

Packing Technology contributes to increasing Value and Cutting Cost

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Dear Reader,

This article focuses on how the prime quality can be maintained in metal industry products which can easily suffer from rust. We introduce the readers to challenges for keeping the product quality unchanged from production line to end user.

Out of many different ways of protecting and packing the product, according to laboratory and experimental tests, there is one packing method that gives the best rust protection.

Using the right method of packing the rust problem can be solved and in the same time the producers can save in operational costs.

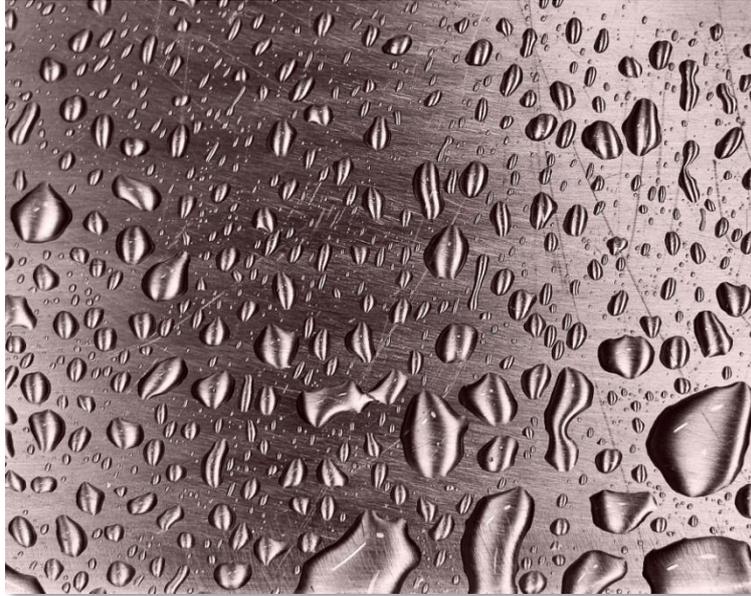
In case you are interested to learn more about rust prevention and product packing, do not hesitate to contact Pesimal Oy.

There is also more information of packing related machines and materials in www.pesimal.com.

[Contact information](#)

1. Is packing necessary? Damages caused by moisture

We all know that most materials get wet and moist when they are exposed for sudden temperature differences and the relative humidity around is high enough. Warm air is able to keep more moisture than cold air, but when the air cools it condensates to water. This kind of moisture covers basically everything, including metal surfaces, starting a chemical reaction.



Condensation water on a metal surface

When iron reacts with oxygen, it forms a new substance, iron oxide. This can happen when the oxygen level is high enough for chemical reaction. Water acts as the medium to transfer electrons in the electrochemical process, where iron loses electrons by oxidation causing the water to break into hydroxide ions. Oxygen and oxidation process starts and if salt is involved the process will speed up dramatically.

Now the iron that has oxidized reacts with the hydroxide ions and oxygen forms metal oxide. These salts remain even if the water tries and they restart rusting whenever they come in contact with moisture.

That is the reason why the metals get rusted more quickly near the beaches or salty places, ocean transports or in polluted environment and the importance of proper protection is even bigger.

2. How do this effect on steel producers

New steel grades are developed for various purposes; laser cutting for manufacturing processes; car manufacturers etc. are demanding rust free materials. But rust attacks metals, even galvanized products suffer from so called “white rust” caused by moisture. For the same reason copper turns green and silver gets black. All customers demand rust free prime products arriving to their manufacturing site and also sometimes to be hold on a stock for a while in their premises. Packing and especially moisture protection is the key element for preserving the excellent product quality.

How do we prevent products rusting during storage and transport?

When knowing the reason for rusting, there is a simple solution:

If we can prevent water and oxygen mixture to come in contact with the metal - we can prevent rust

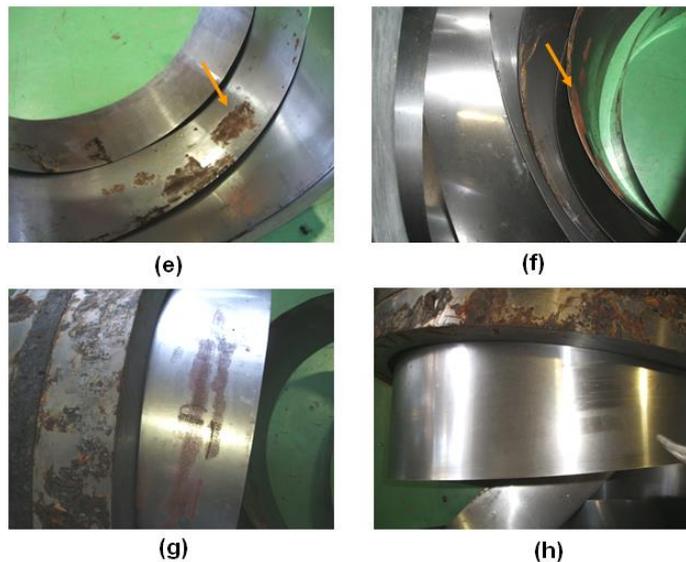
As a conclusion we understand that the packing should be airtight. Reduce the existing air quantity to minimum inside the package to avoid rust. The smaller the amount of moisture is - the better is the result.

In the following, we study the packing methods available for Industrial scale production.

Traditional packing

In traditional packing, which is made manually by workers, packing starts by folding a VCI laminated paper sheet into the coil eye. The purpose of this part of the packing is rust prevention. After this, packing continues by adding a mechanical protection to coil eye, outer surface, headers and to the corners.

The problem is that it is impossible to get the manual packing air tight since manually folded paper cannot be sealed properly. Also the flow of air from environment diminishes VCI effect and finally feeds oxidation. According to packing material producers, even the best VCI qualities will not last more than six months in traditional packing.



Common rust occurred to products packed with traditional packing

Environmental Issues

This packing, VCI paper laminated with plastic, can not be recycled easily because the paper and the plastic lamination needs to be separated, in order to be recycled in conventional methods. This is not an easy process and that is limiting sales of this material to some countries for example in Europe.

Safety Issues

In traditional packing a big area is engaged for packing materials preparation and storage for various sizes of pre-cut materials.

Safety areas are difficult to isolate. Operators have to take the risks of objects falling off, straps springing open, being dragged into turning parts, being cut by sharp things, noise influence and other vocational diseases. When working closely with VCI treated materials, risk for skin damages is high. the packing method requires many operators and the operational cost is high.



Manual packing

***Traditional packing stress the environment
and causes safety risks unnecessarily***

3. Moisture protection by wrapping machines

Benefiting in cost saving and caring for the environment

Through Eye Wrapping (TEW) machines for coils and strips as well as stretch wrappers for long products have been on the market for quite some time and they have proven to make an excellent result on moisture protection.



TEW result

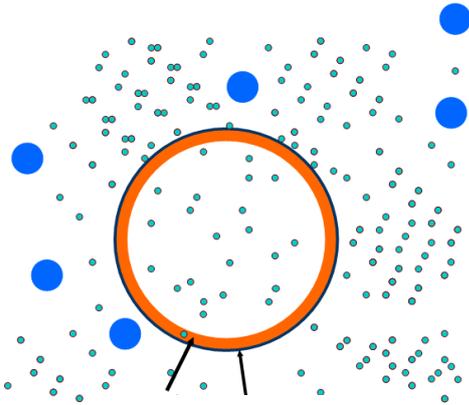
TEW -machine is stretching commonly used stretch film through the eye of the coil with an overlap forming an airtight package; the air inside will be reduced into tiny amount still remaining in between the layers in the coil.

Some manufacturers have developed additional options to refine the result with a layer of crepe paper laid simultaneously under the stretch film. Crepe paper is a common, cheap paper type with ability to absorb and keep moisture. This paper can be treated with VCI, if necessary.

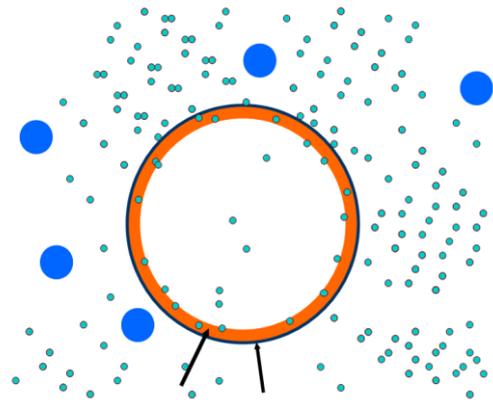
***In practice the rust can be prevented by
TEW technology using the combination
of crepe paper and PE-film***

In the following, a demonstration of crep paper's ability to absorb moisture.

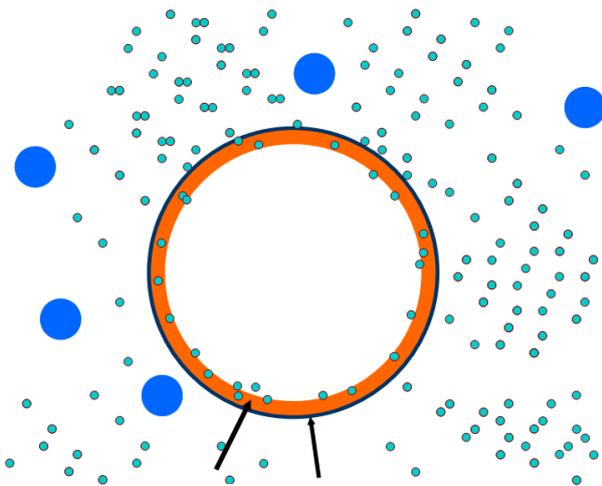
Rust-proof packing: Water-absorbing paper + PE film



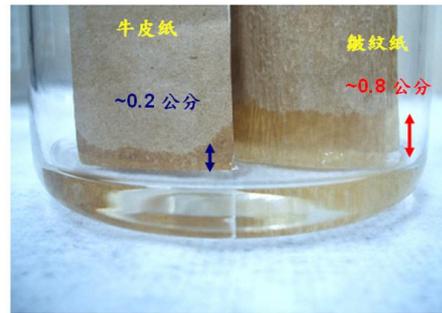
Humidity exists inside and outside package. Big water drops are isolated by PE film



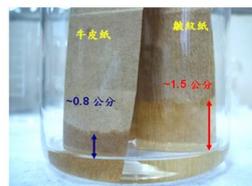
Humidity nearby water-absorbing paper is diminishing of gradually



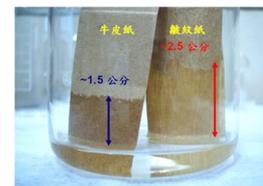
Humidity deep inside the paper



(a)



(b)



(c)

*Water-absorbing ability of crepe paper is better than kraft paper (the left sample is kraft paper and the right is crepe paper)
(a) 30 s; (b) 5 min; (c) 30 min*

This method requires a machine to pre stretch the film to stick on the overlap and to create an airtight package, where the moisture from outside is isolated. Together with crepe paper laid against the coil surface to absorb the small amount of moisture left inside, the moisture protection comes to be perfect.

This method is impossible to carry out manually by workers. When it is done by machine it is also safe and fast, up to 20 normal sized coils in an hour can be wrapped with low operational costs. Overlapping of the packing material is freely adjustable from 5 up to 99 % to optimize material usage as well as to meet rust prevention requirements.

Environmental Issues

Environmental regulations are going to do a big impact on future choices concerning packing material. European countries have already a lot of regulations around this topic and there is much more to come. In the near future, all packing materials must be recyclable.

Stretch film is made of recycled material and it is possible to recycle fully again. It is also approved environmentally sustainable.

Today every company has an environmental policy and the awareness of environmental issues, operational cost structure and employee safety is very high. The good news is that the environmental packing materials are actually cheaper to use than the traditional materials.

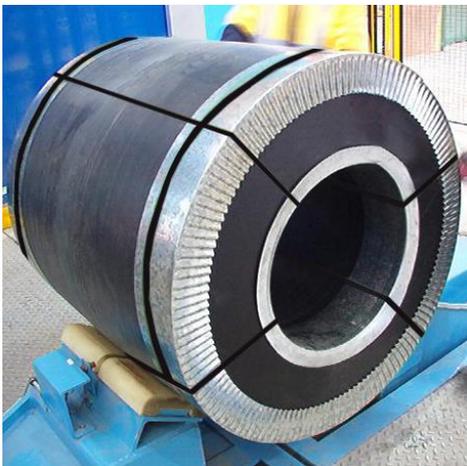
Secondly, every year millions of dollars are lost due to corrosion and rusting of materials during transportation and storage. Rejected materials, due to rust, are of course recycled, but the environmental effect of unnecessary energy consumption for re-melting the rejected materials is huge from the world wide perspective.

5. Methods for Mechanical protection

The second phase of the product packing is the mechanical protection, which is placed after the moisture protection. Mechanical protection is used for products delivered to distance or stored for a long time.

The mechanical protection against damages during transportation can vary much depending on geographical location and how long the transportation is. There are many possibilities to protect the product, it is mainly a question of how to keep costs down and still reach good protection.

The new packing materials introduced earlier are doing a great impact for cost savings without compromising the quality. The benefits of automatic packing lines are even greater, because the line can form and cut the packing material and thus reduce the waste in moisture protection as well as in mechanical protection.



6. Cost Savings

Cost of packing space, labor cost, maintenance cost and packing material cost are a part company's operative costs. It is even important for every Mill Manager to compare packing, logistic and storage space costs as it is to compare any other operational cost.

Besides packing cost there are also other quality costs as reclamation costs from damaged material and "branding cost" from improper packing's. Good quality is more worth than an advertisement.

Lines with higher automation have higher investment cost and lower operational cost and for manual lines the situation is opposite. The fair comparison below for pay off time is using depreciation cost for investment.

Cost comparison:

Cost Item	Automatic Line	Manual Line
Packing material cost	Lower: The line is material saving and no need to purchase many different sizes	Higher: Precut material makes purchase cost higher and need of stored amount is bigger
Labor Cost	Lower and more predictable in long run	Higher and more unpredictable
Maintenance Cost	Case to case	Case to case
Inventory cost	Lower: Needed area small, less stored material needed	Higher: Many sizes of precut materials make storage space much bigger
Depreciation cost for investment	Case to case: Usually more equipment means higher depreciation cost	Case to case

7. Conclusion

The focus on manufacturing process and making excellent products is the primary target for all mills. But somewhere during this process is forgotten that the quality is counted when the customer opens the package and finds out the condition of the goods. Are they clean, rust and damage free or if they need to reject a couple of layers before using the material for their own production. This is without a doubt one important criterion, together with the price, when they rank the suppliers in good and less good.

It is always easier to stay with the old than change to the new, but the investment to packing machines will pay back in less operational cost and better customer satisfaction. We can think only how important the packing is for consumer products to make the brand famous. Considering how important it is, it seems as there is margin to earn and market share to gain.