

**SUSTAINABLE**  
STAINLESS



## Safety and Sustainability Awards 2016



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## Welcome from the Chairman of the Health, Safety and Environment Committee



We are all working hard to create sustainability within our companies and among our customers and stakeholders. But there is much that can be learnt from what each of us are doing, because we all handle similar problems in different ways. The case studies which are submitted by our members for our annual awards reveal many different success stories as our members continually seek new ways to address safety and environmental issues, not only for their own companies, but also for their customers and for society in general.

Our members have done very important work in improving safety in the workplace and improving

the health and well-being of the people who work in our industry. The health and safety of our workforce is a constant priority for all our member companies and is a continuing priority for our Health, Safety and Environment (HSE) Committee.

For all of these reasons, it is very useful for ISSF to collect and re-circulate the submissions which are received from our members for the annual awards, so that our members may have an opportunity to learn from each other.

This is the seventh year in which we have presented awards recognising excellence in Sustainability and Safety.

In total, 13 case studies were submitted for this year's awards from 11 member companies. Having responses from only 11 out of 56 members is disappointing. I would hope that we can encourage all of our members to participate more actively in future years.

It is very pleasing to note that the standard of the

entries has improved each year and the judging process has become more and more difficult. As with any competition, not everyone can win an award, but the value of all of the entries will remain evident for all members to see.

The importance of sustainability and corporate responsibility is increasing globally and the challenge which our industry faces is how to turn our achievements in this area to our advantage in the market by adding value for our customers and for end-users of stainless steel. The web pages of ISSF are an important tool for sharing this know-how and these good ideas and improvements. I therefore warmly recommend that you all study this year's submissions, and re-visit the submissions from previous years – there are some very good solutions, practices and cases from which we can all learn and profit.

Dr Juha Ylimaunu  
Chairman  
ISSF Health, Safety and Environment Committee  
Brussels, May 2016



## Secretary-General's Message



Dear Members,

This is the 7th time that we have presented our Annual Awards. At first sight, the response level, with 7 applications for the Safety Award and 6 for the Sustainability Award, may seem to be disappointing,

bearing in mind that we have a membership of 31 producing companies, but I can assure you that the standard of the entries we have received is as high as ever.

I know that all of you have your own programs to ensure the safety of your workforces and to ensure the protection of the environment in which

you work and I know that there is some excellent work being done in these areas. I would just encourage you all to communicate your plans and achievements, so that we can tell regulatory authorities and the general public what we are doing to manage the safety of our people and the protection of our environment, and so that others may learn from your innovation and hard work. Our Awards program is designed to reward excellence and commitment, but also to provide an incentive to others to submit their own programs for adjudication in these annual competitions. Remember, you have to be in the competition in order to win it!

I congratulate the winners of this year's Awards for their worthy efforts – they have demonstrated how even focusing on relatively simple, day-to-day

activities, but doing them well and in a disciplined manner, can achieve really significant results as long as you do it consistently and thoroughly.

But each of the submissions for this year's Awards is worthy of attention in its own right. As in previous years, we have published all of the submissions in our Annual Safety and Sustainability Brochure. I would encourage you all to read this brochure carefully because good ideas can so easily be duplicated elsewhere and we can all learn from each other.

John Rowe  
Secretary-General  
International Stainless Steel Forum  
Brussels



## Outokumpu

**Award:** Safety  
**Category:** Workplace improvement

# Has there been an increase in mortality in stainless steel production caused by occupational exposures or working conditions?

## Challenge

In stainless steel production, fine and ultrafine particles may be generated in the melting processes and also emitted from the use of fuels. It is known that long-term exposure to fine particulate air pollution is associated with cardiovascular mortality probably due to pulmonary and systemic inflammation and accelerated atherosclerosis. Other working conditions may also have impacts on mortality of employees.

Stainless steel has been produced for more than 100 years, but the number of published studies and data on cause-specific mortality in stainless steel production workers is very limited. As a responsible industry the stainless steel sector should be aware about occupational exposure impacts on employees. Also employees in stainless steel industry have raised legitimate concerns about potentially increased mortality caused by occupational exposures in the workplace air.

The main question was: Is the mortality from respiratory or circulatory diseases increased in stainless steel production workers?

## Action

Outokumpu conducted, in co-operation with the Finnish Cancer Registry, a cancer incidence study which was published in 2013 in the British Medical Journal. The same cohort consisting of all persons employed at Kemi chromite mine and Tornio ferrochromium and stainless steel mill during the period 1967-2004 was used in the present study. The cohort included a total of 8088 workers. The cohort was divided into sub-cohorts by production departments.

The causes of death for 1971-2012 were obtained from Statistics Finland.

Detailed exposure data covering the whole production chain have been published earlier in peer-reviewed scientific publications.



## Outokumpu

**Award:** Safety  
**Category:** Workplace improvement

### **Has there been an increase in mortality in stainless steel production caused by occupational exposures or working conditions?**

#### **Outcome**

The article “Cause-specific mortality in Finnish ferrochromium and stainless steel production workers” was published in Occupational Medicine in December 2015. The article can be downloaded via the following link: <http://occmed.oxfordjournals.org/content/early/2015/12/08/occmed.kqv197.full.pdf?keytype=ref&ijkey=ozafqg8sV3Led06>

First of all, the results of the cause-specific mortality study were definitely good. We found significant decreases in overall mortality and in particular in mortality from circulatory diseases, accidents and suicides.

Conclusion of the research project: The occupational exposures or working conditions in modern ferrochromium and stainless steel industry appear not to be associated with increased mortality from any cause of death. In other words, we don't have increased mortality in stainless steel production workers caused by occupational exposures or working conditions in Outokumpu's production chain in Finland.

Because the results have been published in a peer-reviewed publication they can be applied globally to any stainless steel production facility where the occupational exposures are at the similar levels.

The results have been communicated openly to Outokumpu's own employees and other stakeholders.

## Nippon Yakin Kogyo Co., Ltd.

**Award:** Safety  
**Category:** Workplace improvement

# Hazardous Measurement System for Chemical Substances

## Challenge

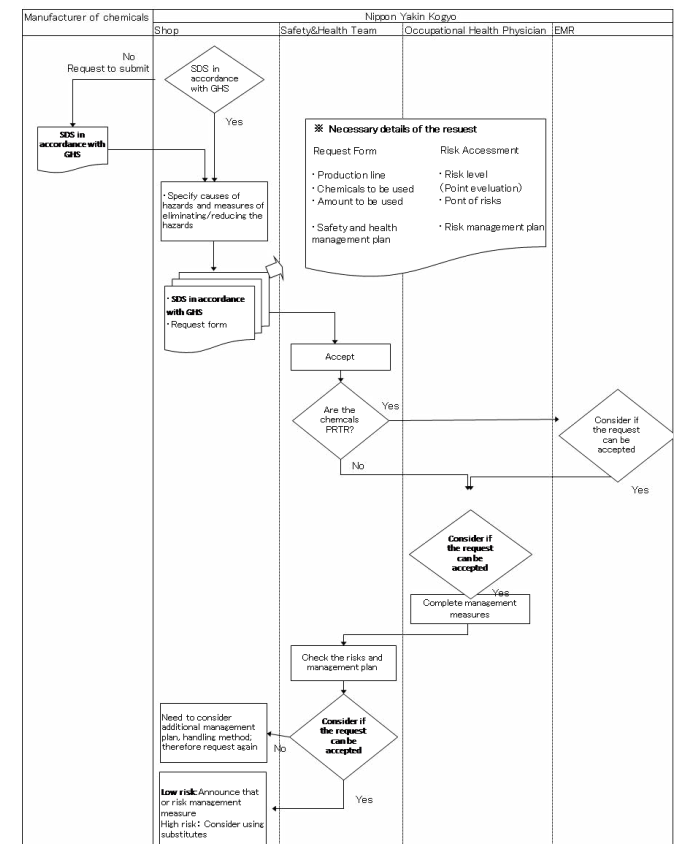
At our plant, we have implemented a Safety Priority Action Plan to prevent work accidents and health problems amongst employees. We have managed various chemical substances to prevent direct hazards for health of our employees. Now we need to prevent long-term effects like carcinogenicity and reproduction toxicity in order to protect our employees essentially.

## Action

Our new system to prevent long-term effect of chemical substances is as follows.

1. All departments which handle chemical substances must obtain a SDS (Safety Data Sheet). This SDS is needed when the chemical substance is introduced and when the application is changed.
2. We evaluate hazards, exposure and scattering with point-rating system and clarify the priority of temporary or permanent measurement.
3. All employees of handling section, managing section including industrial medical physicians are informed of the hazards and measurements (see chart 1.)

Flowchart of Hazardous Measurement System for Chemical Substances





## Nippon Yakin Kogyo Co., Ltd.

**Award:** Safety

**Category:** Workplace improvement

# Hazardous Measurement System for Chemical Substances

## Outcome

Now we can evaluate the priority of measurements for all chemical substances. All employees handling each chemical substance can understand characteristics of substances and raise awareness to prevent long-term health effect of them.





## ACERINOX EUROPA, S.A.U.

**Award:** Safety  
**Category:** Workplace improvement

# Implementation of a Simple System to Change Wiper Roll Blocks in Sendzimir Mills

## Challenge

The objective of this project is to change in Sendzimir mills, quite simply, the upper wiper roll blocks (Pollastrelli system) in a safe way, avoiding the risk of occupational accidents, making easier and less tiring work for the operator.



*Pollastrelli left roll with risk of fall*

## Action

A new device has been developed in order to change the upper Pollastrelli blocks. This device can be used whether the strip is threaded through the mill or not.

The design consists of a mechanical or hydraulic jack modified to this effect. Pictures are annexed to the present report.

## Outcome

Using this device, safety of the operators will be increased and the risk of having to work inside and between the Pollastrelli blocks is eliminated:

- Avoid the risk of upper rolls falling on the hands or arms (even on the head) of operators.
- Decrease the fatigue and over-training of the operators.
- Avoid the exposure to high temperatures existing in and between Pollastrelli blocks that can produce burns and thermal stress.
- Upper Pollastrelli blocks retain rolling oil and cooling oil for bearings (oil unit). The new system avoids this mixture of hot oil drops falling on operators.



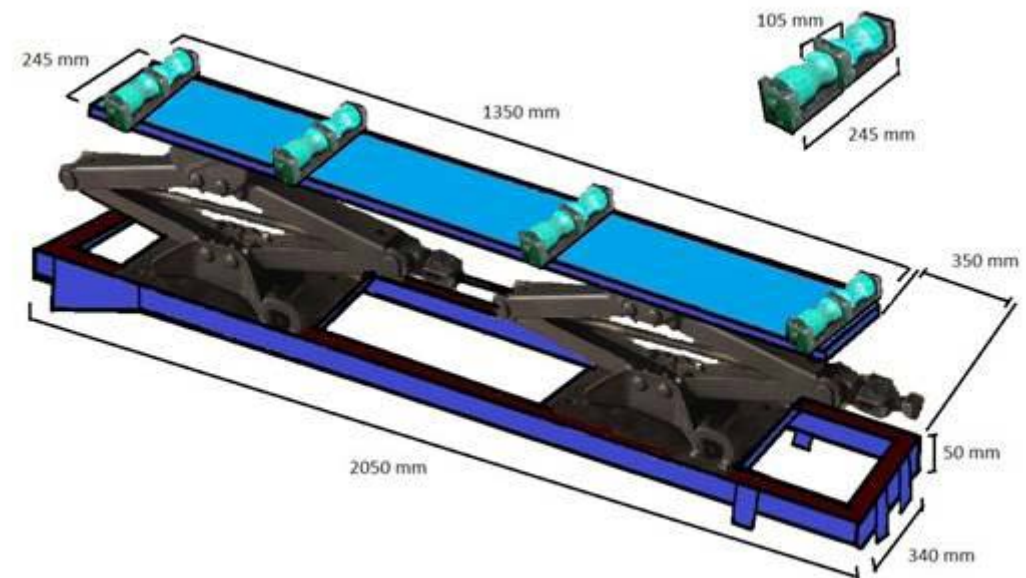
## ACERINOX EUROPA, S.A.U.

**Award:** Safety  
**Category:** Workplace improvement

### Implementation of a Simple System to Change Wiper Roll Blocks in Sendzimir Mills



Characteristics of the workplace



Scheme of the new device



## ACERINOX EUROPA, S.A.U.

**Award:** Safety  
**Category:** Workplace improvement

### Implementation of a Simple System to Change Wiper Roll Blocks in Sendzimir Mills



*Area where the device is placed*

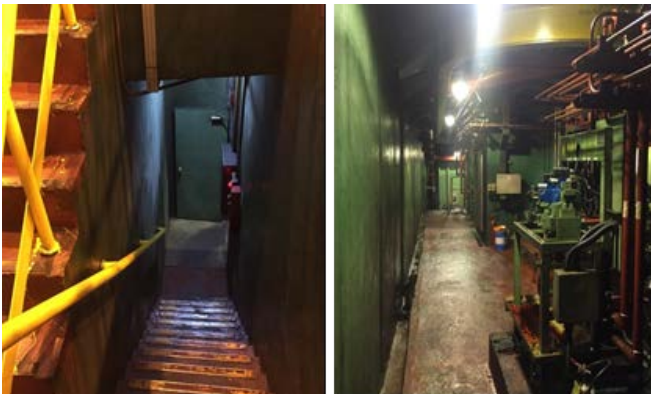
## HYUNDAI BNG STEEL CO., LTD

**Award:** Safety  
**Category:** Workplace improvement

### Improvement of Access Control System

#### Challenge

There are some problems with extinguishing the fires in the cellars. The cellar is an enclosed space, so everyone is exposed to potential suffocation. If the cellar catches fire, the operator can switch on a CO<sub>2</sub> fire extinguisher. If the operator does not check the location of workers, it is possible that someone may be left in the cellar and he may be asphyxiated by the CO<sub>2</sub>.



The cellar

#### Action

We placed a signboard in front of the cellar entrance which can display the presence or absence of workers. If someone wants to enter the cellar, he has to record information (purpose of visit, time, name) and turn on the light (green light: absence, red light: presence).



Situation before

#### Outcome

Actually, accidents have occurred rarely in our company, but safety has been strengthened further for workers, which can prevent any possible accidents. Also, it can prevent unauthorized person from gaining access to the cellars through recording information.



Situation after: before entering the cellar, turn on the light



## Nippon Steel & Sumikin Stainless Steel Corporation (NSSC)

**Award:** Safety  
**Category:** Safety training

### Safety and Health Education for Veteran Employees

#### Challenge

At NSSC, there are 158 veteran employees aged 55 and older. They account for approximately 18% of all employees who get involved in works in factories.

Not only do many of these veterans have long years of experience, knowledge and skills developed through their work, they also have high moral standards and play important roles as “a mental supporter” in each work place.

On the other hand, the result of the in-house medical check-up shows that incident rate increases with age (Figure 1). Specifically, employees in a senior age group tend to have a higher risk of personal injury (e.g. bone fracture caused by a stumble) and illness.

To minimise this risk related to aging, it is important to implement countermeasures such as improving work environment. However, it is more significant that veteran employees become aware of their own health and safety risks and improve their living environment for themselves.

In order that veteran employees can keep working, there has been an increased need for the company to encourage them to pay attention to their own living environment so they come to improve their own physical and mental motivation.

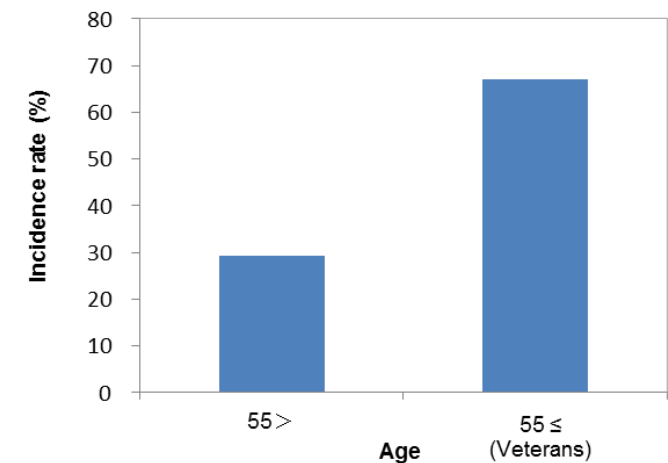


Figure 1: Relation between age and incidence rate





## Nippon Steel & Sumikin Stainless Steel Corporation (NSSC)

**Award:** Safety  
**Category:** Safety training

### Safety and Health Education for Veteran Employees

#### Action

First of all, the company implemented bone density test of all employees and disclosed the result to them. It showed that veteran employees tend to have a high risk of fracture (Figure 2). Based on the result, the company raised awareness of those who had low bone density, and recommended regular exercise, dietary modification and outpatient care.

As a result, the company also started a new training course in 2013 which was intended for veteran employees aged 55 and older with the goal of generating their self-awareness of deteriorated physical (e.g. strength and a sense of balance) and mental (e.g. motivation) capabilities.

The details of the training are:

1. To strengthen their mind
  - Lecture by General Superintendent of the Works (“Expectation for Veteran Employees”)
  - Lecture and discussion with external instructors (“The Role of the Veteran to Activate a Workplace”)

2. Activities and precautions for veteran employees
  - Lecture on examples of activities and accidents in which veteran employees may get involved
  - Discussion among participants on preventive measures against accidents
3. Objective evaluation of your own strength
  - Lecture on physical changes and increased risks of lifestyle diseases caused by aging
  - Raising awareness of deteriorated strength and a sense of balance through self-mobility test

At the end of the training course, there was an active exchange of opinions among participants, General Superintendent and lecturers to encourage mutual cultivation.

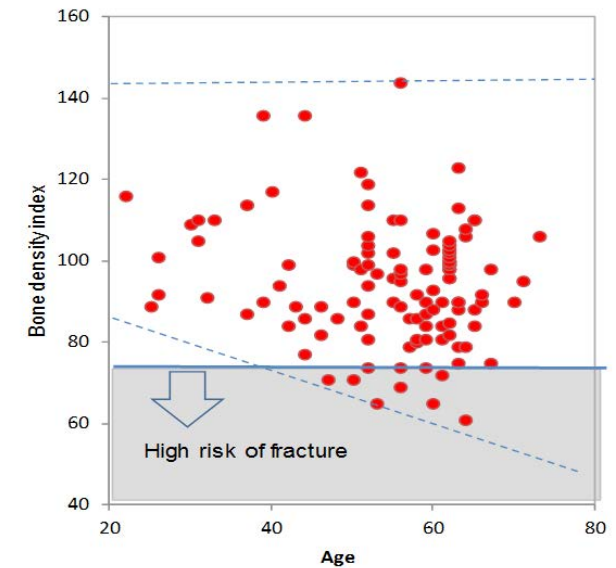


Figure 2: Bone density test result



## Nippon Steel & Sumikin Stainless Steel Corporation (NSSC)

**Award:** Safety  
**Category:** Safety training

### Safety and Health Education for Veteran Employees

#### Outcome

Nearly every employee aged 55 and older (except for part-time employees) finished the training course in the past three years. Almost all of them answered the questionnaire that the training was effective in improving their awareness of the importance of health, safety and motivation to work.

The effect of the training can be seen in the result of a medical interview during the latest health checkup (Figure 3). Awareness of veteran employees in regards to health (e.g. smoking, dietary and exercise) has obviously improved. It was also confirmed that they had voluntarily started working on health improvement.

Since lifestyle habits from one's youth have great impacts on your health, the company is now working on a new training course for younger workers to help them better understand the importance of exercising and lifestyle habits. Furthermore, the company has also implemented hardware countermeasures such as eliminating small level differences on the floor and improving visibility by classifying dangerous places by colour.

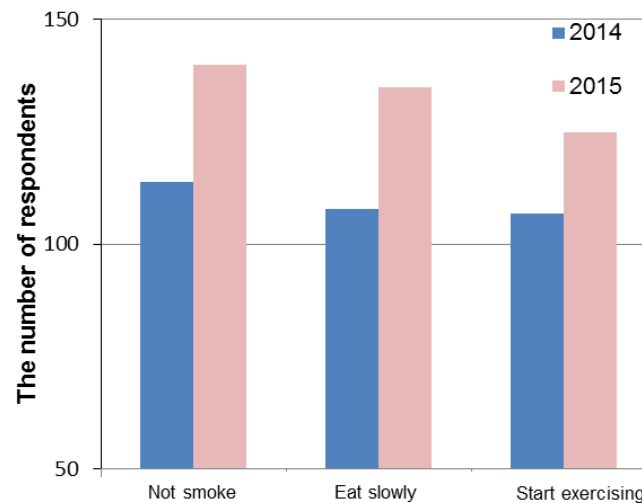


Figure 3: Improvement of health awareness after the training (aged 55 and older)



## North American Stainless

**Award:** Safety  
**Category:** Workplace improvement

### Safety Performance Improvement

#### Challenge

In 2014 NAS ended the year with 4.51 total recordable injuries per million man hours worked and a 1.13 lost-time injury rate. We needed to reduce the number of recordable and lost time injuries that our employees were sustaining on the job. We had already improved our guarding and enhanced our safety programs, but something was still missing. One item we noted was lack of employee involvement in our safety process, some employees were hesitant in participating and others just felt that safety wasn't their responsibility. We realized that we needed our employees input and participation to improve our safety process.

#### Action

In order to increase employee participation we did three things: 1) enhanced our Incident Reporting System to include Near Miss reports and added a time limit to get the reports closed out (72 hours for high risk; 7 days for medium risk and 30 days for low risk); 2) We started a Behavioural Based Observation (BBO) Safety Program with all employees completing BBO's; and 3) Managers, Supervisors and Group Leaders began conducting safety talks every morning throughout the plant.

1. Our Incident Reporting (IR) system had been in place for years but only covered injuries and property damages. By adding a Near Miss category we encouraged employees to enter incidents where an employee could have been injured. These reports are followed up on as if the employee was injured. A full investigation is completed and a Near Miss alert is posted for all employees to review. When we added the time limit to close out the incidents, it showed employees that we were following up in a timely manner and they weren't just entering reports and they were sitting out there with nobody looking at them. A weekly

"past due" report is sent to the Management team and there has to be a very good reason why the IR is past due (i.e. pending parts to be delivered or work to be done.)

2. We expanded our BBO program to all employees requiring them to complete one BBO a month, with supervision completing two per month. Feedback from the observation generates discussion between peers and encourages employees to identify solutions to the behaviours identified during the observation. Once the BBO's are completed, they are input into a database. If a follow-up is required, a Hazard report is automatically generated in our IR system, so we can ensure it gets addressed timely. Again, by having a good follow-up system, it encourages employees to complete their BBO's, because they see they are being reviewed and corrected.
3. Managers, Supervisors, and Group Leads started conducting a morning tool box talk every day. They take small groups to different lines and discuss safety. The talks may range from what they are doing that day and



## North American Stainless

**Award:** Safety  
**Category:** Workplace improvement

### Safety Performance Improvement

the hazards involved or review a near miss, injury, or property damage alert. This gives employees one-on-one time to discuss safety topics in their areas. It also shows employees that all levels of Management are participating in our Safety program.

#### 5 SAFETY PRINCIPLES OF NORTH AMERICAN STAINLESS

1. SAFETY IS EVERYONES RESPONSIBILITY
2. PPE IS YOUR LAST LINE OF DEFENSE
3. KNOW AND UNDERSTAND YOUR WORK ENVIRONMENT
4. THINK SAFETY BEFORE YOU START
5. WHEN IN DOUBT – LOCKOUT



### Outcome

Our employees completed 19,628 BBO's and we had 113 near miss reports. As mentioned above, all near misses were investigated as if they were an injury and alerts were distributed to all employees to review and discuss and any BBO's that required follow-up were automatically entered into our IR system.

In addition, we have noticed that our employees are much more aware when it comes to safety. If anybody walks onto our plant floor without the proper PPE, they will stop the individual and inform them of what they need. They are much more open with the Safety Coordinators and bring up issues and/or ideas about safety. With the increase in employee participation we significantly reduced our recordable and lost time injuries and ended 2015 with a .93 Total Recordable Rate and a .07 lost time rate.

#### NORTH AMERICAN STAINLESS CARDINAL RULES

1. MUST WEAR FALL PROTECTION ABOVE 4 FEET
2. MUST LOCKOUT ALL SOURCES OF ENERGY BEFORE ENTERING
3. MUST HAVE ALL PERMITS PRIOR TO PERFORMING ANY SPECIALIZED WORK
4. MUST REPORT ALL INJURIES, ILLNESS AND NEAR MISSES PRIOR TO THE END OF SHIFT
5. MUST WEAR REQUIRED PPE



## JFE Steel Corporation

**Award:** Safety  
**Category:** Safety training

### Safety Training to bring up the Person and his Mind

#### Challenge

JFE Steel has taken a variety of equipment safety measures to improve the further work environment under the fundamental principle, "Safety is the first priority". However the industrial accidents have often occurred due to the unsafe movements of workers which resulted from the lack of knowledge and awareness, or against the rules etc. We need to educate and train the workers with company cooperation in the steelworks to notice the importance of the safety first principle.

#### Action

In order to eradicate the industrial accidents, it is important not only to take the equipment safety measures but also to bring up the person and his mind that the worker always keeps the safety rules even if the person works alone. JFE Steel has introduced the public awareness activities of workers, such as the notice of Safety and Health poster of JFE Steel Corporation, the repeating safety educations and the accident trainings for the body sensation. The poster shows the JFE Steel worker's picture and this year's safety priority items. The original education uses DVDs which relate directly to one's work in order to understand easily and visually the fatal accidents. The trainings contain the virtual reality program which simulates the actual industrial accidents by using the latest technology.

*Example of Safety Training (Notice of Safety and Health poster): The poster shows the JFE Steel worker's picture shows this year's safety priority items. The fundamental principle is: Safety is the first priority.*

**2016年 JFEスチール安全衛生活動方針**

**安全はすべてに優先する**

**基本的考え方**

JFE スチールは安全で健康的な職場を作るため、

- 良い人間関係とコミュニケーションを大切にします。
- 安全が確保できないときは躊躇せず設備を停止し、作業を中止させます。
- 必要な人と資金を速やかに投入します。

**重点実施項目**

1. 自主自立活動の推進
2. グループ会社・協力会社の安全衛生活動の強化と支援
3. 心と体の健康の保持・増進

JFEスチール(株)  
代表取締役社長  
楠木 厚司



## JFE Steel Corporation

**Award:** Safety  
**Category:** Safety training

### Safety Trainings to Bring up the Person and his Mind

#### Outcome

The number of the industrial accidents in JFE Steel decreases remarkably in the past few years (it decreased about 47 percentage compared with the average data from 2008 to 2012). Finally the outcome is reasonably recognized and we believe that these activities are not something wrong in the direction of safety activities. We think that the safety activities are necessary to sustain a safe environment and to prevent the mannerism.



*Example of Safety Training (Simulated experience implement Virtual Reality). You can experience the simulated fall accident at the location of faults when you walk along the path as usual.*



## Aperam

**Award:** Sustainability

**Category:** Environmental management system (EMS)/ Investment in new processes and products

# Biological Control of Pests and Diseases in the Management of Planted Eucalyptus Forests

## Challenge

Aperam South America already stands out for its innovative manufacturing process. Previously based on coke, the steel plant located in Timóteo, Minas Gerais (Brazil), now relies on charcoal (a renewable biomass that is a substitute for fossil fuels, 2014 production 433,000tonnes) that is produced from own eucalyptus forests planted in the Jequitinhonha Valley (126 thousand hectares). As a consequence, the Company CO2 emission ratio is significantly lower compared to other integrated plants. In addition, this process promotes renewable energies, sustainable development and it has also a positive social and economic impact in a poor and remote region of Brazil.

The company strives to keep the management of the plantations increasingly sustainable, avoiding any possible negative environmental impacts, looking for ingenious solutions and benchmarking best practices. A good example of this is the way pest control is operated.

In 2003, the forests of Aperam BioEnergia and

several forest companies in Brazil were impacted by an exotic pest coming from Australia (*Glycaspis brimblecombei*). A group of private companies planting renewable eucalyptus forest - Vallourec , Gerdau, among others - decided to fight together the voracity of the plague, and they gained the support of several research institutes: the Federal University of Viçosa (UFV), the Universidade Estadual Paulista (UNESP) and the Institute of Forestry Research and Studies (IPEF) that took the lead in search of solutions.

In this context, the major challenge was to offset these large infestations thanks to the most appropriate balance between natural solutions and pesticides, also between environmental protection and efficiency.

## Action

To ensure the sustainability of our forests, in 2003, we started the biological control project of pests and diseases (technique that seeks the balance between pests and their natural enemies, which reduces or even eliminates the use of pesticides), encompassing the following steps:

- Understand the behavior of pests and diseases and their way of dispersion;
- Identify the plague and methods to fight against them. Initially a chemical solution was the first option but it generated negative environmental impacts and a high costs. As a consequence, researchers were sent in the country of origin of the plague to identify their possible natural enemies. Further research ensured that using natural enemies would not create new local pests or environmental imbalance. Eventually, Brazilian governmental agency, the Ministry of Agriculture Livestock and Supply (MAPA) authorized the import of this plague's natural enemies.
- Once arrived in Brazil, they were first sent to quarantine at governmental labs and tested before permission was granted for pest control



## Aperam

**Award:** Sustainability

**Category:** Environmental management system (EMS)/ Investment in new processes and products

### Biological Control of Pests and Diseases in the Management of Planted Eucalyptus Forests

use. To control psyllid, we imported from Australia in 2004 the natural enemy, bliteus wasp *Psyllaephagus*, which parasites psyllid's shells.

- In 2010, we had the attack of two more pests from Australia: the bronze bug (*Thaumastocoris peregrinus*) and the gall wasp (*Leptocibe* invasion). We saw that these two pests disperse very quickly and have high potential to damage critically our forests. In this way, we went back to the same way of psyllid to control the bronze bug, importing the natural enemy *Cleruchoides noackae* in late 2011.
- More recently, in 2014 we imported the natural enemy of the gall wasp, the *Selitrichodes neeseri*, making releases in the forests of the company and adjusting our laboratory to also multiply this insect.
- We built and implemented a laboratory dedicated to biologic control at BioEnergia plant in Itamarandiba, where we grow and study the insects.
- We reproduce and release natural enemies in the company's forests;
- We keep a detailed monitoring on the

variation of population both of the pest and natural enemy; Since 2003, no health problem occurred with our workers and community due to these insects.

Due to the efficiency of this program, more employees were trained and qualified to perform the activities. The project was expanded to the entire forestry of the company.



### Outcome

From 2011 to 2014 - we had a significant reduction of 65% in the infested areas.

We avoided the use of 4000 kg of chemical pesticides annually.

We are gradually reducing the cost of products and aerial chemical application.

Other benefits have been achieved:

- Program excellence recognition by certification: ISO 14001, OHSAS 18001 and FSC-FM.
- Improvement in the habitat of animals in our forests, more numerous and more diverse wildlife.
- Improved relationship with the communities, where the number of complaints regarding chemical's aerial application is zero.



## Acerinox

**Award:** Sustainability

**Category:** Emissions/Energy intensity

### Energy Saving Hot Rolling Shop

#### Challenge

Looking for energy saving, Acerinox detected unnecessary energy consumption during short stops in Hot Rolling Shop.

In order to improve the situation, Acerinox finally decided to establish a new action protocol to solve the detected issue and to achieve a substantial energy saving after its application.

#### Action

Previously, long stops were considered by Acerinox and an energy saving was clearly achieved.

As so good results were reached, Acerinox thought that applying a similar protocol could solve the existing problem (short stops).

The new protocol is based on a procedure in the same way long shutdowns are managed in Hot Rolling Mill.

This protocol includes the disconnection of a list of auxiliary facilities when Hot Rolling Shop interrupts its production for a short time.

Some examples of the equipment turned off during short stops are:

- Fume Extractors (cyclones): Roughing and Steckel mills.
- Cooling towers fans.
- Laminar Flow pumps.

In order to achieve an efficient disconnection

and connection procedure of auxiliary facilities, Acerinox installed a new software with which operators can decide between working with "Saving mode" or "Production mode".

## Acerinox

**Award:** Sustainability  
**Category:** Emissions/Energy intensity

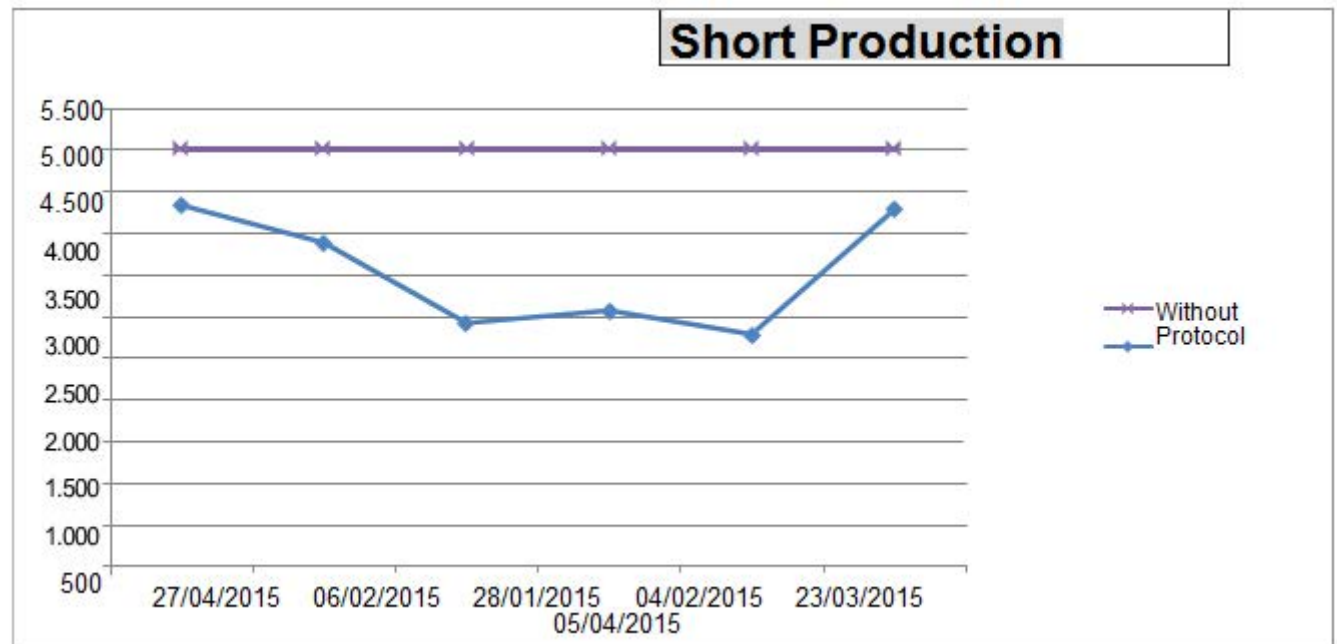
### Energy Saving Hot Rolling Shop

#### Outcome

After the new protocol mentioned, Acerinox has obtained a double benefit.

A considerable reduction in energy consumption (estimated as 470000 kwh per year) and a decrease in indirect emissions will be also achieved (around 126 CO2 tonnes per year), (Scope 2).

The procedure for this energy saving has been quite easy to stablish and also very effective.



COMPARISON OF CONSUMPTION IN HOT ROLLING DEPARTMENT: STOP OF PRODUCTION WITH OR WITHOUT SHUTDOWN PROTOCOL

\*The purple line (consumption without protocol) represents the average value of energy consumption when no protocol actions are applied.

\*The blue line (Consumption with protocol) represents the consumption obtained with varying degrees of protocol. Mill power meters measurements are used for the evaluation.

The differential value between purple and blue lines shows that with the highest degree of disconnection we have achieved savings up to 2 kW.



## Outokumpu

**Award:** Sustainability

**Category:** Emissions/Material efficiency/Investment in new processes and products

### Maximising Water Recycling in Cold Rolling Plant, Mexico

#### Challenge

In Mexico, San Luis Potosí, Outokumpu's cold rolling mill is located in a dry arid area, where groundwater is a valuable asset for people. The less our production consumes it, the more can be used for drinking, farming and vegetation.

#### Action

The progress in water recycling is based on long term work. Already in 2001 the imposed environmental conditions to discharge gave the opportunity to recycle water back to cold rolling process in a larger scale.

During the years our cold rolling plant has developed and improved the water treatment and recycling. One of the last investments was new Crystallizer equipment in 2013. It saves energy, money and environment compared to old system and also decreased CO2 emissions from this water treatment process part by 95%. This is the last phase on the wastewater treatment plant process and makes water recycling efficient; the solution with high concentration of salts coming from the evaporation phase is heated in order to evaporate the water and to obtain rest material in crystal shape.

#### Outcome

Today 99% of the waste water is treated, recycled and reused in cold rolling plant. This level is unique in the stainless steel industry. To follow up on the progress, the plant set up a yearly internal targets for water use in the mill. The savings in fresh water usage is equivalent to the quantity consumed by 1,100 households yearly. In 2015 the fresh water consumption of the cold rolling was extremely low (1.22 m3/t) and well below target (1.50 m3/t).

The plant has also achieved its own target in water use per rolled ton of steel. "For us to continue recycling water is important because it allows us to contribute to environmental care as an organization. We fulfill the environmental regulations and give an example of social responsibility", says Jorge Vieyra, head of production and environmental management at Mexinox.



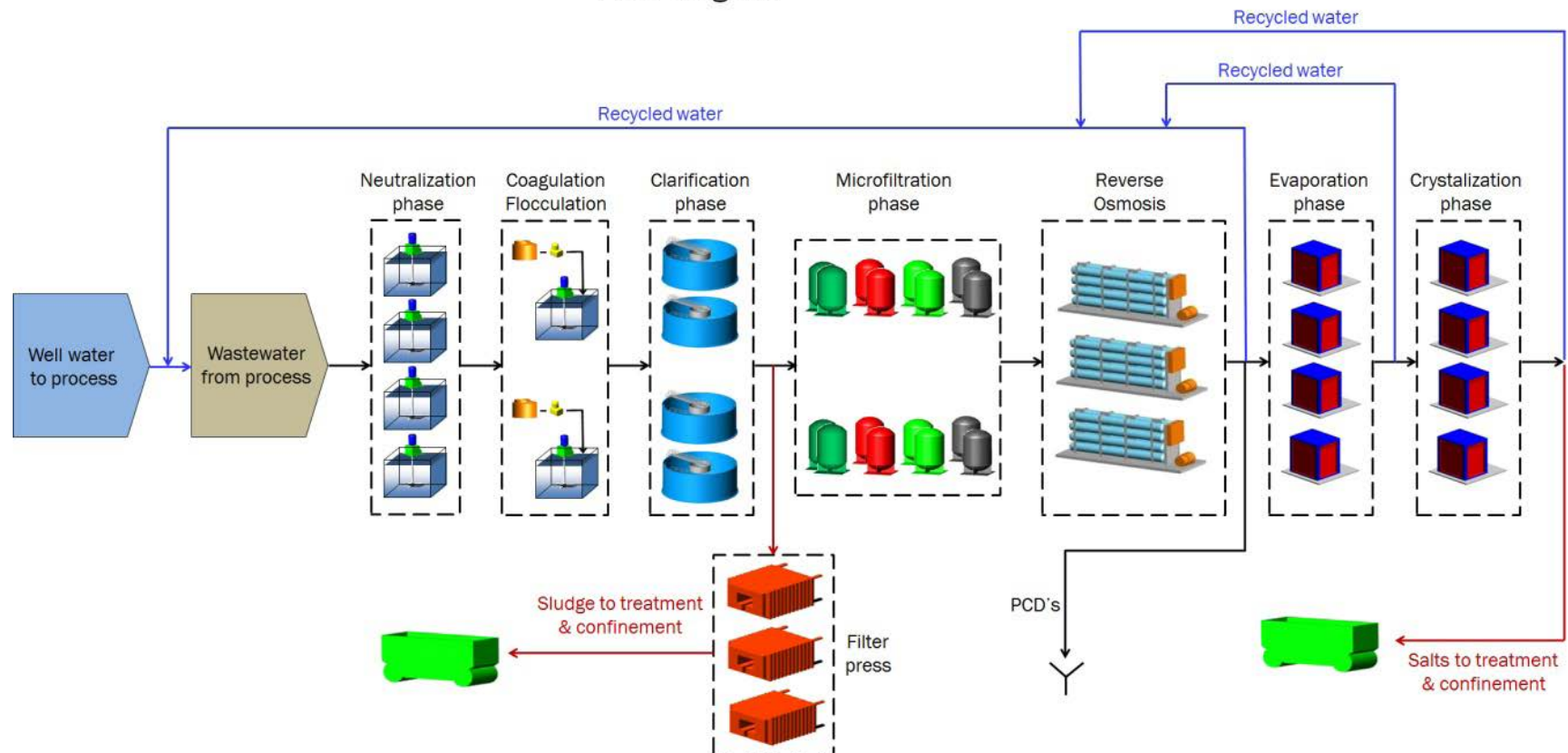


## Outokumpu

**Award:** Sustainability  
**Category:** Emissions/Material efficiency/Investment in new processes and products

# Maximising Water Recycling in Cold Rolling Plant, Mexico

Wastewater Treatment Plant  
 Flow Diagram





## Nisshin Steel

**Award:** Sustainability

**Category:** Emissions/Environmental Management System (EMS)/Material efficiency

### Recycling of Interleaving Paper to Save Forest Resources

#### Challenge

At our Shunan Works, we use approximately 13,800 tons of interleaving paper a year in total to protect the surface of our stainless steel products during manufacture (interleaving paper for manufacture) and while they are wound into finished coils (interleaving paper for products). In order to reduce our paper consumption, paper interleaved during manufacture is rewound and reused. However, paper which deteriorated beyond rewinding is sold outside and the shortfall must be bought anew from a paper company and such purchase total approximately 4,000 tons a year. In an attempt to reduce our consumption of new paper, we worked to build a system to recycle used interleaving paper which is deemed unrewindable.

#### Action

Our recycling system for used interleaving paper performs as follows. Used, unrewindable interleaving paper is shredded and stored in the yard of the paper recycling plant. The used paper is put in the pulper, dissolved in warm water into primary material for paper-making. The primary material is run through the system for removal of foreign substances and oil, and its concentration is adjusted to what is suited for paper-making. Then the refined and concentration-adjusted primary material is fed into the paper-making machine and turned into paper, which is dried out and recycled into interleaving paper for products. Recycled interleaving paper (recycled paper) is cut and slit into prescribed widths and lengths and supplied to the cold rolling and finishing lines in our Shunan Works. The processing capacity of this recycling system is approximately 10 tons a day. Waste water generated in the recycling system is detoxified in the adjacent waste water treatment facility and sent to the overall water treatment plant in our Shunan Works.

#### Outcome

This recycling system of used interleaving paper has given us two pillars for saving paper resources, along with the conventional rewinding system (reuse) and has helped us substantially reduce the generation of used interleaving paper, leading to a dramatic cutback in our purchase of new paper. Quantitatively, this recycling system enables us to process approximately 3,600 tons of used interleaving paper a year, achieving a recycling rate of roughly 90%. This quantity translates into preventing deforestation of some 29ha, which are equal to 40 soccer pitches or to two-thirds of the Vatican City. The remaining, unrecycled 10% is composed of sludge generated in the system, which is processed and used as material for cement at a neighboring chemical company. This recycling system for used interleaving paper is operated by Shunan Shigyo Co., Ltd., a subsidiary of Nisshin Steel.

## Nisshin Steel

**Award:** Sustainability

**Category:** Emissions/Environmental Management System (EMS)/Material efficiency

### Recycling of Interleaving Paper to Save Forest Resources

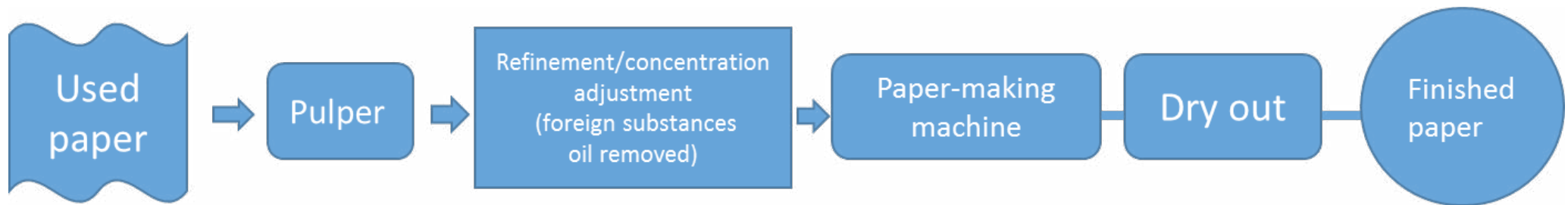


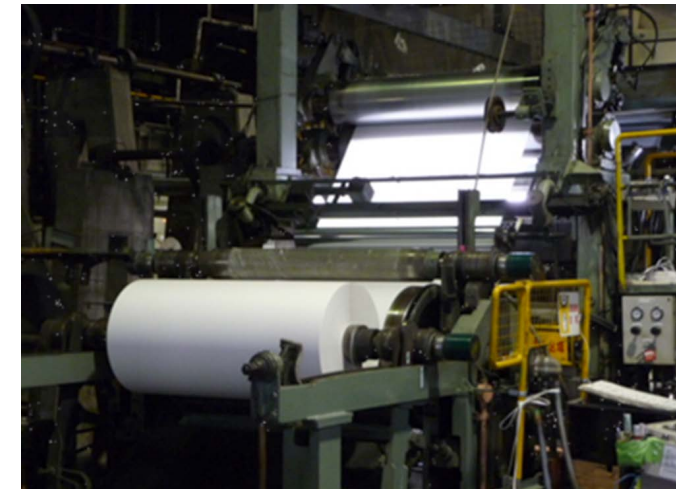
Diagram: The recycling system for used interleaving paper



Used interleaving paper deemed unrewindable



Pulper (material dissolving process)



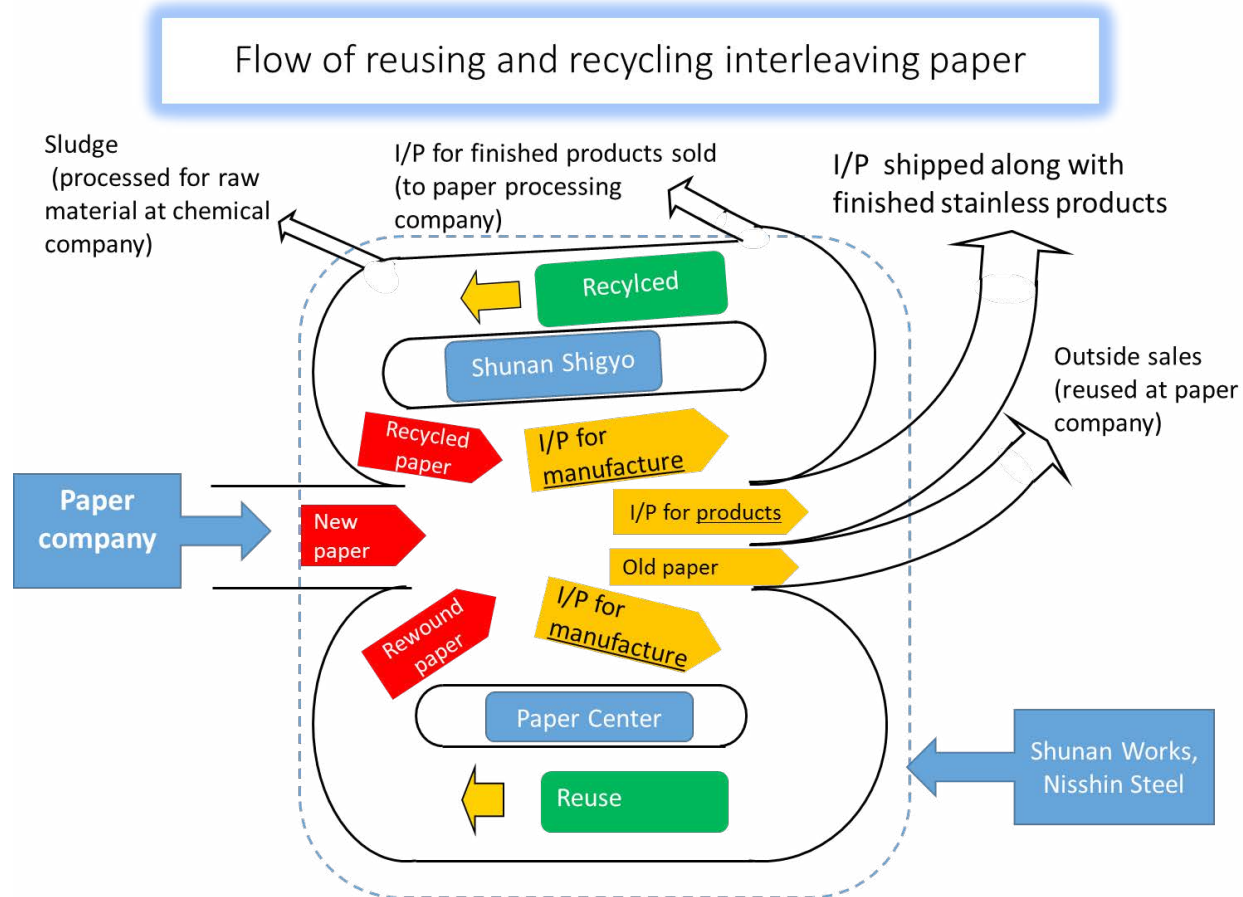
Paper-winding process



## Nisshin Steel

**Award:** Sustainability  
**Category:** Emissions/Environmental Management System (EMS)/Material efficiency

### Recycling of Interleaving Paper to Save Forest Resources





## Böllinghaus Steel S.A.

**Award:** Sustainability  
**Category:** Energy intensity

### Save To Compete Project

#### Challenge

Since 2011 the energy consumption of the overall plant is increasing an average of 20% a year. Largely due to the introduction of new equipment (heat treatment furnaces fueled with natural gas), and to a lesser extent due to air leaks heating needs of chemical baths and inefficient lighting systems.

#### Action

Bollinghaus Steel joined the Energy Efficiency Program SAVE TO COMPETE supported by the energy supplier which consists in the identification and implementation of potential energy consumption reduction measures, in which the generated energy savings outweigh the financial costs arising from the measures financing. From the nine measures identified, the following were implemented:

1. Energy recovery from flue gases for heating air and water (October 2015);
2. Reduced class efficient engines replacement by high-performance engines: blast machine and furnace fan (September 2015)
3. Interior lighting refurbishment: tubular fluorescent technology and LED tubes (July 2015)
4. Outdoor lightning multi-level ballasts installation (August 2015)
5. Energy Management System installation (July 2015)
6. Open Rolling Mill furnace inlet air heat

exchanger replacement (June 2015)

The project aims an annual saving of 91k€ (11% of the invoice), equivalent to 130 tons energy saving with a payback of 4.1 years and more than 500ton CO2/year avoided. Outcome

In the last quarter, we noticed a reduction of 10% on the energy consumption.

#### Outcome

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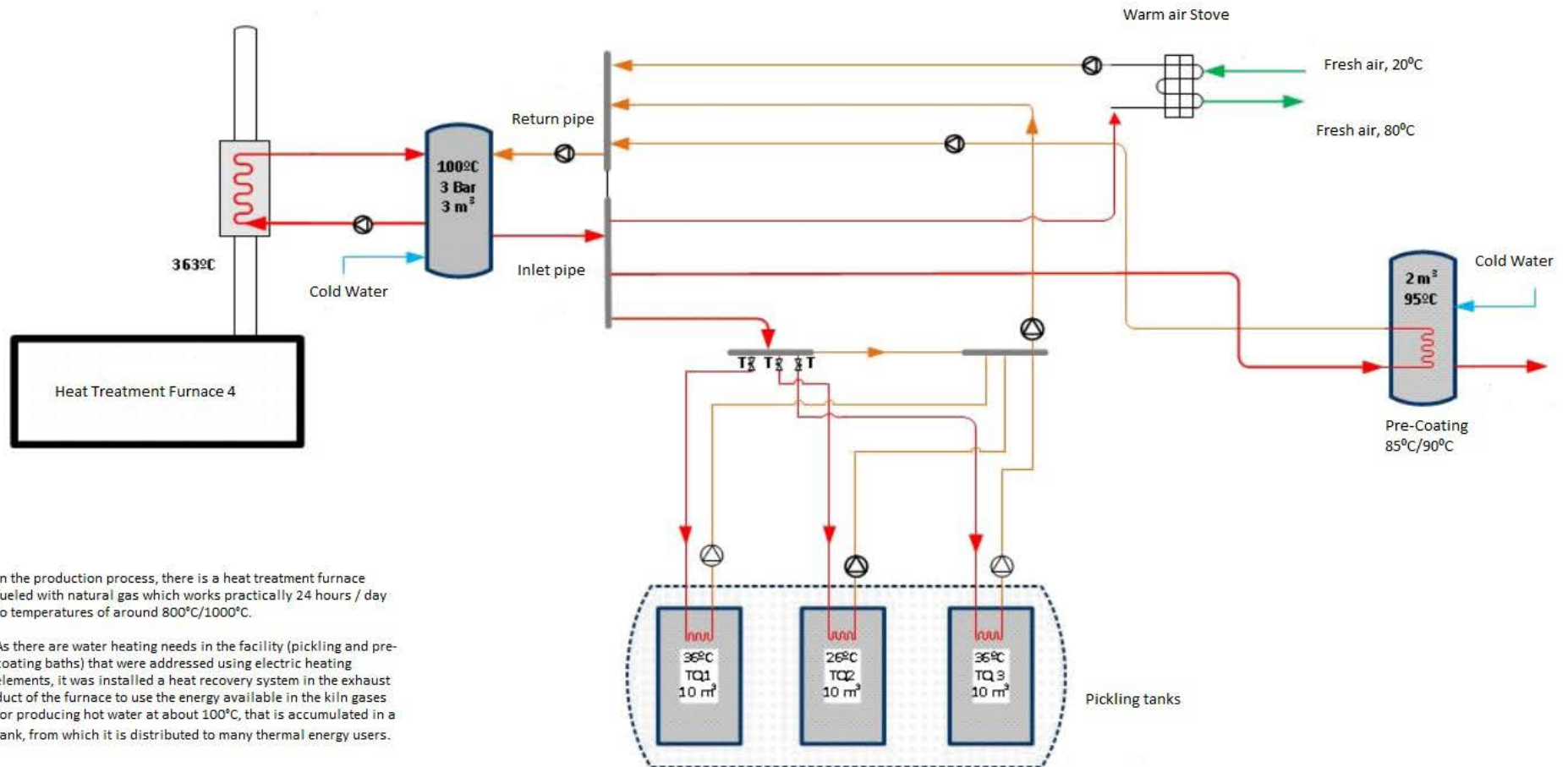




## Böllinghaus Steel S.A.

**Award:** Sustainability  
**Category:** Energy intensity

### Save To Compete Project



In the production process, there is a heat treatment furnace fueled with natural gas which works practically 24 hours / day to temperatures of around 800°C/1000°C.

As there are water heating needs in the facility (pickling and pre-coating baths) that were addressed using electric heating elements, it was installed a heat recovery system in the exhaust duct of the furnace to use the energy available in the kiln gases for producing hot water at about 100°C, that is accumulated in a tank, from which it is distributed to many thermal energy users.



## Nippon Yakin Kogyo Co., Ltd.

**Award:** Sustainability  
**Category:** Material efficiency

### Set up a New Project for Activation of Clerical Staff

#### Challenge

We have improved the production process for long years; however our administration has not been improved enough yet. Now the demand for the contribution of the clerical staff him/herself is growing in order to pursue the operational efficiency.

#### Action

Set up a cross-sectional group of clerical staffs to make a suggestion to improve the administrative operations. The cases are as follows.

1. Improved recycle rates to separate garbage strictly.
2. Changed the process of purchase record inspection.
3. Changed the stock system of office supplies. Previously each department managed its own stocks. We decided to share them with all departments in order to reduce unnecessary stocks.

#### Outcome

1. We succeeded to improve the recycling rates reducing paper wastes. Its economic benefit was US\$30,000 approx. since the start of this project, April of 2014. (See chart 1.)
2. We succeeded to reduce the time for hand-written reports. About 50 hours per month were saved due to the improvement. (See chart 2.)
3. We saved about US\$2,000 per quarter. (See chart 3)

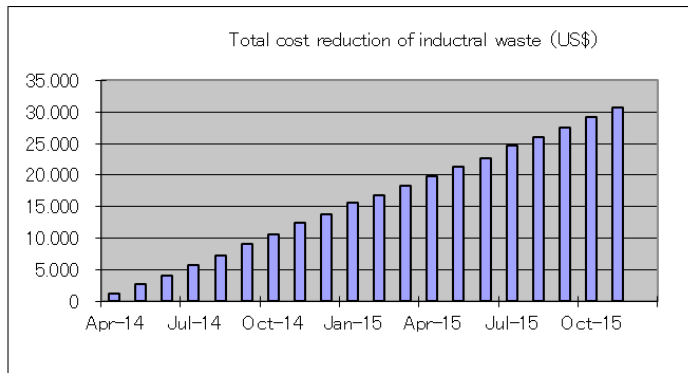


## Nippon Yakin Kogyo Co., Ltd.

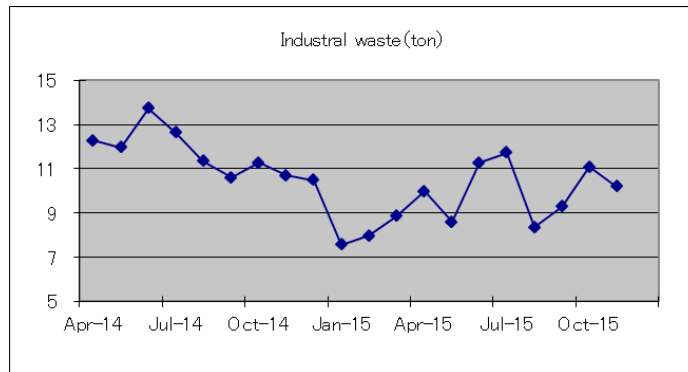
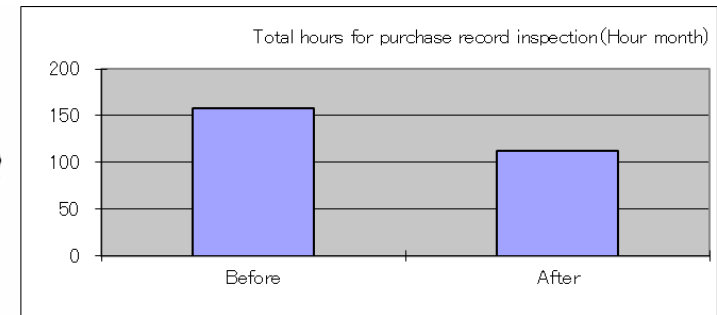
**Award:** Sustainability  
**Category:** Material efficiency

### Set up a New Project for Activation of Clerical Staff

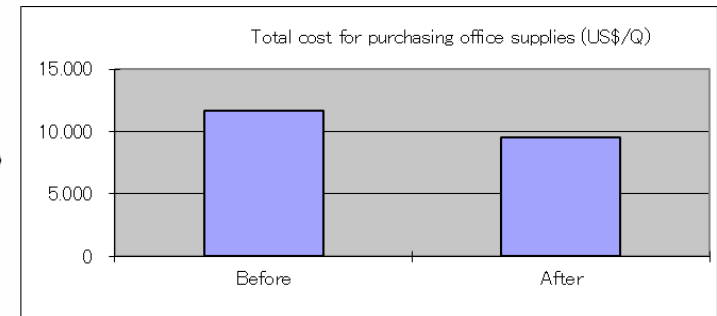
Improving recycling rates due to detailed clarification of paper waste



Improvement of purchase record inspection



Cost reduction of purchasing office supplies







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## About ISSF

The International Stainless Steel Forum (ISSF) is a non-profit research and development organisation which was founded in 1996 and which serves as the focal point for the international stainless steel industry.

### Who are the members?

ISSF has two categories of membership: company members and affiliated members. Company members are producers of stainless steel (integrated mills and rerollers). Affiliated members are national or regional stainless steel industry associations. ISSF now has 65 members in 25 countries. Collectively they produce 80% of all stainless steel.

### Vision

Stainless steel provides sustainable solutions for everyday life.

### More information

For more information about ISSF, please consult our website [worldstainless.org](http://worldstainless.org).

For more information about stainless steel and sustainability, please consult the [sustainablestainless.org](http://sustainablestainless.org) website.

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[worldstainless.org](http://worldstainless.org)