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# Rotor – Entangled Matter

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**Abstract** This visual essay showcases material from an exhibition displayed in Brussels in autumn 2024. The exhibition featured films created for the occasion by Bêka & Lemoine, as well as exhibits borrowed from the collections of Rotor, a Brussels-based collective research and design practice. These movies and objects were accompanied by wall texts and captions, which are reproduced here in an adapted version. The exhibition presented sites where materials are produced, transformed, reused or disposed of within a 200 km radius of Brussels. It addressed the complexity that characterises the organisation of material flows in the current economy. The stills from Bêka & Lemoine's films and Rotor's texts intertwined to create narratives that address various issues, such as the scale of industrial activity, the relationship to work, the role of machines, waste management and the impact of material movement on the landscape.

**Keywords** Waste. Salvage. Reuse. Material flows. Spoil tip. Quarry. Mining. Underground. Entanglement.

**Summary** 1 Introduction. – 2 The Becoming and the Unbecoming of Waste. – 3 The Wealth of the Underground. – 4 When a Quarry Exploitation Transforms into Salvage Centre.

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## 1 Introduction

In autumn 2024, the journal *A+ Architecture in Belgium* and the arts house Bozar presented the exhibition *Entangled Matter*, in which the Brussels-based non-profit organisation Rotor reflected critically on its practice. Rotor is a cooperative design practice that investigates the organisation of the material environment. It develops critical positions through research and design. Besides projects in architecture and interior design, Rotor also produces exhibitions, books, economic models and policy proposals.

The exhibition was built around a series of nine films commissioned from the film duo Bêka & Lemoine. Entitled *Transmutation*, the series dialogues with objects from Rotor's collections (images, material samples, publications, archives, etc.).

The exhibition presented sites where materials are produced, transformed, (re)used or disposed of, in a radius of 200 km around Brussels. This approach is in line with Rotor's aim to better understand how material flows are organised today: where do goods come from, how they are produced, how they are disposed of and where they usually end up. Most of these flows start from some sort of underground 'reservoir', where 'raw materials' are extracted to produce goods, and tend to end up there too, in various types of landfill. It is what happens in between that interests us the most. Some material pathways can be highly complex, with multiple passages to and from the subsurface, but also dispersal into the atmosphere (usually through a combustion process) and into the landscape. Although we like our exhibitions to be descriptive, evocative and largely open to interpretation, our practice aims to reshape some of these pathways and the models on which they are based, to make them less damaging to the web of life on Earth. Keeping existing goods in circulation through subsequent reuse cycles is one possible strategy to do this. Since its inception, Rotor has played a key role in promoting reuse through diverse activities, such as launching a salvage company in Brussels, helping various building professionals adopt reuse, developing diverse solutions to facilitate reuse, and encouraging public authorities to adapt regulatory frameworks to encourage reuse. Taking a step back from these operational missions, the exhibition highlighted the value – but also the limitations – of efforts by Rotor and others to promote alternative ways of circulating materials, particularly through various forms of reuse.

The films and the artifacts on display spoke to the complexity that characterises the organisation of material flows in the current economy. They weave together entangled narratives that address broader issues: the scale of industrial activity, the relationship to work, the impact on the landscape of the movement of materials, waste management, the changes brought about by climate change,

the role of citizens' initiatives and the possible trajectories of infrastructure conversion.

What follows is a selection of three from the nine sites on display in the exhibition. They specifically highlight aspects of the relationship between the industrial process and the underground – both as a source of 'raw materials' and as a destination for various types of waste.

## 2 The Becoming and the Unbecoming of Waste

Discarded elements – post-consumer waste, surplus materials, leftovers, 'excreta', etc. – are the inevitable counterpart of production and consumption. However, 'discarded' is not a fixed identity. Waste can be reintroduced into industrial processes when the context changes – e.g. technological developments, price fluctuations, changing standards, etc. – and when it meets industrial characteristics – e.g. large quantities, concentrated reservoirs, predictable characteristics, etc. These practices are as old as industry itself.

The Carabinier mine was located in the heart of the Belgian coal region around Charleroi. It was exploited between 1918 and 1955. The fraction of shale with too low a coal content was dumped on the surface and in the former clay pits left behind by a previous brickmaking activity, gradually forming the spoil tips so typical of coal mining areas. During its years of exploitation, the Carabinier mine produced two spoil tips called Terril n°1 du Carabinier and Terril n°2 du Carabinier. Today, it is the latter that is being exploited.

Black shale can still contain between 5 and 15 per cent of coal, probably considered too low a density when richer veins were easily accessible, but not negligible either, especially as energy prices rise. It is commonly used for its energetic power. Red shale is the result of a phenomenon called subterranean combustion. The complex combination of water, oxygen and iron sulphide can provoke exothermic reactions that burn the remaining coal. The shale then takes on a beautiful reddish hue. It is commonly used in the ceramics industry, to make bricks and tiles, for instance.


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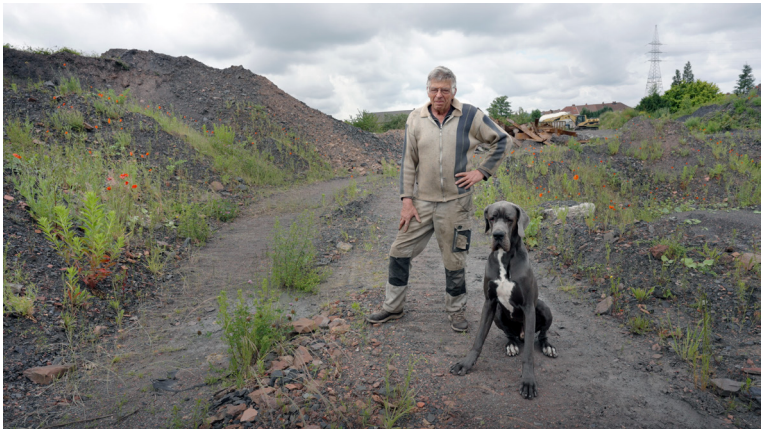

**Figure 1** The owner of a company that recovers shale from a former spoil tip

**Figure 2** Two workers repairing a sieving machine


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**Figure 3** View on the different machines used for processing black and red shale

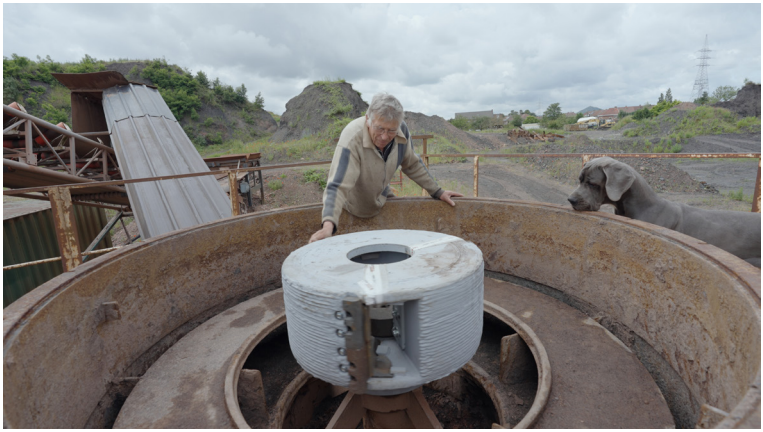

**Figure 4** The owner of the company is showing the central piece of an industrial crusher


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**Figure 5** View on the conveyor belts used for processing shale

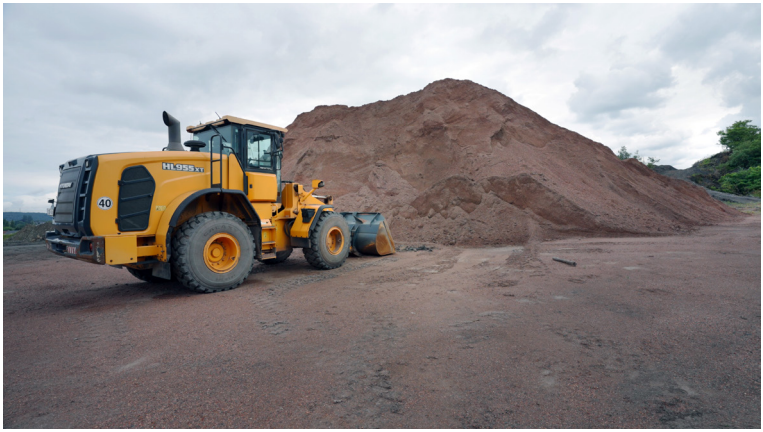


**Figure 6** Processed red shale, ready for pick-up

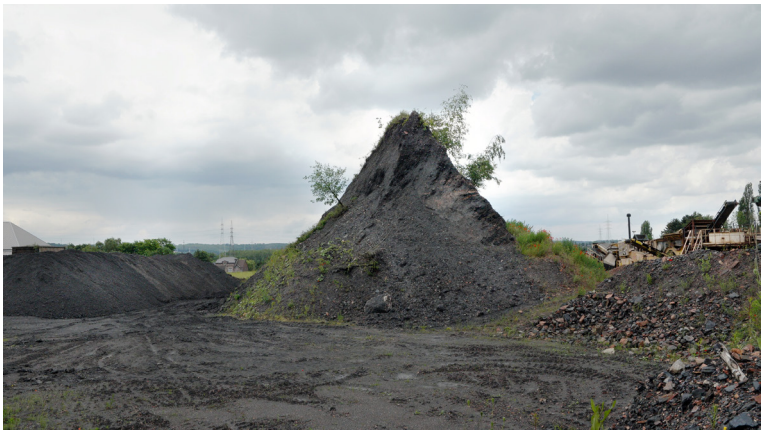

**Figure 7** Black shale from the spoil tip

**Figure 8** Pile of red shale

The extraction of black and red coal shale from the Terril n°2 du Carabinier has been carried out since 1988 by a local family business, Immobilière du Terril De Pont-de-Loup Sc. Their activity consists mainly in excavating the spoil tip, sorting the shale, sieving it, crushing it and re-sieving it to obtain granulates with the desired dimensions and characteristics. Extraction can only take place when the weather is fine and the spoil tip is relatively dry. It is then that they build up stocks to sell during winter. A very large part of the original spoil tip has been processed over the last four decades.

In less than a century, the village of Pont-de-Loup has seen a small mountain, almost 120 metres high, form and erode at an accelerated rate! First, the industry dug into the soil to extract clay. The resulting holes were then filled with waste from underground mining activities. This waste was so abundant that it formed high mounds across the landscape. These mounds were then recognised as potential reservoirs of resources. Exploiting them transformed this stock of sediment into a flow of industrial resources that end up in various types of product, some of which, like concrete, will return below the surface of the ground for foundation or filling work. The industry terraforms the topography of the landscape, and the limit between what is above and below ground shifts with it.

## 3 The Wealth of the Underground

The exploitation of subterranean wealth relies on the 'work' of biogeological forces that shape a wide range of materials, from the most mundane to the most precious. Since the Renaissance, the subsoil has increasingly been seen as an inert reservoir of exploitable resources. Although it still prevails in industry and public policies, this view is being challenged in favour of a more cautious approach to the complex nature of the underground.

The last underground quarry in Belgium is located in Golzinne, in the province of Namur, where the Mazy black marble is extracted, world famous for its incredibly fine grain. The quarry has been owned by the Merbes-Sprimont company since 1928. On average, 250 $m^3$ of rock is extracted annually from the quarry, of which 10 to 15 per cent can be sold after processing. This amounts to around 800 tonnes. In the stone industry, where large volumes of soil and rock have to be moved to get to the commercially viable part, these fractions are quite common.

Some traces on the walls of the quarry testify to earlier phases of extraction, with marks left by hammers, drills and other early mining equipment. The quarry follows the approximately three-metre-high stratum of marble. This bank emerges at the surface, where an open-cast quarry was originally exploited. It then sinks into the ground at an incline of almost 30 per cent. Continuously operating water pumps have allowed the quarry to be dug down to a depth of 90 metres. A large, semi-automatic chainsaw machine is now used to excavate and cut the blocks, following a room and pillar principle, when some parts of the stratum are left untouched and serve as pillars supporting the overburden.

**Figure 9** View of the room and pillar system in the underground quarry of black marble

**Figure 10** The automated saw used to cut the blocks of black marble


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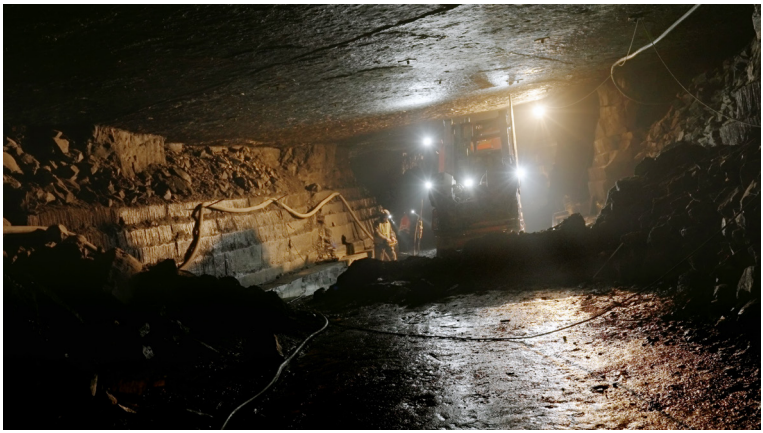

**Figure 11** Working to extract blocks of black marble

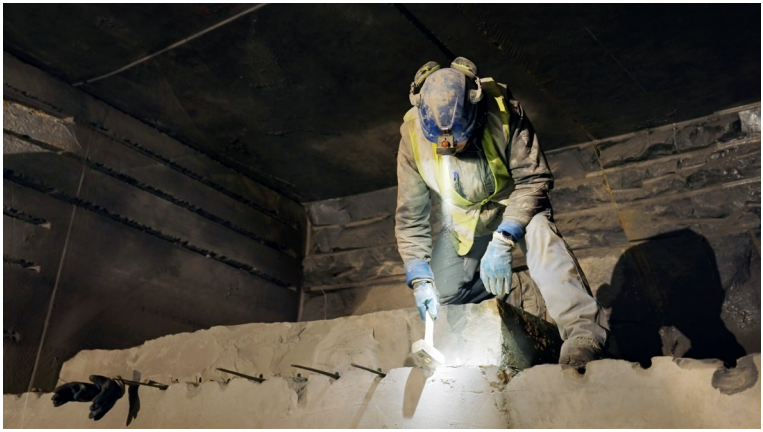

**Figure 12** Use of wedges to detach a block of black marble

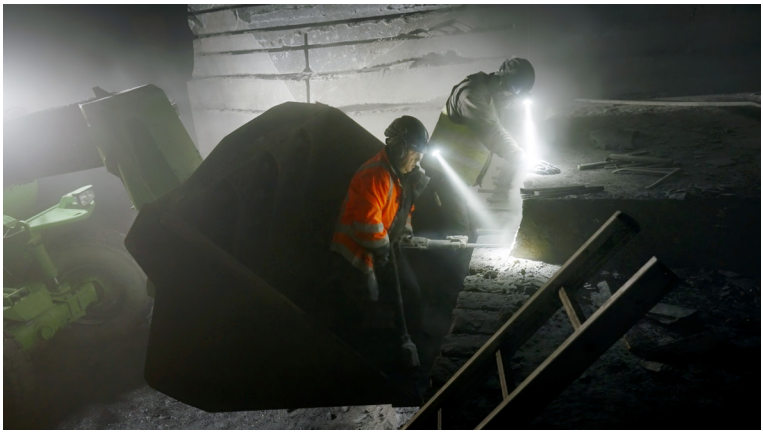

**Figure 13** Drilling holes to detach a block of black marble

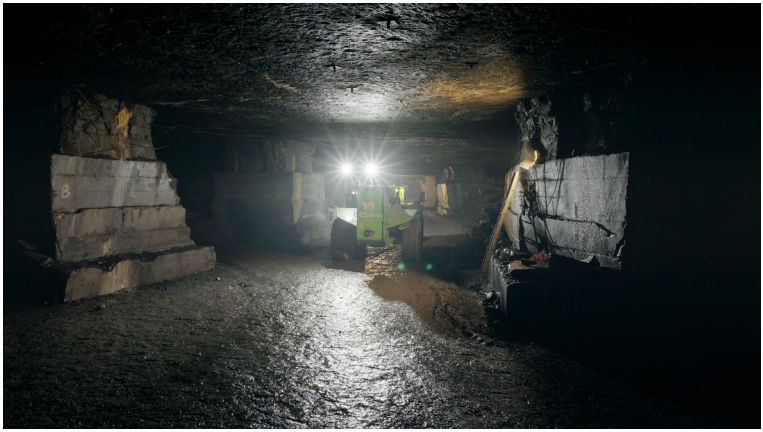

**Figure 14** The bulldozer is used for moving blocks and many other tasks

**Figure 15** View of a room where black marble blocks are extracted

**Figure 16** Workers of the underground quarry


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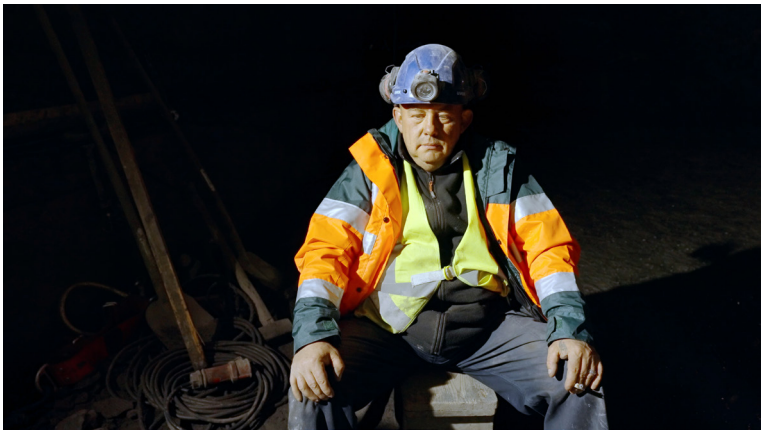

**Figure 17** Worker of the underground quarry

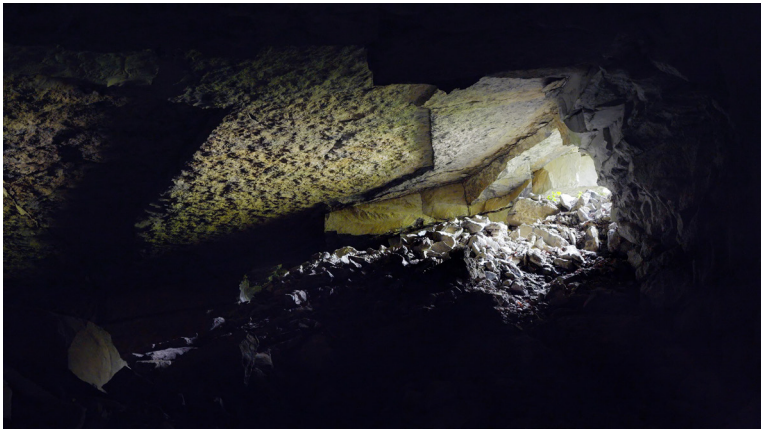

**Figure 18** One of the exits of the underground quarry


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**Figure 19** The main exit of the underground quarry

Only four people are currently involved in the extraction of the rock and its subsequent processing into blocks. Despite the company's best efforts to make work easier and to maintain the highest safety standards, working conditions underground remain difficult. The company is struggling to recruit staff. The concession granted to Merbes-Sprimont covers 120 hectares, of which only four are currently being exploited. The rate of exploitation depends on many factors, but mainly they do not want to extract more than is absolutely necessary to meet market demand.

The profitability of the operation is due to the Mazy marble's unique aesthetic. It has often been used above ground in prestigious projects that take advantage of its unique surface – from the Palace of Versailles to the very building where the Entangled Matter exhibition took place, Victor Horta's Centre for Fine Arts in Brussels. Today, it is much sought after for the restoration of historical monuments but also for contemporary design projects. It is not uncommon to find small batches of this marble on the reclamation market, where its high cultural and economic value almost always justifies its salvage.

## 4 When a Quarry Exploitation Transforms into Salvage Centre

The salvage of building materials for reuse follows a different logic from that of industrial production and waste management. Materials typically come from many small, dispersed sources. They require specific spaces, logistics, skills and know-how to collect, store and process. Salvage practices show a rich gradient between purely artisanal models and more pronounced forms of industrialization. Overall, they provide useful tools for rethinking how to engage with materials.

**Figure 20** Heaps of reclaimed cobblestones

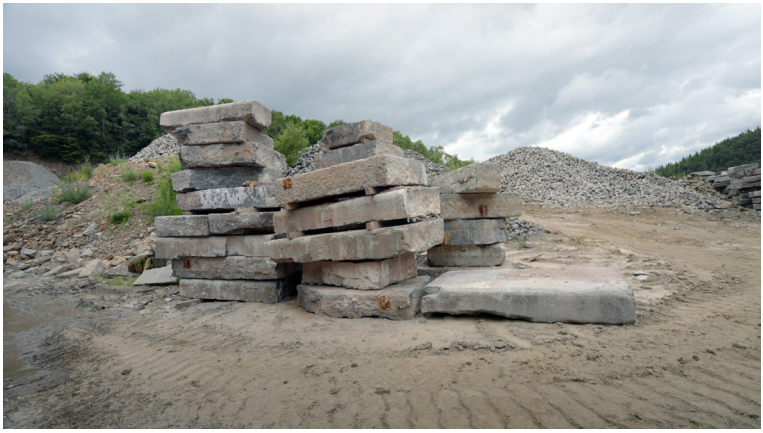

**Figure 21** Blocks of stone reclaimed from maritime infrastructure


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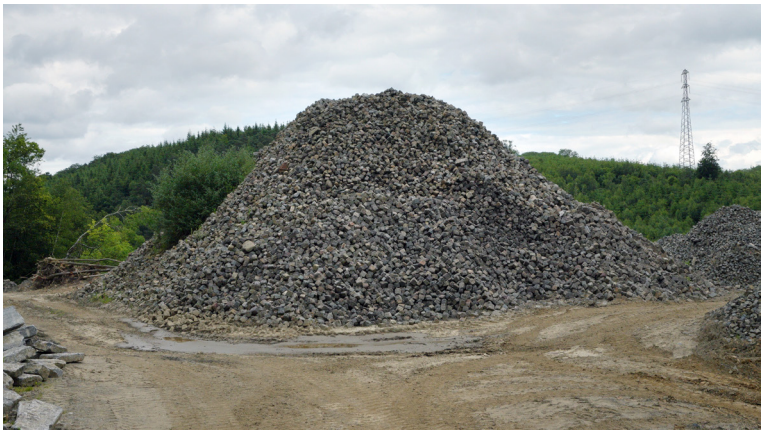

**Figure 22** Reclaimed cobblestone stored in a sandstone quarry

**Figure 23** An operator of the cleaving machine that cuts rubble stone to size


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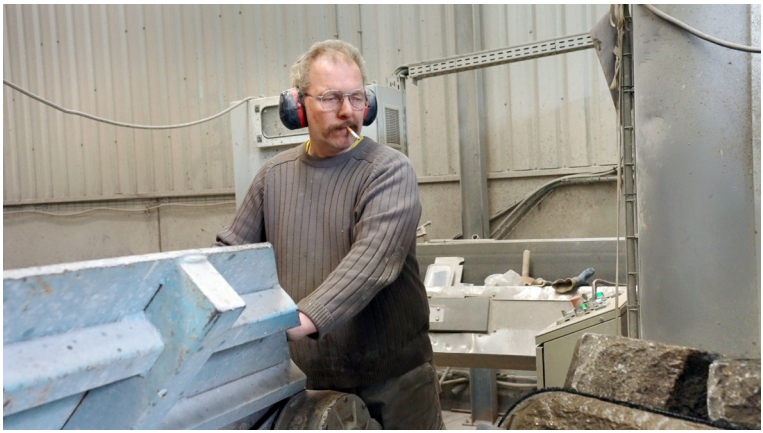

**Figure 24** An operator of the cutting machine that is used to process reclaimed stone blocks

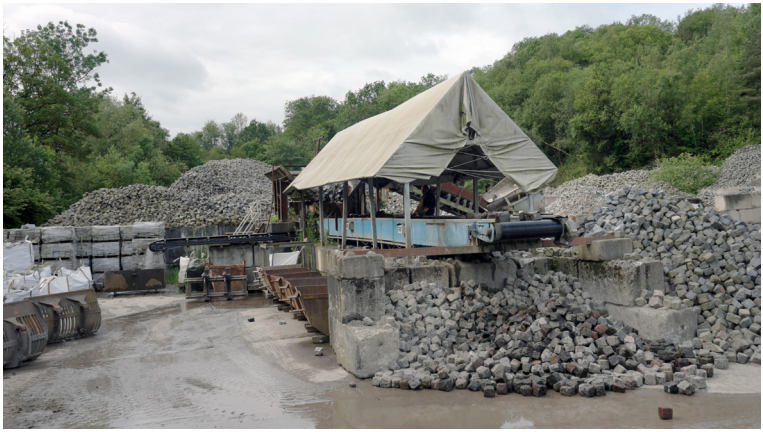

**Figure 25** Conveyor belt used to sort salvaged paving elements according to type and dimensions

Carrière de la Hazotte is a family business that sells paving materials. Some of its stock is new material fresh from their quarry, but much of it are materials reclaimed from roadworks. As the company name suggests, it was originally a sandstone quarry. Although the quarry is still operational, it is now mainly occupied by heaps of paving stones salvaged from towns and cities in a radius of around 200 kilometres from the quarry's location.

This combination of extraction and salvage is not new for this business. The current owners, the Verhoeven family, bought the quarry in 1968. At the time, it was producing stone aggregates at full capacity, mainly for use in the construction of surface infrastructure

such as motorways and roads. However, this flow was suddenly curtailed by the 1973 oil crisis and the subsequent stop of roadworks (which needed oil not only for the various engine-driven machines but also for asphalt production). Mr. Verhoeven senior quickly had to look for other sources of income. He found them in the salvage and sale of various building materials.

Gradually, the company has focused on reclaimed pavement materials, where it has developed solid expertise. A stonemason works part-time for the company, re-cutting blocks from stones that are salvaged here and there. Over the years, the company has acquired a range of machinery to process the materials, new and reclaimed alike.

Salvaging, processing and sorting these inherently robust materials is often quick and easy (provided the correct equipment is available). However, their reuse potential is widely ignored in public tenders which prioritize the speed of roadworks, or even explicitly excluding reuse altogether. As a result, the local supply of salvaged pavement materials has been declining for some time in Belgium. Furthermore, specialized companies sometimes have to export to other continents. Competition from cheap new materials quarried in regions where labour is much less costly or from concrete paving often limits the sale of salvaged elements to specific applications where their rustic appearance is of value.

## References

One of the rooms on the exhibition circuit showcased a selection of books that were used for the project. This installation was designed to provide references on the different topics covered in the exhibition, as well as offering opportunities for further reflection. Although the present essay does not adopt the format of a more conventional scientific contribution, it seemed useful to reproduce the list of books that were on display.

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