Refurbishment of the Grande Halle de Colombelles

Test the reuse of equipment and structural elements via the creation of a reuse batch

Image source: CSTB

- **Context:** the Grande Halle de Colombelles is the electrical workshop of Société Métallurgique de Normandie which, at its peak, employed 6,400 people and produced 4% of the nation's steel production. To retain a memory of this regional industrial activity, the building was conserved and refurbished. The objective was to transform a historical industrial building into an innovation hub that hosts economic stakeholders (start-ups, craftsmen) and cultural events.
- **The challenge**: promote the reuse of equipment as well as structural materials.
- **Location**: the Grande Halle offers 3,000 m² distributed between the large nave (1,100 m² of space and 12 m high under skylights, intended to receive exhibits, concerts, conferences, etc.) and the small nave with a surface area of 2,200 m² distributed over three levels, grouping together shared workshops, coworking on two levels, spaces for artistic residency, training, seminars, etc.
- **Reclaimed materials:** insulation materials, cast-iron and steel radiators, sanitary fittings, a fire door, wooden beams.

Contents

Chronology

September 2014: Call for tenders for a framework agreement for design. Reuse is not mentioned as an objective.

April 2015: Awarding of the design team contract. During the exchanges with the client and at the APS (preliminary outline project) stage, the selected bidder makes reuse a major issue of the rehabilitation project.

June 2017: Invitation to tenders for construction works contracts.

January 2018: Awarding of various batches including the reuse batch (€146,994 exc. tax to the association Le WIP).

The selected contractors of nine batches (« External works", "Deconstruction – Structural works - Structure - Metal framework - Concrete façade - Worksite installation", "Wooden framework", "Drywall - Plasterwork - Insulation - Suspended ceilings", "Interior Joinery - Layout - Wooden floors on beams", "Metalwork – Locksmithing", "Paint – Resin", "Plumbing - biomass heating – ventilation", "High-voltage and low-voltage electricity") propose variants that integrate reuse although reclaimed building materials have not been identified at this stage of the project.

October 2019: Handing over the keys to the operator and the occupant.

Why create a single reuse batch ?

Potential reclaimed building elements identified before the construction works contracts			
Stakeholders	Field	Potential materials	Comments
Networks and local associations	Eco-construction network, eco-materials, community construction projects	-	Valorisation of technique and ecological materials
Craftsmen	Locksmithing	Glazing	Work regularly on public building projects (replacing bay windows, etc.). Stock of glazing and other unused items (measurement errors, cancelled orders, etc.).
Demolition, renovation sites	Earthworks, Civil engineering	Sheet steel cladding to cover the temporary work site (about 60 m^2)	Glazing worksite at Ifs. After a reclamation audit, the capital gain associated with the selective dismantling of the reclaimed materials was estimated
Manufacturers, resellers	Glazing or joinery	External, internal joinery	Had 60 Bay windows 1x2m to be reclaimed in June – They were recontacted but did not answer again.

- No reclaimed building elements had been identified and qualified. Only potential sources had been located and mentioned in the DCE (tender file for contractors). This solution compensated for the absence of a local platform that would have stored materials.
- The contract was with separate trades. Asking each one of the selected companies to identify reclaimed building materials and to integrate them into the project, was bound to fail. The selected companies did not have enough knowledge of the reuse value chains and moving away from their traditional suppliers was too complex. From a scheduling and logistics standpoint, this seemed impossible.
- Reuse formally remains an uncommon practice and requires a specific approach.

Source: Normandie Aménagement

For more information: "Procurement strategies" Guide – FCRBE Project - Web access

Missions associated to the reuse batch

Nature du matériau	BOIS DE CHARPENTE - RÉSINEUX
Description	pannes et chevrons de 6 maisons 1920 et 7 extensions 1980
Dimensions	section 65 x 180 ou 80 x 230
Quantité sur sites	60 pannes
Quantité projet	160 poteaux 74x120x1200 et 60x60x3000
Quantité récupérée	21
Etat	BON
Localisation sur sites	charpentes RDC et R+1
Localisation projet	poteaux des garde-corps des balcons R+1 et R+2
Système de fixation	
Echantillon	OUI
Date de dépose / stockage	octobre / novembre 2018
Variante obligatoire prévue	OUI

One of the pages of the material sheet specifying the origin of the materials, the available quantities, the location on the deconstruction site and in the future project of la Grande Halle

Source: Le WIP / Encore Heureux architectes

The selected bidder of the reuse batch was the association the WIP created to manage the future Grande Halle. As the future manager of the premises, le WIP represented the client during the rehabilitation project.

The five missions of the selected bidder of the reuse batch

1. **Identify reclaimed building elements** on other worksites in progress located within 30 km. In fact, neighbouring buildings undergoing deconstruction and located within 5 km, were the source of reclaimed materials.

2. **Handle the logistics** of the materials identified and validated by the design team.

3. **Participate in the reconditioning** of the materials which had to be transformed to be compatible with the project design.

4. **Create a place to store the reconditioned materials**.

5. **Secure reuse by creating a reuse portfolio for insurers,** to guarantee traceability of the materials and equipment that were going to be reused.

Reuse actors: the design team and the building technical controller

La Cité de chantier, the place where the architects explain reuse methods to the construction companies that were discovering this practice.

Image source: CSTB

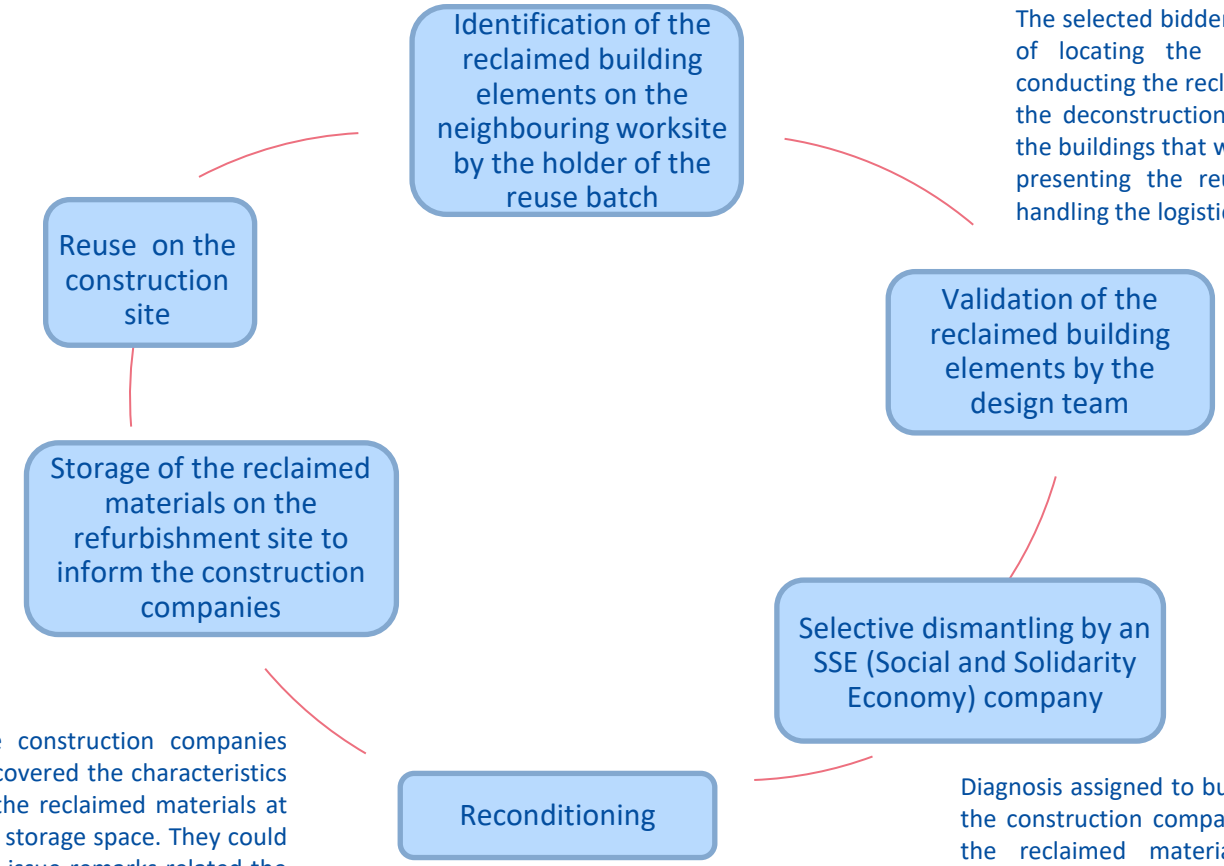
The architect initiated the creation of the reuse batch. He guided the companies by organising a « permanent architectural space". This space aims to explain the specificities of reuse to the companies, show them which materials would be reused and guide them to see how their usual practices would be modified. Finally, they had to exhibit great flexibility in revising their project and adapting it to the reclaimed building elements that were located and validated

The design office had a transversal mission to support the architects. It provided its environmental expertise, coordinated the engineering team and handled the technical follow-up for the works.

The building technical controller had an additional mission. Indeed, the client wanted him to participate in the process of validating the identified reclaimed building materials and to give his formal opinion on the quality of these materials. His report was added to the reuse portfolio sent to the insurer.

The process of controlling technical-insurance risks

1/ Get organised in order to guarantee traceability of the materials



The selected bidder of the reuse batch is in charge of locating the reclaimed building elements, conducting the reclamation audit, negotiating with the deconstruction companies and the clients of the buildings that were going to be deconstructed, presenting the reuse portfolio to the insurers, handling the logistics of the project site.

The design office and the architect validate the materials by following two criteria: the available quantities and the quality. Materials of quality but in low quantities were rarely retained. It seemed preferable to wait and hope for opportunities offered by another deconstruction site.

Diagnosis assigned to building technical controller and more often to the construction company who is awarded the batch concerned by the reclaimed materials. This approach guarantees that the dismantling and transport do not lead to the degradation of the reclaimed materials. When the construction company was not in charge of the dismantling, it could still formulate recommendations.

The construction companies discovered the characteristics of the reclaimed materials at the storage space. They could still issue remarks related the specificities of installation.

2/ The reuse portfolio for insurers (1)

VALORISATION

Étapes de reconditionnement

Avant tout transport, les radiateurs sont conditionnés sur palettes, par taille, avec planche intermédiaire pour éviter tout choc
En attente de leur enlèvement par le prestataire

PRESTATION DE RÉNOVATION

- démontage des bouchons et purges
- décapage chimique par bain
- nettoyage intérieur haute pression /désembouage
- sablage fin / aérogommage ou grenaillage pour éliminer graisses et résidus de peinture
- séchage étuve
- 2 couches de vernis mat
- protection et emballage individuel
- transport sur site
- PV de traitement

Société retenue pour réaliser ces prestations
SPIRAL, Ouistreham

Après valorisation par la société Spiral en concertation avec l'entreprise Courtin qui réalise la pose des radiateurs, il a été conclu que le Lot 1 fournit :

- kit de bouchonnage
- purge 15/21
- pied et console de fixation

L'entreprise Courtin fournit les robinets thermostatiques.

A page of the reuse technical file specifying the conditions for reconditioning radiators (Source: Le WIP / Encore Heureux architectes)

For each reclaimed building materials, a file comprising three documents was compiled:

- **A letter from the building technical controller** who explained that based on its competences and its observation, the reclaimed building materials were of quality and could be integrated into a new project. In certain cases, additional tests were conducted by an engineering School in Caen.
- A **similar letter from the installation company** that was concerned by the reclaimed building material.
- An **execution file** ("the reuse technical file") that concerned the material sheets. This dossier was the equivalent of technical sheets for new products.

2/ The reuse portfolio for insurers (2)

- The insurers were contacted right from the study phase by the design office and the building inspector. The objective was to present the project and particularly the reuse approach so that it would be understood and validated.
- For each reclaimed building material, a systematic approach was adopted. The objective was to qualify the process and the reuse methodology in order to demonstrate to the insurers that reclaimed building materials did not entail more risk than new products. The opinion of the experts (primarily the building inspector and the design office) and the file that provided information on the origin of the materials and details on how they would be implemented, convinced the insurer.

For more information: FutuREuse - Evaluating the technical performance of reclaimed building materials – CSTC, CSTB, FCRBE – 2023 - Web access

A methodology for evaluating performance in 4 steps, is proposed:

1) Identifying the technical requirements to be assessed in light of the intended use and the reuse potential of the reclaimed material.
2) Gathering relevant information on the material.
3) Defining the level of confidence needed and determining the evaluation methods of the required technical performances of the material.
4) Evaluate the technical performances of the reclaimed material.

3/ Reuse Case: Insulation Material

Image source: Le WIP / Encore Heureux architectes

- The insulation materials originated from two recently constructed buildings that were going to be deconstructed following a problem of swelling pollutants that had weakened the structure.
- A material sheet characterising the reclaimed product was developed in order to ensure its traceability. It presents information related to its location in the original building, the quantity available on the site, the percentage reclaimed, its quality, the date of dismantling.
- After removal, the design office and the building technical controller gave a favourable opinion on the quality of the products
- Laboratory tests were conducted by ESITC (Ecole Supérieure d'Ingénieurs des Travaux de la Construction of Caen) using samples in order to demonstrate that neither the use of the insultation materials nor the selective dismantling had altered the qualities of the product. The aging tests covered the following values:
  1) Sound absorption
  2) Thermal conductivity
  3) Resistance to humidity (sorption/desorption)
  4) Density and sizing.
- These elements satisfied the insurer who considered that the performance of the insulation materials was proved.

4/ Reuse Case: Radiators

Image source: Le WIP / Encore Heureux architectes

- The plumbing company cut out water circulations for two office buildings that were going to be deconstructed.
- The SSE (Social and Solidarity Economy company) did the removing, conditioned the radiators on pallets to transport them to the site of a local company specialised in reconditioning radiators.
- The reconditioning of the radiators followed a process in several steps: stripping by water-blasting, blowing the dust with high-pressure compressed air, application of a rustproofing primer coat, application of two finishing coats of paint, drying in the oven. To be protected during the transport to la Grande Halle and during storage, each radiator was wrapped.
- On the site of la Grande Halle, le WIP provided capping kit and the fastening brackets of the radiators.
- The construction company selected for the "Plumbing, biomass heating, ventilation" batch provided the thermostatic valves. It was also in charge of installing the radiators.
- As for the insulation materials, a material sheet of the product specifying the origin of the material, the dismantling and reconditioning procedures, was developed in order to prove to the insurers that the reconditioned material was still performant.

5/ Reuse Case: Wooden Beams

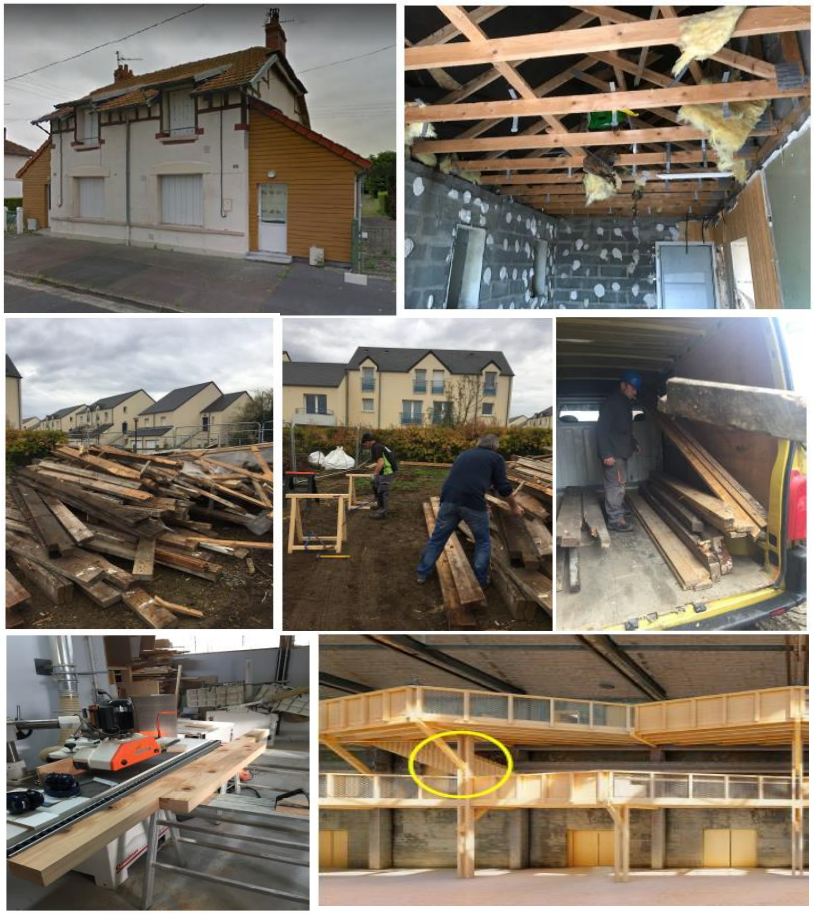


Image source: Le WIP / Encore Heureux architectes

- The reclaimed wooden beams came from the deconstruction of 34 social housing units located in Caen.
- The materials were approved by the design team and the architect reviewed his initial design.
- Before dismantling, the company awarded the "external joinery" batch, formulated its requirements and provided advice on dismantling framework elements (rafters, beams and trusses) to the company in charge of deconstructing the 34 housing units.
- Once the beams were dismantled, the SSE (Social and Solidarity Economy company) removed the nails.
- The company that held the "joinery" batch planed, polished and chamfered the beams in order to transform them into posts for the protective railings of the balconies and integrate them into the architectural project.

6/ Reuse Case: The Fire Door

A specific approach was followed for the fire door. The building technical controller indicated as an expert that reuse would not generate any further risk. It was first necessary to prove that the door was indeed a fire door before creating a new fire door. Finally, a compensatory measure was taken: smoke detectors were added.

Problems encountered

- The candidates to the nine batches potentially affected by the reclaimed building materials, were requested to propose a variant bid :
    - The first response based on the unaltered specification, concerned a conventional project without reclaimed material. The candidates had to quote a basic price for the supply and installation of new material;
    - The variant price only concerned the installation of material.

    No company proposed a coefficient that would increase the variant price. According to the design team, construction companies thought that business would be done as usual with no reclaimed building material. Therefore, they did not change the calculation of costs for this project.
- The plumbing company, which was directly affected because most of the radiators were reclaimed, immediately doubted the quality of the reconditioned radiators. When these radiators were brought into the construction site, it asked to see the "real" reclaimed radiators.
- The construction companies did not understand why the client preferred to install reclaimed materials while new and cheaper materials were available on the market.

Assessment

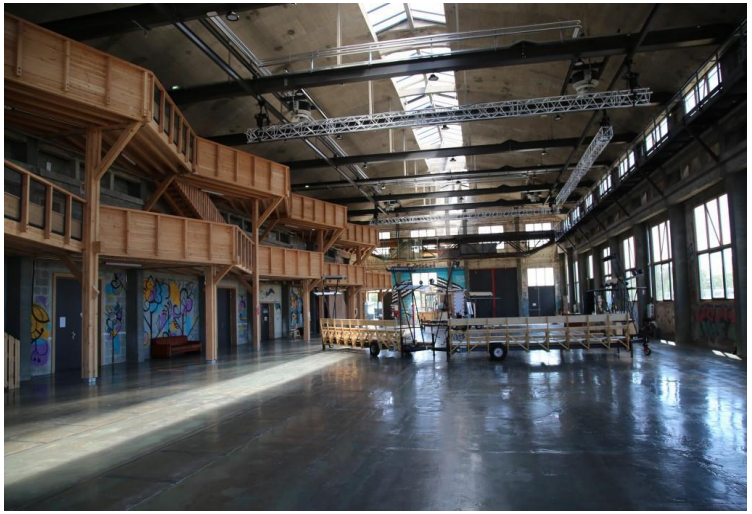


Image source: CSTB

The reclaimed building materials encompassed:

- 430 m² of insulation in very good condition (rock wool);
- 29 cast-iron radiators;
- 30 steel radiators;
- 21 pieces of wood sized 74x120x1200 designed for the protective railings of the balconies F+1 and F+2. They were made from reclaimed wooden posts
- 45 pieces of wood sized 60x90x1400 reused for the construction of a staircase;
- 20 sanitary fittings (all the site's hand basins are reclaimed)
- 50 solid wooden doors of which two fire doors.

Conclusion on good practices related to insurance

The refurbishment of the Grande Halle de Colombelles project is a pioneering project in terms of reuse. A process in several steps was defined from the preparation of the call for tenders to the termination of the refurbishment project in order to lift and control the risks associated with the absence of documentation and information on reclaimed materials. These actions avoided to pay extra insurance premiums :

- The creation of a single reuse batch structured all the approaches and helped assessing the suitability of the materials for use. This facilitated the control of the logistics chain from identifying the source of the reclaimed materials, to dismantling, transportation, cleaning, reparation and storage.
- The creation of a reuse portfolio for insurers (equivalent to technical sheets for new products) gathering information on the reclaimed materials (domain of use and function in the first lifetime) guaranteed the reliability of the transmitted information
- A methodology to evaluate the technical performances of the reclaimed materials was established. Co-written and validated by the reuse actors (the client, the contractors, the selected bidder of the reuse batch, the building technical controller, the insurance), it allowed for a reasonable distribution of responsibilities.
- The process adopted to qualify reclaimed materials was largely based on the competence of recognised experts. The design office, the architect and the technical controller worked together to justify the fitness for use of reclaimed materials. Their judgement was based on their experience, the available documentation and complementary tests to evaluate the required technical performances of the materials. The aim was to demonstrate that the reclaimed materials presented suitable characteristics for meeting the needs of the intended use and that they were not more risky than new ones.
- The creation of a "permanent architectural space" aimed to expose reclaimed materials and to explain to construction companies the specificities of reclaimed materials, contributed to secure the practices.
- The role of the building technical controller was expanded. It participated in the process of validating the compliance of identified reclaimed building materials. His opinion was integrated to the reuse portfolio forwarded to the insurer.

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