

FutuREuse

Material Surface Treatments

For commonly reclaimed
building elements



Rotor for

Interreg 
North-West Europe

FCRBE

European Regional Development Fund

REUSE IN THE CIRCULAR ECONOMY

In the European Union and around the world, construction materials have a massive impact on climate change, ecosystems collapsing and natural resource overconsumption. As a waste prevention strategy, reuse is a great solution to overproduction and natural resource depletion.

Despite its waste prevention potential, the salvage and reclamation trade is largely overlooked, especially in the context of formal construction projects. Better consideration for this approach in tools widely used by the construction industry would be interesting leverage to foster, support and further develop the reclamation sector.

THE FCRBE PROJECT

FCRBE stands for Facilitating the circulation of reclaimed building elements and aims to increase by 50%, the amount of reclaimed building elements being circulated on its territory, by 2032. The project involves 7 partners:

Rotor, lead partner (BE), **Bellastock** (FR), **Brussels Environment** (BE), **The university of Brighton** (UK), **Salvo** (UK), **Construction Confederation** (BE), **Belgian Building research Institute** (BE) and the **Scientific and Technical Center for Building** (FR)

For more information on FCRBE: <http://www.nweurope.eu/fcrbe>

FUTUREUSE: 7 SHORT INTRODUCTIONS TO THE WORLD OF REUSE

This is one of a series of seven booklets that have been produced to serve as a taste of what the FCRBE project aims to achieve. The subjects span the broad spectrum of reuse, covering considerations before, during and after with useful information to guide and inspire working with reclaimed materials. The booklets also highlight environmental benefits, clarify grey areas and frequently asked questions regarding best practices, whilst sparking curiosity for a future where use is reuse.

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Introduction

Every so often, a reclaimed material may need to be adapted to its new use, or to satisfy a new user's expectations. In many cases, adapting the material involves changing its surface. Depending on the material, where it came from, its age and intended use, there may be many different ways a surface can be adapted.

While in recent years the "reclaimed look" has become trendy, it is important to learn about materials, their patinas and ways to care for their surface conditions to foster reuse. This information is also useful to identify and avoid fake "reclaimed" materials.

Each reclaimed material's eventual transformation depends on the state it is in, after it has been dismantled from its original location. We have gathered a few case studies to give an overall introduction to the world of surface treatments.

1.

Patina(s)

Patina, as we understand it, designates the aspect of the surface of a material which has been progressively transformed through its original use (or uses). Patina is different from the simple dirt or dust layer that may be found on the surface of some materials (especially if they have been left unused for a long time). It refers to the complex transformation of the surface of a material in contact with wind, water and natural agents in general (including, of course, the various actions of humans).

In our understanding, patina encompasses wear and tear but can not be reduced to it. It refers to the multiple terms used to describe the condition of a material that has aged. One way to look at it would be

to analyse the different phenomena likely to affect the original surface of a material:

- Some are subtractive. They tend to remove matter from the original material. For instance, a stone surface or a door handle progressively polished by the feet or hands of multiple users (or the same user multiple times), or the successive scratches around a keyhole.
- Some are additive. They tend to add a new layer on top of the original surface. It may refer to deposits, efflorescence but also the growth of moss, algae and other biological forms on some surfaces.
- Some are of a chemical nature. The subtle oxidation of copper, for instance, which confers its green aspect and forms an outer layer that prevents the surface from further corrosion, or the subtle transformation of a bronze door handle in contact with greasy hands.



Paint layers on doors chipping away, being painted, and then chipping again, or repainted.



Lime buildup and water damage on a reclaimed and crackled porcelain sink

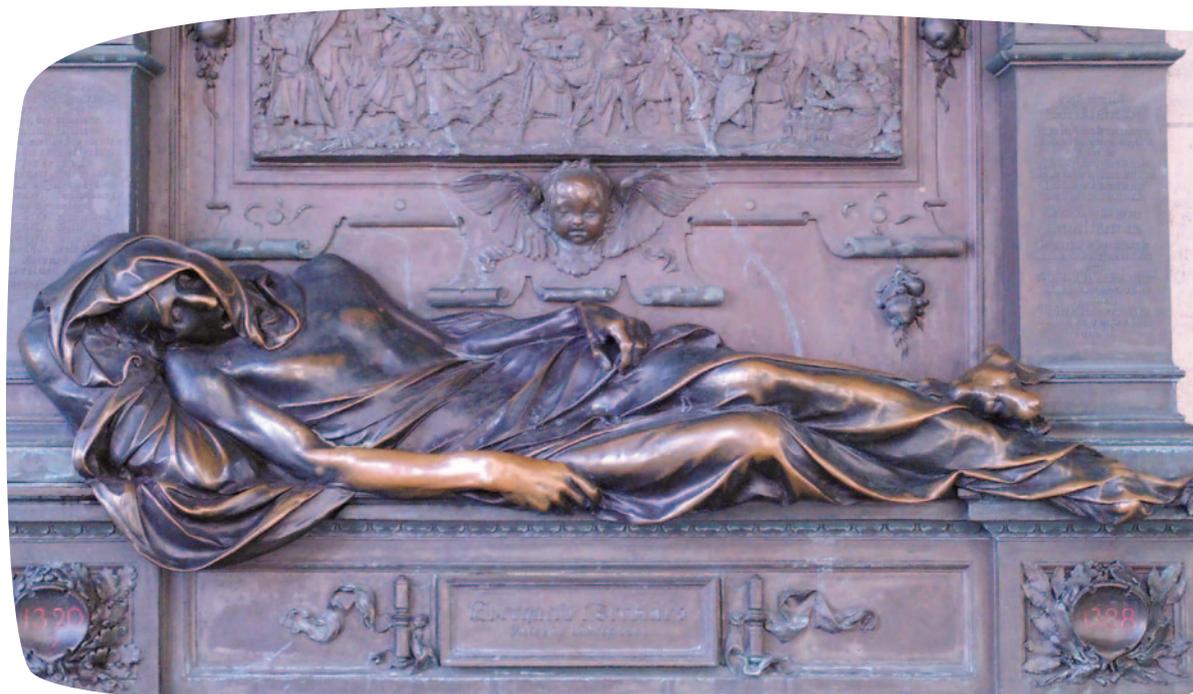


Rust forming where paint is no longer protecting a surface

Many types of patina are a mix between these different phenomena. They are entirely dependent on the material's environment and history. The placement of multiple copies of an identical object in any given space can change each copy's history and aspect through their independent interactions with the environment. In one way or another, these traces are beautiful markings left

by the passage of people and time. Reversely, from these traces, one can often infer what the material was used for and which areas of the object were worn and why.

Patina is thus unique to each material. When feasible, it should be preserved.



Bronze sculpture discoloration from touch

2.

Treatments

Contrary to wear, there is a whole array of surface treatments or procedures applied to the surface of a material to make it better in some way. For example by making metal, stone or wooden objects more resistant to breaking down. A surface treatment will likely alter the patina as well as the outer layers of the original materials. This results in many different types of surface treatments which can be categorised like the earlier mentioned patina layers; subtractive, additive and chemical treatments.

Before any structural transformation is done, cleaning should always be the first choice, and sometimes final treatment a reclaimed material undergoes. This subtractive treatment is simply the gentle removal of dirt, grime or dust by using basic soap and water when possible. Sometimes just water can do the trick. Heavier duty cleaning products may include degreasers at



Oil treatment samples

various levels of toxicity and strength, which for the sake of the environment and personal health we discourage the use of. Instead of erasing traces of wear, embracing such characteristics can add a lot to the quality and the meaning of the design.¹

Household products can also be used to rid surfaces of unwanted marks. Either mixed with water to form a paste, diluted in water to soak an object, or used as an odor absorber, baking soda, or bicarbonate of soda is considered a non-abrasive (very mildly abrasive if kept in powder form) all purpose cleaner. This easy to find product can help get rid of unwanted marks, odours and grease on plastics, carpet tiles, fabric, kitchen appliances, and even your teeth. These are exemplary hygienic reasons to further clean material surfaces.



Recup Design Workshop, sanding wooden surface

1. As illustrated, for instance, in recent design practices. To see more of it please refer to *Fashion for Reclamation* of the *futuREuse* booklet series (by Sara Morel and Becky Moles for Salvo, Interreg FCRBE Project, 2021).



signs of use on a light switch

A surface finish can be both aesthetic and practical of course. Additive surface treatments may depend on the reclaimed material's new use. If a surface is meant to be gripped then a rougher surface is desired. A protective finish may result if the surface will experience higher user traffic than its previous installation. New uses may sometimes require specific characteristics to be met before installation, for example to make a surface easier to clean, more durable, or resistant to certain elements to avoid abrasion.

Oftentimes, these two types of treatments are combined. Sometimes these procedures can be chemical and thus categorised separately. We will not explore chemical treatments in this booklet, as the aim is to avoid these. As a reminder reuse is taking a material from any given installation to be reused, as it was originally intended, in a new construction or project. Upcycling or downcycling are often cross referenced with reuse. These are practices which change the intended use of a material or object thus not considered as reuse.²

Wear is unavoidable; no one has ever designed and built a space without giving even a minimal amount of thought to its use and the required material resistance.

2. For a better understanding of reuse please refer to *Waste or product? Criteria for reuse of the FutuREuse booklet series* (By Susie Naval for Rotor, Interreg FCRBE Project, 2021).



Chipped paint on door and handle

Now that we have the basics covered, let's figure out how to better apply some of these techniques.

- Would you want to let time condition the surface through use, or would you rather shield the surface and maintain its natural beauty?
- What level of results do you want to attain?
- If you do this yourself, which machines and tools do you have access to?
- Are you hiring someone?

Remember, achievement of any results depends on the material, its use, and maintenance. As a rule of thumb, always preserve the reclaimed material's patina. Unless its new use has specific requirements you should strive for a non abrasive cleaning as treatment whenever possible. In the end, reconditioning a reclaimed material is, at its most basic process, a - sometimes not so deep-clean.

3.

A dive into the wild world of Patinas

This non-exhaustive list goes over some commonly found materials in buildings across northwestern Europe. These are materials regularly sold by reclaimed dealers. You can find many of them on online platforms such as opalis.eu and salvoweb.com which over the years have shed light on a network of reclaimed dealers in northwest Europe.

This list was curated with patinas in mind. We hope to pique some interest in the wild world of patinas. This means that traces of use here are highlighted rather than erased, reverting materials not to a “like-new” visual surface, but to a gently used yet reinforced surface aesthetic. These case studies aim to generalise a standard in the observing of and bringing a different kind of attention to the marks left behind by other agents, over periods of time.

Salvaged Old oak hardwood flooring

Some examples of commonly found wood species include afzelia, beech, maple, oak, pine, teak. The various species of wood have different uses from hardwood flooring, window frames, load bearing beams, doors and countertops, to furniture such as tables, chairs, and cabinets.

Wood, being a very common building element material whose uses vary greatly, can have diverse surface conditions over time. Take for example an old oak hardwood floor salvaged from an old barrack. The building is up for demolition. Over the years it has been used in many different ways. The 800 square meters of oak wood flooring is uninstalled and brought to a warehouse to be sorted, cleaned, and resold as reclaimed oak parquet.

The sorting process can be very tedious as the floor in each room and hallway in the Parisian barracks was stepped on by hundreds if not thousands of different

shoes over the years. These shoes may have come from a room containing chemicals damaging the floor’s integrity causing the wooden planks to be less resistant to cracking and breakage. They may have come directly from the outside, with mud leaving behind water stains and jamming the joints with layers of grime and dirt. Sand particles carried by shoes are very abrasive. In the hallways where foot traffic was highest, the floor may have completely lost its protective lacquer finish, making these planks thinner than the rest of the lot. Over the years, foot traffic could have had the same effect as sandblasting the whole floor with a machine. In the stockroom, the floor was painted to help organise material, leaving some of the oak completely hidden behind a thick layer of what could be lead paint. Finally there was a side of the building with large east-facing windows, the flooring from this side of the building is a shade lighter due to the harsh morning sun dodging the surface for so many years.

The batch of 800 m² of wood coming from the same Parisian barracks becomes anywhere from 3-8 smaller batches of different qualities and quantities. The painted flooring poses a problem, where lead-based paint was widely used in the past, it is now forbidden to use and must be properly removed when found, so as not to induce any health problems. This is one of the few instances in which we would encourage an abrasive surface reconditioning technique such as sanding (with much ventilation and proper personal protective equipment).

The rest of the wood flooring is then cleaned by hand to avoid further damage, the use of rotating brushes or small mechanical tools speed up the cleaning. The tongue and grooves which at one point were full of grime are carefully cleaned bare in order to be properly installed in a new location.

The character of the parquet found in the Parisian barracks is inimitable. There are a few ways to keep the surface condition and freeze its ageing, protect it from further damage, and simply make its faults shine. On a less toxic maintenance tip and with some research,



A great example of deformation for reuse is routing old hardwood flooring planks in order to homogenize their widths and for ease of reinstallation. Woodworkers is a workshop in Brussels specialising in furniture (<https://www.woodworkers.be/>).



there exists producers of very high quality maintenance products, with a focus on wood and stone, based on effective natural ingredients. These low toxicity solutions help accent the used material. In the case of the sun kissed oak floor, an oil application can bring back a more natural look, as oils often darken wood.

The case for biological growth on natural stone

In Northwestern Europe there are various commonly used stones easily found in many different types of constructions: Belgian blue limestone, black Mazy marble, carrara marble, cast bazalt, granite, Jura limestone, travertine, york stone, grit stone. Uses for stone vary greatly as well, from flooring (both interior and exterior), wall cladding, window sills, stairs, fountains, garden sculptures, fireplace mantles, plinths and more. Those used externally are usually untreated unless used as decorative flooring, in which case they have a raw underside and a polished, or otherwise finished exposed side. A simple, non-invasive reuse of some stones, can simply be to use the unpolished raw undersides of a batch of stone, leaving a clean palette to work with.

Exterior stone used for landscape sculptures, steps and cobble stones for example, will more than likely have some sort of biological growth. Moss, in the right conditions, can completely cover the stone and make it appear green. Many sculptural stones with little to no

human contact, or which are stocked in the perfect light, moisture and temperature conditions will develop some form of lichens, algae or moss depending on their environment.

For historical preservationists biological growth is unwanted because it may accelerate decomposition or degradation of a stone construction. There are undoubtedly some invasive types of biological growth which embed their roots into the very structure of the stone through crevices, joints, or cavities, accelerating erosion. There is however some due diligence in



Stone found at the Orimenta yard (www.orimenta.nl)



Lichens growing on a stone sculpture in a cemetery. © Emmanuel Cortés

understanding lichens and other biological growth which may allow for a symbiosis, and protection from, rather than invasion of the elements. There are some studies which support this hypothesis. Results from the comparative analysis of the water transport data on a temple located in Angkor Wat (Cambodia) suggested that lichens had an important moisture-controlling function for the environmentally stressed stones [1]. Lichens are also a good indicator of air quality and can help determine historical timelines of specific sites as they grow roughly 3mm per year.

There are anti-green agents both toxic and less toxic, which may also damage the surface or structure of any given material. There are existing examples of some unprecedented beauty in every city with some form of biological growth. In Brussels we have paved streets, the joints of some streets are vibrant green, giving some areas of the city a surreal glow which can be admired by anyone walking along the streets. It is uncommon to magnify used surface conditions in stone, but why not change this thinking and explore possibilities of embracing a bio-patina?



*Moss growing in between cobblestones
© Emmanuel Cortés*

Antique sanitary Components and contemporary use

While sanitary components such as toilets, urinals, sinks, and shelves are nowadays made out of porcelain, some of these were once cast in iron and finished with an enamel coating. You can still score a vintage enamelled sink or claw foot bath today and find options to re-enamel it for a longer lifespan. This is a low-cost high-value solution to reusing cast iron sanitary elements.

In contemporary production, porcelain components are vitrified to make their surfaces non-porous and therefore resistant to water, which is the element these objects are most in contact with. While most used porcelain sanitary components will have some sort of buildup, it is not difficult to clean the surface back to a shiny white. Water can cause limescale buildup, especially with leaky faucets or standing water left behind in a building that is bound to be demolished, or redeveloped.



Lime build up on reclaimed sink



Abandoned bathtubs © Jeff Buck



Re enamelled foot bath © Marlene Manto

Normally, for small surface stains, a simple baking soda and water or vinegar solution and some elbow grease can do the trick. In order to clean the interior surfaces and achieve a like-new functioning toilet or urinal, there must be a more robust procedure. A light acid bath over a period of time dissolves any built up limescale, and after a power wash rinse you are all set. Please mind that such a procedure is more complicated than this simplified description. Some cleaning procedures are not ideal however. As we learn with a large batch of sanitary elements unmounted from a large building in the center of Brussels, this procedure is not economically interesting.

Cleaning cost per component has to be addressed here. The storage space, bath facilities, cleaning solutions, and labour all contribute to the cost of reconditioning. In the case of a toilet, it is not cost effective to reuse. While regions have different water regulations, norms and best practices, the practice of reusing toilets, like many other types of technical equipment, may differ between regions and by country. In the near future, sanitary manufacturers can provide an ecological way to



Urinals soaked in acid bath for a deep clean

close the loop. For now, there are tons of resellers who have at least a small section of reclaimed sanitary components, in the UK for example there are specialist dealers focusing on sanitary ware waiting to be reused!

Metallic Components

There are hundreds of types of metallic hardware pieces in our everyday life as we interact with different rooms and passageways in the buildings we roam. Many of these gems go unnoticed. Did you notice the feet on the re enamelled tub in the previous section?



Re enamelled foot bath detail © Marlene Manto



Reclaimed bucket sinks before and after cleaning

Hardware can be the design cornerstone of any room while also going unnoticed. Most commonly made with some kind of metal, hardware can range from legs and feet to hinges, door knobs and handles, and even decorative screws. All of which are in one way or another finished.



The chrome from this exterior door's hinge has been attacked by the elements



The chrome on these sink accessories has worn off from use, the underlying brass is visible and has gathered some patina as well

Sanitary accessories are most commonly made out of copper, brass, stainless steel, and zinc alloys, a chrome layer can be added for extra protection against corrosion. The insides of these hardware pieces are a combination of metals, and thus the surfaces tend to have equally varying results over time and after use.

While burnishing and polishing metal will produce a shiny surface, this can dull down over time if not maintained properly. However, "all that glitters is not gold." In today's world there is an affinity for the character of an object to be magnified, glorified and valued highly. The naturally occurring patina can be valued higher than a metal's burnished shiny state. Some designers may even have this in mind when creating objects.

This 1974 door pull handle by Jules Wabbes from the Generale de Banque headquarters in Brussels is now back on sale as one of the higher valued hardware objects at RotorDC, a salvage dealer specialised in contemporary materials. The patina of the surface you can admire is one of its most valued characteristics. Cleaning these of dirt and other unwanted residue must be done so with much care so as not to disturb the natural patina achieved simply over time. The bronze handles can be brought to a shining state through some vigorous yet soft scrubbing with an antique polish solution for brass. The thick paste serves as a soft yet powerful abrasive agent that removes any built up tarnish. However, a dull, visibly used pair of door handles is valued higher than a shiny pair. Soap and water are enough to clean but not restore brass or any other metal whose patina is desired.

On a more practical level there are chemical transformations some metals can go through to create a stronger, more resistant object. To prolong life and protect against rust, steel galvanising is a long practiced procedure to give steel a protective coating usually with zinc. The corrosion first occurs on the zinc coating and then starts attacking the main steel structure. This process can be re-done to reinforce steel once more. Chrome has also been used as a protective finish in metal hardware, while even trendier now is the black matte protective finish giving stainless steel accessories (especially in bathrooms) a neutral look to combine with other design aspects.



1974 Brass door pull by Jules Wabbes from the Generale de Banque headquarters in Brussels



4.

Maintenance and aesthetic value

Continued maintenance is key when intentionally erasing or magnifying traces of use. This is true for any new material, and especially true for good quality second hand materials and their continued use. The basic idea behind maintenance is to maintain an optimally usable material through a cycle of cleaning, or reapplying protective layers until the material is deemed unusable.

This aspect of materials is often overlooked as Hilary Sample highlights in *Maintenance Architecture* [2]. When a material is cared for properly, its quality cycles from new to used, then to like-new after a protective layer is added or a cleaning happens, then back to used and again to like-new after each cleaning or protection, refinishing or repair.

To better illustrate this cycle, refer to [Usus / Usures How things stand by Rotor](#) [3] which analyses wear as a material phenomenon and as an agent which can influence human behaviour. In it you will find among others, these clever and simple illustrations that show an object's life through various modes of use. These charts simplify the subtle differences between materiality and its decomposition, lifespan, and care.³

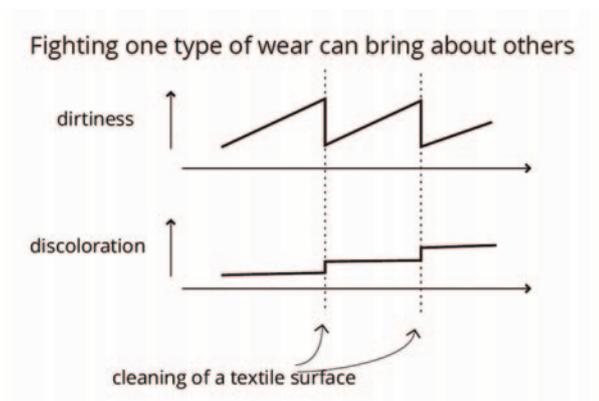


Chart from *Usus/Usures*, Rotor 2010

³ For more specific information about reclaimed materials, their use, their technical treatment and their availability, the FCRBE project published 40 technical sheets on common reclaimed materials (available on [Opalis.eu](#)).

In relation to environmental concerns, there has been a rise in trends to reuse, recycle, upcycle, and give “new life” to old objects and this has created an aesthetic in design, architecture and even in fashion. This aesthetic, when authentic, is beautiful and can really add an edge to a finished project. However, as it is intended to reduce the use of raw materials and manufacturing of new products, this trend does not sit well with production behemoths. Fake distressed materials are injected into the market and mixed with authentically reclaimed materials and products. Reducing the quality of the overall reclaimed aesthetic.

It is important to learn about material surfaces in order to better identify those that have been tested by time versus those tested by a machine or a “reuse look” maker. There are ways to develop a label system or processes to trace the history of a particular product or material. However, these systems of material tracking and reused products have a hard time to impose themselves in our consumption modes. It is currently up to reclaimed material resellers, service providers and legislators helping with the circulation of reclaimed products to give importance to reclaimed materials. The proper identification and use of such materials in new projects is key in helping make change in this system of mass production.

To conclude, there is much to be learned from a material, its surface, use history and intended use. How we decide to clean, protect, reuse and maintain a product will have its consequences. The choices we make with the products we use in our projects, our work and daily lives will continue to be stamped on the various surfaces we encounter. This short introduction could give you the extra nudge of curiosity to see just how far you can take a material surface, to recondition it to like-new status over and over again. There are plenty of resources out there to help you masterfully reclaim an old wooden floor, clean an otherwise unusable sink, or give new life to an old painted door by carefully removing its old crackling paint. Look for your local reclaimed material reseller, or look on [Salvoweb](#) or [Opalis](#) for one near you.

Bibliography and further references

[1] T. Warscheid, H. Leisen, Microbiological studies on stone deterioration and development of conservation measures at Angkor Wat, in *Biocolonization of Stone: Control and Preventive Methods*, Proceedings from the MCI Workshop Series, Vol. 2, eds Charola A. E., McNamara C., Koestler R. J. (Washington, DC: Smithsonian Institution Scholarly Press), 1–18, 2011

[2] H. Sample, *Maintenance architecture*, 2016

[3] Rotor (T. Boniver and al), A d'Hoop, B. Zitouni, *Usus/usures. Etat des lieux - How things stand*, Rotor asbl website, 2010

<http://rotordb.org/en/projects/usususures-etat-des-lieux-how-things-stand>

Spécifications techniques, Mapei website, consulted in 2020

<https://www.mapei.com/be/fr-be/outils-et-telechargements/specifications-techniques>

Pierre Naturelle : tous nos documents et nos outils à télécharger, Centre technique de matériaux naturels de construction, consulted in 2020

http://www.ctmnc.fr/pages/nos_documents_roc_a_telecharger.php

Anodizing, plating, powder coating and finishing answers, Homepage of the metal finishing website, consulted in 2020

<https://www.finishing.com>

AUTHOR

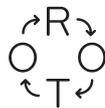
Emmanuel Cortés Garcia for Rotor (Belgium)

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