

To address the risk of injury from touching / guiding suspended loads and equipment being transported along with material which was being processed, simple hands-off devices were developed for tasks where the risk was not acceptable, these tools were simple inventions and bespoke to the task. Tools were created for guiding suspended coils in transportation and for cleaning activities during the process which meant that the task could be conducted from outside the danger area instead of stopping the process and applying Lock out procedures.

To supplement and kick start the initiative Posters were designed “No spare for your Hands” to try and get employees to think about the fact that you only get one pair of hands and if you injure them you could lose them forever and this initiative was communicated to the workforce. This was aligned to the introduction of Outokumpu's behavioural safety program Safestart which focusses on personal safety at work and at home and educates employees to think before they act and apply good habits and behaviours when working.

The first year saw a good improvement but, realising there was still room for improvement, in 2018 the message was reinforced with an extensive study on Hand, finger and wrist injuries and the required PPE which could improve the level of protection. This study gave enough data to make the decision to wear gloves and cut resistant sleeves mandatory in process areas.

To monitor this change other changes were made to drive interaction and discussion between employees and managers. The visibility of supervisors and managers was increased with safety behavioural observations becoming a key tool in the development of the new ways of working. Together with the Safestart

Hands are not tools

“Rate your state” process, a positive safety discussion could be held between operators and supervisors, and any changes to procedures could be agreed and improved. Additionally, the significant changes to working with new tools and procedures could raise additional hazards and therefore the hazard reporting green card system was encouraged and promoted to identify new hazards and risks and ensure they were reduced or eradicated.

To also help the promotion of the initiative in 2018 and to try and prevent the error states occurring while working, a simple set of rules was introduced for all to follow - “10 rules to reduce hand injuries”. In 2019 the Outokumpu theme for world safety day was Hand Safety. The local San Luis Potosi initiative was further expanded with themed safety walks which concentrated on activities involving hands and any risks that may be still evident. Practical examples

Safety in Hands

1. Avoid pinch points
2. Check / Inspect your hand tools
3. Keep safety guards in position
4. Keep your hands off equipment in movement
5. Correctly apply LOTOTO
6. Keep your hands off hot spots
7. Use the correct gloves
8. Use the tools, not your hands
9. Avoid quick reactions
10. There are no spares for your hands

10 rules to reduce hand injuries



2019 San Luis Potosi Family Day



Hand prints in the locker area

of everyday tasks which people perform without even thinking were showcased using only three fingers or with just one hand to emphasise the difficulties which could be experienced if your hands or fingers were damaged or even missing. Operational and maintenance tasks were also analysed using the risk reduction event to drive the risk to even lower levels. During the 2019 San Luis Potosi Family day, family members of our employees printed their own hands together with a quote about how hands and family life interact and these were erected in the locker changing facilities to remind them someone is waiting for them when they arrive home, which was a very strong message to all.



Hands are not tools

Outcome

Across the 3 years lost time injuries which were attributed to hands and fingers were eliminated with zero in 2019 and first aid treated hand and finger injuries reduced from 17 in 2017 to 2 in 2019.

To maintain this improvement, management safety walks are now mandatory and evident on Tuesdays and Thursdays and these have led to increased felt leadership and employee involvement in safety, especially around hand related issues. The addition of safestart and the rate your state tool has made employees more aware of complacency in their work and is helping them think about where they place their hands by working on good work habits.



Examples of "handoff Tools"



New strategy for Safety

Member Company POSCO
Category workplace improvement

Challenge

We are making continuous efforts to prevent safety hazards. However, safety accidents are occurring continuously and the social costs and responsibilities of accidents are also increasing. Various safety management such as safety audits by the leaders were conducted twice daily, but it was quite difficult to change the safety minds of individual workers, and qualitative differences in the excavation of potential risks were also made due to the leaders' expertise in safety. Therefore, a method is needed to change the safety mind of all members and to detect potential risks that do not arise.

Action

First, a 12-member committee covering managers, leaders, safety officials, labor-management councils and labor unions was formed. Including the labor unions and labor-management councils (before leader-driven activity), the company leads voluntary participation of all workers. The company wanted to remind the workers once again that their respect for the workers was based on safety activities by demonstrating their commitment to active improvement activities. The committee first opened a safety web_board for all workers to participate in, to explore potential risks that did not arise and to collect VOCs of workers, and to provide feedback and immediate improvement of the leadership. Next, we held discussion sessions on high-risk groups and difficult issues, while the idea that we've discovered is detailed in order to increase the ability to execute.

Outcome

As a result of these activities, the number of potential risks doubled in 2019 to 2616 cases as compared to 1176 cases in the previous year. The Company made 2050 improvements and the remaining cases are also in progress. In addition, labor-management communication was strengthened through safety activities that all participated in, and expectations were heightened that the limit on potential risks that were not addressed could be overcome.



SCHMOLZ+BICKENBACH Occupational Health & Industrial Safety

Member Company	SCHMOLZ+BICKENBACH
Category	workplace improvement; accident analysis; safety training; skill training



**I TAKE CARE OF MYSELF
AND MY COLLEAGUES**

Challenge

- Establishment of sustainable and globally valid Health & Safety Standards for the SCHMOLZ+BICKENBACH Group (S+B Group).
- The challenge is to merge the historically grown companies/ business units of the S+B Group, which are characterized by different Health & Safety Standards, and to establish common standards in accordance with our corporate vision ONE GROUP-ONE GOAL.
- With the aim of achieving our vision of “zero accidents” in a defined medium-term period of time, among other things by using synergies in the S+B Group, the S+B Group has oriented itself to the PDCA (Plan-Do-Check-Act) cycle.

Action

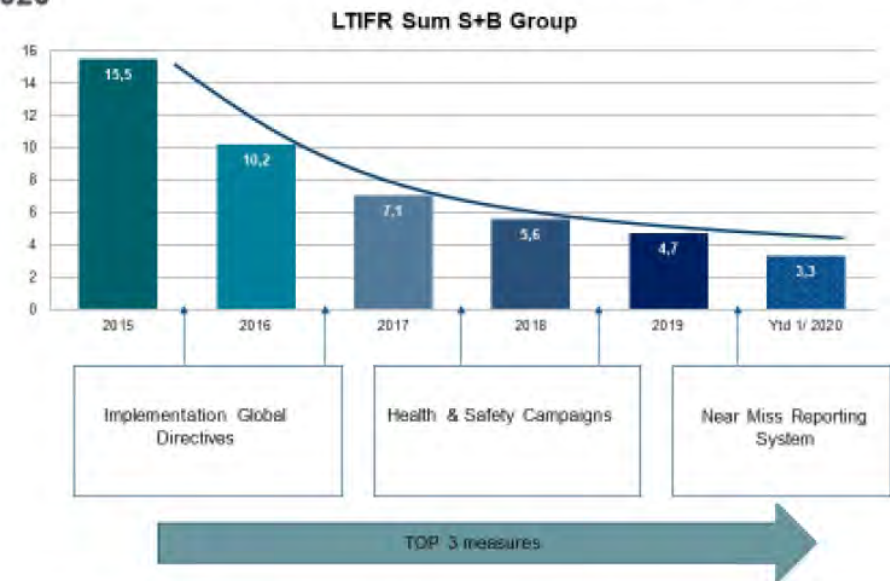
- As a first measure, the Global Health & Safety department was established in 2015, which coordinates and strategically develops projects and campaigns in close and trusting cooperation with the Health & Safety Managers of the seven Business Units and their line managers.
- A further measure was the implementation of a Health & Safety Steering Committee (Top Managers) and a Task Force Team (Health & Safety Managers).
- General standards have been jointly developed and defined within the S+B Group. With the help of an 11-point plan, measures have been implemented over the past 5 years and key figures have been compiled for standardized reporting. From the reporting it can be concluded that the 11-point plan is effective, and this is also reflected in the LTIFR.

SCHMOLZ+BICKENBACH Occupational Health & Industrial Safety

Outcome

- Since the establishment of the Global Health & Safety department and the start of uniform reporting in 2015 up to and including 1/2020, the SCHMOLZ+BICKENBACH Group has succeeded in reducing LTIFR by 79%. This significantly positive development also follows the Bradley curve.
- The recording and reporting of near misses supports us on our journey to zero accidents and is an important leading indicator.
- In the years ahead, we will continue to work on the core elements of occupational safety and health. Leadership and the further improvement of our safety culture will be a central component.

Outcome: Development of the LTIFR* S+B Group 2015 – Ytd 2020



11 * LTIFR: Last Time Injury Frequency Rate = $\frac{\text{Number of lost time injuries in accounting period}}{\text{Total worked hours}} \times 1.000.000$

Fire Alarm System

Member Company
Category

SIJ ACRONI d.o.o.
workplace improvement

Challenge

Due to large dispersion of facilities under surveillance (some more than 3 km) a lot of valuable time was lost in finding the micro location of the fire alarm. The micro location needed to be found first manually by person on duty what resulted sometimes in huge time losses until the rescue could be done.

Action

Implementation of control system (SCADA) made specifically for our needs called Zarja AMS. Due to high importance - safety, we have tripled redundancy communication lines (Wire communication, GSM Network, Ethernet). In case of fire alarm, the responsible person gets visual report on control system and SMS is send to responsible of the micro location of fire. The same goes also for fire department.

Outcome

We reduced response time immensely, the human error due to automatization was reduced. The responsible person on duty could immediately start on saving the problem, at the same time fire department could be navigated to location of fire. Evacuation of personnel if needed started immediately.



Figure 1: Layout of Object under surveillance



Figure 2: Alarm notification area



Figure 3: Layout of fire detection system



Emission reduction improving office lighting by applying new technologies

Member Company Acerinox S.A.
Category emissions; energy intensity

Challenge

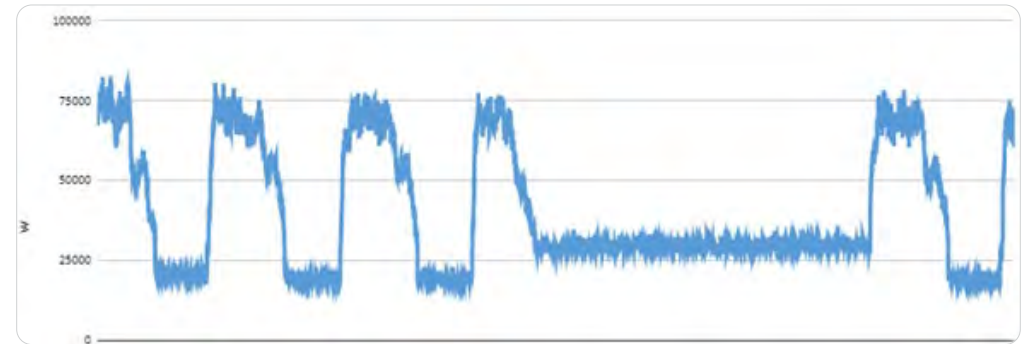
One of the main purposes of the factory is to reduce CO2 emissions. Regarding it, an important tool is the energy saving.

Action

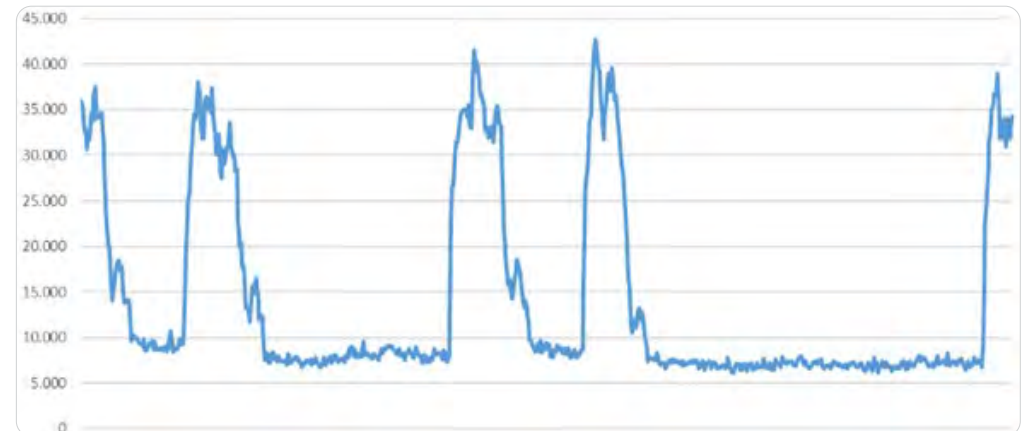
The factory's energy and environmental policies include both direct and indirect emission strategies. In this sense (indirect) a few years ago a campaign to improve energy efficiency in lighting began. We have just finished the "LED Buildings" section with a significant effort of 1288 LEDs for all our non-industrial buildings (there are similar campaigns for industrial buildings and road sections). The installed LED equipment is able to save both by the decrease in power and by its possibilities of regulation (the power can be programmed according to the place of use, and in addition, it can be switched off when there is no presence).

Outcome

We have performed energy measurements before and after installation. The results, which can be seen in the following graphs, have been spectacular. Another important improvement has been the quality of lighting compared to the previous situation (fluorescent tubes). For all these lighting strategies (not only for buildings) making estimates (using the reduction of power and hours of use) we have achieved an annual energy savings of 480180 kWh so far. This action plan is still active today...



BEFORE (Power, Watts, Several days including weekend)



AFTER (Power, Watts, Several days including weekend)



Revamping to Optimize Packaging for Sustainability

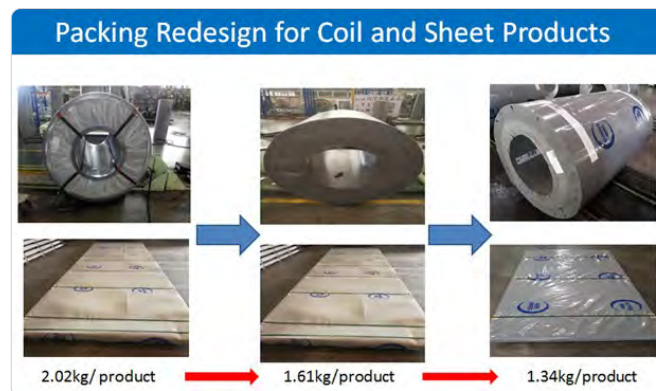
Member Company **BAHRU STAINLESS SDN BHD.**
Category **material efficiency**

Challenge

With increasing competition across plus price pressures affecting everything from raw materials to logistics, Bahru Stainless had implemented a revamping project to optimize sustainable packaging for cost reduction and material efficiency improvement.

Action

Through adopting resource-efficient designs in packaging design, focusing on reduce in the use of plastic and wood in packaging materials. Reducing in the first place conserves natural resources. In addition, we also promoting reusable wood via the pallet redesign as another action towards sustainable packaging.

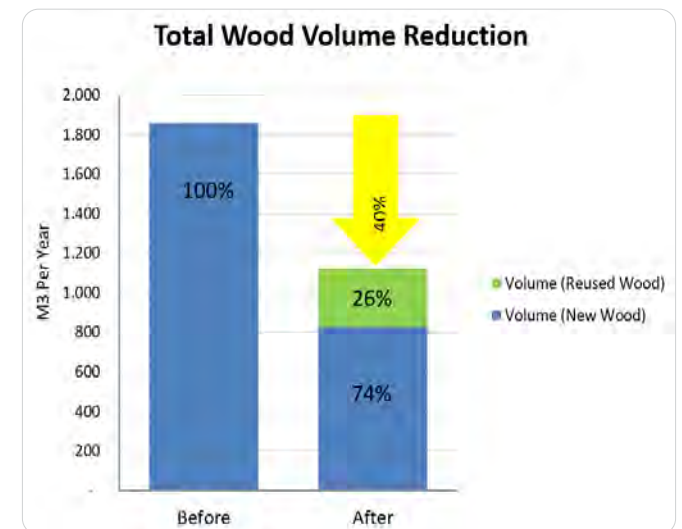


Outcome

Benefit from revamping packaging project promoting intelligent use of material to reduce costs by implement structural designs that maximize material and also leading to the relevant savings on storage, transportation and disposal/recycling costs due to less material.

The new design packaging had managed to reduce the total plastic usage by 34 % from average 2.02 kg per product to 1.34 kgs per product. For the pallet redesign project, the total wood volume usage was reduced by 40 % from 1,856 m³ to 828 m³ per annum. Out of total 828 m³, 26 % are the reclaim used wood.

More effective use of materials means lower costs and less waste to be generated. It can take significant ingenuity to reduce the amount of material in a pack, even by just one gram. The return on the effort is worthy when our improvement successfully reduces the packaging and waste impact in our value chain, result in material cost savings.





Power Curtailment for energy consumption improvement

Member Company **BAHRU STAINLESS SDN BHD.**
Category **energy intensity**

Challenge

To improve and have proper control of the energy demand during day time peaks by avoiding the “Maximum Demand (M.D)” charge that used to be imposed to electricity bill due to improper power usage and planning.

Action

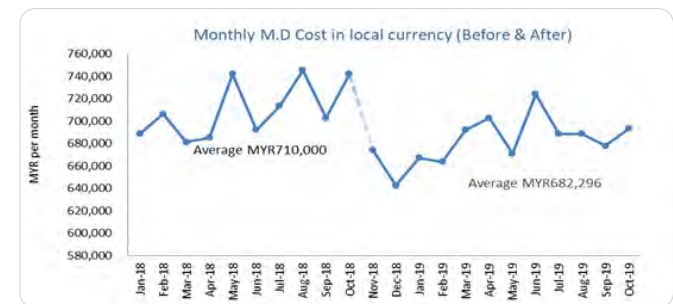
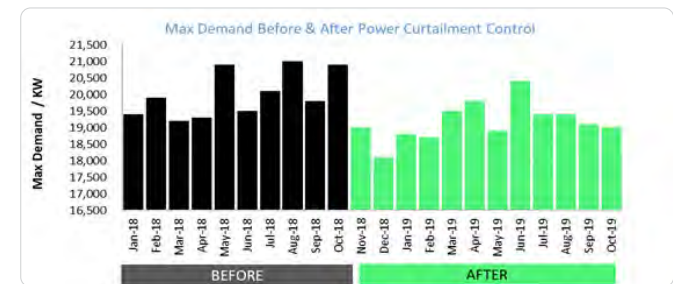
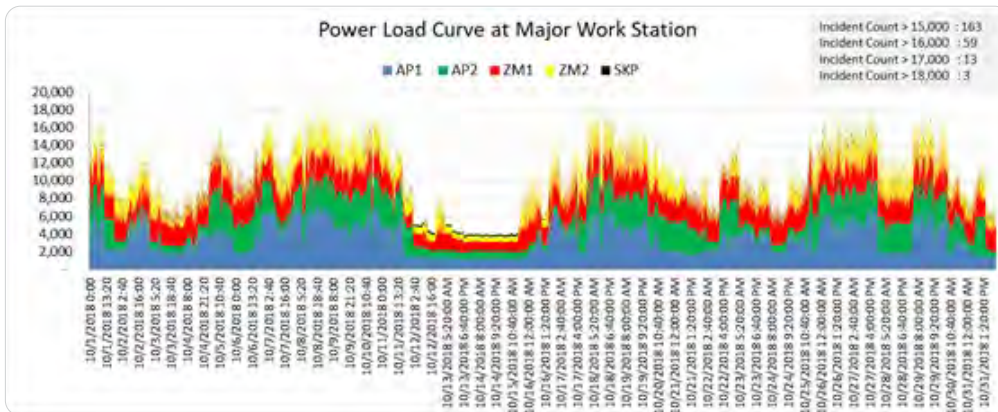
The Power Curtailment is based on concept of collecting power consumption data from the SCADA in order to monitor the historical usage pattern and behaviour. Curtailment software program was established to interface the high power consumption equipment like Z-Mills so that period of high demand could prior detect and reduce the electricity demand. These include intervention to

automatically slowdown by limiting the speed, pass interlock system or stop the mills where necessary.

Outcome

As per example of maximum demand power load curve given, by only prevent the 3 incidences that power load had hit over 18,000KW, it will enable to reduce total M.D cost by 5.5%.

The result after the implementation had managed to reduce total maximum demand cost by 3% without interrupting to the smooth run of the operations. It's estimated this initiative to total saving of USD 80,692 per annum.





Paper recycling program for resources conservation

Member Company **BAHRU STAINLESS SDN BHD.**
Category **Material efficiency**

Challenge

Improve the paper consumption material efficiency.

Action

Used interleaving paper which is not contaminated with oil residues are collected from the production unit, packed and sent to external facility for recycling and further rewinding into reusable recycle paper. The recycled paper is reused in the production line; improve the lifespan of the consumables (paper), promoting recycling program for better material conservation and efficiency.

Outcome

Recycling paper program contribute to lesser generation of waste paper for 45% and at the same time able reduce the new paper consumption for 18.7% as summarise in the table below.

The paper recycling program manages to reduce waste generation that lead to lesser environmental impact of the waste disposal activity, in addition its promoting more effective use of resources by material conservation with significant cost saving.

	2018	2019	Remarks
Waste-recycle paper	1000 ton (3.28 kg/ton)	515 ton (1.8 kg/ton)	45% in term of kg/ton reduction achieved in generation of waste paper
Consumed new paper	2332 ton (7.65 kg/ton)	1781 ton (6.22 kg/ton)	18.7% in term of kg/ton reduction achieved in new paper consumption

Paper recycling program benefit summary



Development of ceramics

Member Company North American Stainless
Category investment in new processes and products

Challenge

NAS generates large quantities of slag as part of the steel making process, and will continue to produce this waste stream. The slag, once treated by Phoenix Services to remove the steel, is known as aggregate and has been approved by Kentucky Division of Waste Management to be used for multiple purposes, such as concrete production. Unfortunately, while it was approved for concrete production, local concrete producers did not want the aggregate as it slows the cure time of concrete.

Action

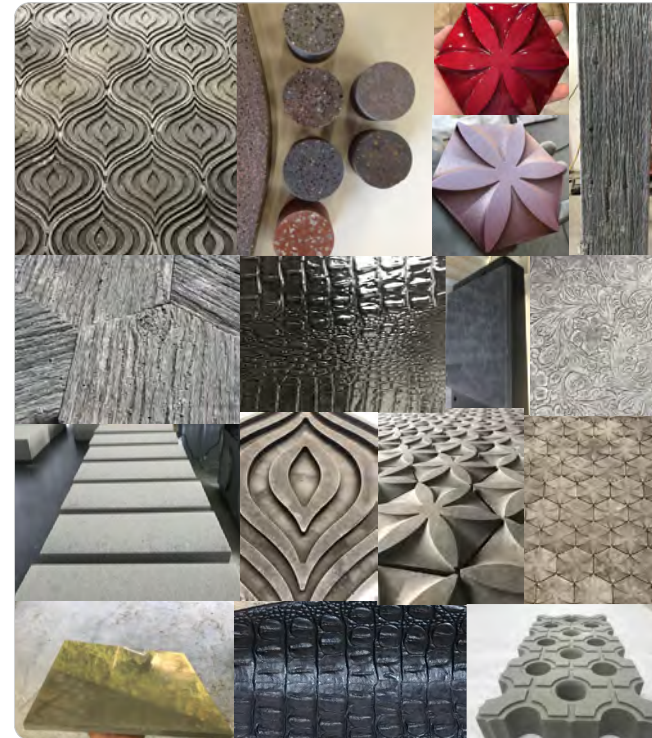
NAS has been working with a company, Truce Global, to develop products that can be manufactured using aggregate for its cementitious properties. During 2019, NAS has diverted 12,000 tons of aggregate to Truce Global to develop architectural products. The aggregate is used as an alternative raw-material to sand-based Portland Cement. Geo-polymers are used to physically and chemically encapsulate the aggregate to make a comparable if not more resilient building product. The final products are various tiles and outdoor pavers as seen from the picture.

Outcome

The aggregate will be able to be used to manufacture valuable commodities. Because this aggregate-based cold ceramic relies on steel waste as the primary raw material rather than Portland cement, this cementitious material does not contribute to air pollutants such as NO₂, SO₂, and CO because it does not rely on energy intensive kilns or other firing processes. Similarly, environmental and social impacts of sand extraction are avoided altogether. Along with the lower

ambient air pollution, these products have an 80% lower carbon footprint compared to traditional cement production methods. All products exceed product-based ASTM standards.

While finishing this research and development phase, a production facility near NAS is being constructed so that these architectural products can be manufactured using NAS aggregate and be economically competitive with traditional Portland-cement products.



Final products. Picture courtesy of Truce Global



Aggregate for site development

Member Company **North American Stainless**
Category **material efficiency**

Challenge

NAS generates slag as part of the steel making process. Once this material is treated by Phoenix Services to remove the steel, it can be used as engineered fill (as approved by Kentucky Division of Waste Management). NAS is continuously searching for good uses for this material so that it does not have to be managed as a waste.

Action

NAS is located along the Ohio River in an area with complex terrain. Due to terrain and proximity to Ohio River, there are many areas at NAS and surrounding community that are not capable to being developed unless the topography of the site is modified.

NAS has been able to demonstrate that when the aggregate is placed and compacted, it is an excellent engineered fill that can support future development. Areas have been tested and have a minimum of 95% standard proctor density. In addition NAS has been able to demonstrate through testing that the environmental performance standards are being maintained, and groundwater is not negatively impacted.

Outcome

NAS has been able to successfully develop 3 acres for a truck staging lot, and has been permitted to develop more than 40 additional acres of flat terrain for future development. The surrounding community has been able to improve the terrain for residential and commercial developments in several locations.

Recycled household plastics improve slabs storage

Member Company **Outokumpu Oyj**
Category **material efficiency; investment in new processes and products**

Challenge

There was a lot of work involved in cleaning the yard where we store our raw material, cast semis, also known as slabs. A single semi can weigh up to 25 tonnes, and we use railroad sleepers to prevent the semis from coming in direct contact with the ground. Due to the loads and weather conditions, wooden sleepers tend to crack and crumble. There were wood chips everywhere. There are also safety considerations involved. Railroad sleepers break down, causing the slabs to tilt. Changing weather conditions create problems every winter: wood absorbs water, which then freezes, resulting in extremely slippery surfaces. If the sleepers deform, they may begin to slant and the slabs may slide off.

Action

Christopher Myhrman, head of the Grinding Hall began to look into more durable alternatives for wooden sleepers. That is when we spotted the composite railroad sleepers. The railroad sleepers are produced by a local company called Plaståtervinning i Wermland. The company has delivered sleepers to station areas and is now testing them on the Inland railroad line running through central Sweden. The company grinds the collected plastic into composite granulate, which is used to make sleepers. Composite railroad sleepers are 100% recyclable. After their use, they can be ground and made into new sleepers. The project involving sleepers means that instead of being incinerated, the plastic can be reused to make new products and to save the environment – a

contribution to the circular economy, that is.

To date Outokumpu Degerfors has brought in 105 full-length sleepers of 6 meters each, which means 31.9 tons of recycled plastics. Each kg of recycled plastics saves 2.7 kg CO₂ compared with the business-as-usual scenario that is incineration of waste plastics and producing new plastic. For the sleeper at Outokumpu Degerfors yard it means a saving of 86.2 ton of CO₂. Outokumpu Degerfors is currently looking into other applications where recycled plastic could replace wooden products on site.



Plastic waste



Recycled household plastics improve slabs storage

Outcome

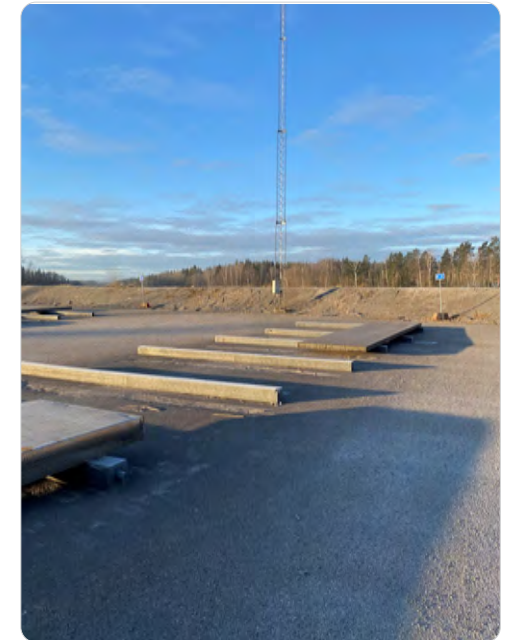
The plastic sleepers are about 1.5 times more expensive than the wooden sleepers, but as they are up to 5-10 times more durable the initial extra cost is quickly offset.

Additionally, there are savings when it comes to cleaning the facilities. Before we had to perform cleaning often as the yard became full of wood chips.

From a societal point of view, using recycled plastic instead of incinerating it is very beneficial. For each kilogram of recycled plastic, the carbon dioxide emissions can be reduced by as much as 2.7 kg compared to incineration. Outokumpu is already tuned in on the circular economy, our steel production is based on recycled scrap, but we want to demonstrate that there are potential to increase waste sorting and use also for other materials that we use in the production.



Recycled sleeper



Slab storage



New lean duplex stainless steel 1.4670 with low thermal conductivity for buildings

Member Company Ugitech S.A.
Category energy intensity; material efficiency

Challenge

In buildings, at balcony-to-wall junctions, the continuity of the insulating envelope of the building is cut. That creates a preferential thermal transfer path between interior and exterior of the building, the latter being even promoted by increased conduction through steel reinforcing bars, placed at the junction for structural reasons, and having higher thermal conductivity than concrete. The energy lost at junctions by the previously described mechanism, also called thermal bridging, is really important.

The goal was to develop a stainless steel which has a much lower thermal conductivity than carbon steel reinforcing bars used currently used at the junction between interior and exterior of buildings for structural reasons.

Action

Ugitech designed in partnership with a thermal breaks manufacturer a lean duplex stainless steel (EN 1.4670 – material N° registered in Europe by VDEh) with a thermal conductivity four times lower than carbon steels currently used for reinforcing bars.

Thermal conductivity of carbons steel = 50 W.m-1.K-1 compared to Stainless steel 1.4670 = 12.5 W.m-1.K-1

The addition of Silicon, not classical on duplex, was found to have an important

effect on thermal conductivity. The chemical composition was then tailored to ensure thermal conductivity below 12,5 W.m-1.K-1, i.e. 25% lower than the state of the art for lean duplex stainless steels, and equivalent mechanical properties, corrosion resistance. This grade is also cost competitive because its Ni content does not exceed 4% which is similar to the lean duplex EN 1.4362.

Outcome

This development has been conducted in partnership with a French ABC market customer who is launching a specific thermal breaks equipped with Ugitech EN 1.4670 stainless steel. In 2019, 10 heats of this grade were produced (~ 400 tons) and it starts being sold to our partner. A patent was also applied in 2017 for this new grade and application.





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About ISSF

The International Stainless Steel Forum (ISSF) is a not-for-profit research and development organisation which was founded in 1996 and serves as the focal point for the global stainless steel industry.

Vision

Sustain our future with stainless steels

Membership of the ISSF

ISSF has two categories of membership namely:

- a. [company members](#) who are producers of stainless steels (integrated mills and re-rollers)
- b. [affiliated members](#) who are national or regional stainless steels industry associations.

The ISSF now has 57 members in 26 countries. Collectively they represent approximately 90% of the total production of stainless steels.

More information

For more information about ISSF, please consult our website worldstainless.org.

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