Factsheet

A1 Westautobahn

resource-efficient road rehabilitation

STRABAG is rehabilitating the A1 Westautobahn motorway in Austria for ASFINAG with a high proportion of recycled asphalt.

The careful use of resources is becoming increasingly important in today's construction industry to ensure a more sustainable future. STRABAG is therefore making greater use of asphalt recycling in road construction: the asphalt mix used should contain a high proportion of recycled material. In comparison to the technical standards, the proportion of recycled material used on the Westautobahn is significantly higher. The company has also used an innovative 3D rehabilitation model to preserve as much of the old road material as possible – a first in Austria.

As much recycled asphalt as possible

The aim of asphalt recycling is to use as much old asphalt as possible – that is, as much as is sustainable and legally permissible based on experience. In some projects, it is possible to use higher rates than usual with the consent of the client. On the A1 Westautobahn at the Steinhäusl junction in Austria, which STRABAG is renewing for ASFINAG, the construction team has rebuilt an eight-kilometre section of motorway in several stages. STRABAG is using an asphalt mix in the base layer that consists of 40 percent recycled milling material. Normally, only 20 percent would be used on highways as part of the high-traffic road network. Twenty percent of recycled material is incorporated into the binder layer, while only new material is applied in the surface course – which is a standard practice on highways.

The project demonstrates that it is possible to rehabilitate a road without sacrificing quality by adding recycled asphalt. With 74,000 vehicles driving on it every day, many of them trucks, the A1 is a very busy road. The recycled mix for the road comes from asphalt mixing plants in St. Pölten and Hausleiten. The asphalt from the old road that has been removed is also processed and used in another project. The Hausleiten mixing plant is state-of-the-art and, from a technical point of view, could produce 100 percent asphalt mix from reclaimed asphalt. In practice, however, a maximum of 70 percent recycled material is added and only used for mixtures that are laid on roads in the so-called lower network, such as municipal roads. These are subject to less demanding quality requirements than heavily trafficked roads such as motorways.

Cover: The mixture on the A1 contains a high proportion of recycled asphalt. /
1 The STRABAG asphalt mixing plant in Hausleiten is very modern. /
2 For Axel Thomaschütz (STRABAG AG Austria), asphalt recycling is a key to making road construction more sustainable. © Sebastian Sieberer

Cost benefits for the client

The STRABAG team used approximately 94,000 tons of recycled material out of a total of 114,000 tons of asphalt mix on the A1. Of this, 24,800 tons is pure reclaimed asphalt.

The project shows that the reuse of asphalt is not only an effective way to conserve resources and reduce CO_2 emissions, but also to reduce the costs of purchasing new materials. Recycling reduces the need for rock and bitumen. For environmental and climate protection reasons, the use of bitumen, being a fossil raw material, should be avoided. It is also expensive – the chemical treatment to turn hardened bitumen back into liquid bitumen is considerably cheaper. STRABAG was able to fulfill the contract for ASFINAG at a lower cost while maintaining the same quality.

> To achieve an even higher recycling rate, everyone must work together – both the planners and the contractors. In addition,the standards, regulations and requirements must be adapted accordingly.

Axel Thomaschütz
Member of the Management Board
STRABAG AG Austria

On average in Austria, around 10 percent of the asphalt material for the surface course, up to 25 per cent for the binder course and up to 40 percent for the base course is recycled in asphalt mixing plants. However, the rates are lower for motorways: usually no recycled asphalt is used in the surface course and only 20 percent is used in the base course.

Innovative scanning method for better resource efficiency

Prior to construction, a mobile laser scanner was used to create a detailed surface map of the road for planning purposes. The resulting design was digitally transmitted to a 3D milling machine, which was then able to precisely mill the surface of the A1 – only removing as much as was necessary. Over a length of three kilometers, the existing concrete surface was broken up and milled down to the base asphalt layers. This new surface was then precisely measured using a terrestrial laser scanner. The Austrian STRABAG project team used a 3D asphalt paver in this area for the first time.

3 The mix for the A1's base layer contains 40 percent recycled asphalt – significantly more than usual. © Sebastian Sieberer

3D asphalt paver with BIM software

The project team used BIM software to transfer the collected data to the 3D asphalt paver and to variably incorporate a so-called profiling layer, which serves as the foundation for the other asphalt layers. The milled section was then filled to create a smooth surface. A mixture with 20 percent recycled content was used. The process is not only fast, but also provides a complete overview of the entire section in advance. The precise removal and application of the material on the A1 saved important resources and prepared the surface individually for the subsequent road layers with recycled asphalt.

In some parts of Austria, recycled asphalt is still considered a waste product. This has to change. Our research ensures that mixtures with a high proportion of recycled materials are of the same quality as new asphalt.

Maximilian Weixlbaum
Managing Director
TPA Austria

Two recycling approaches in Austria

The higher the proportion of recycled asphalt debris, the more closely the granulate, filler content and aggregate quality must be monitored. Additional tests are mandatory from a recycling rate of 25 percent. In Austria, two alternative standard specifications for asphalt recycling are generally used in mix production: the empirical method and the behavior-based approach. The empirical approach is based on a standard recipe that has no direct relation to the behavior of the mix but is based on specifications that have proven effective in terms of composition.

Theoretically, the behavior-based approach allows for significantly higher recycling rates: here, the mix for the road section is individually composed using complex tests. However, important empirical data for high recycling rates is lacking, especially regarding the question of how asphalt quality develops over the years of road use. Asphalt pavements with recycled content are usually subject to strict quality controls, which are carried out at close intervals and over a long period of time after installation. This includes checking the surface grip and the strength of the layers. If imperfections such as cracks or wheel traces are detected, the construction company is required to repair them or even replace entire layers.

4 In the laboratory, the mixture with recycled asphalt is subjected to thorough testing. © Sebastian Sieberer

Cooperation for higher rates

In order to establish higher recycling rates in the long term, bids must be designed accordingly. STRABAG and ASFINAG are working in partnership to achieve higher rates. A change in thinking in the industry could be promoted in the long term by increasing the legally permitted rates for asphalt recycling in Austria. Roads and even footpaths at the municipal level could be built with up to 70 percent recycled asphalt.

Holistic resource conservation

Especially on highways, more reclaimed asphalt could be used in the lower road layers, since the base course itself makes up a large part of the road. At the same time, new methods and equipment, such as the 3D paver, can be used to remove old material with great precision and automatically apply recycled asphalt. This approach not only preserves essential resources but also ensures the optimal utilisation of materials.

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