

# The flexible elastomer modifier for bitumen and asphalt

- *Proven technology, millions of m<sup>2</sup> paved*
- *Applicable in both wet and dry processes*
- *Easy to work with*
- *Durable and long lasting roads*
- *Ideal for noise reduction*
- *Environmentally and climate friendly*

**ROAD+**  
...longer lasting roads

# Cost-efficient and environmentally friendly

## *High demand for virgin polymers*

The use of polymer-modified asphalt and bitumen has been increasing steeply for more than two decades. Pressure on public road budgets has led to an intense focus on maintenance costs, and the marginal extra cost of using polymer-modified asphalt and bitumen has proved to be justified by huge savings on maintenance budgets.

The superior properties of polymer-modified asphalt and bitumen, e.g. the resistance to rutting and cracking, have led to an increased consumption of virgin polymers like SBS (styrene-butadiene-styrene).

However, the increased demand for these virgin polymers, not only for road asphalt and bitumen, but also for other industrial purposes, has led to generally much higher and more volatile world market prices and unstable supplies.

## *Substitute virgin polymers with Road+*

It was therefore a major technological and economical breakthrough when Road+ was launched as a green alternative to virgin polymer modifiers. The main component in Road+ is high quality rubber powder from Genan, which together with Vestenamer substitutes the virgin polymers. In contrast to virgin polymers, supplies and prices are secure and stable, and the avoidance of virgin polymer production means considerable climate benefits.

## *Far superior to earlier rubber asphalts*

The characteristics of Road+ cannot be compared with those of earlier rubber asphalts. The addition of Vestenamer® in the process developed by Evonik makes a crucial difference, as it creates cross-linking between the bitumen and the rubber particles and acts as a dispersant to form a homogenous blend.

## *The new generation of elastomer asphalts*

Properties associated with resistance of rutting and cracking equal or exceed those of virgin polymer modifiers. Because of the addition of Vestenamer®, Road+ does not generate the emissions commonly found in earlier forms of rubber asphalt, and it prevents migration of organic compounds into the ground water. Road+ has superior dispersing properties which make it easy to work with. It does not stick to metal and equipment is easy to clean after use.

Road+ is able to modify all kinds of bitumen, regardless of origin. This has proven to be a great advantage as the quality of bitumen has become increasingly inconsistent.

# What is Road+?

Road+ is an elastomeric bitumen and asphalt modifier and is used according to a process patented by Evonik. Ingredients are 100 parts of high quality rubber powder from Genan mixed with 4.5 parts of Vestenamer®, a semicrystalline polyoctenamer produced by Evonik. Field experience and laboratory tests both show that as a rule of thumb, a standard bitumen modified with 10% Road+ performs on the same level as a similar bitumen modified by 4 % SBS. As a matter of fact many of the properties, e.g. the ability to resist rutting under high loads, are far better.

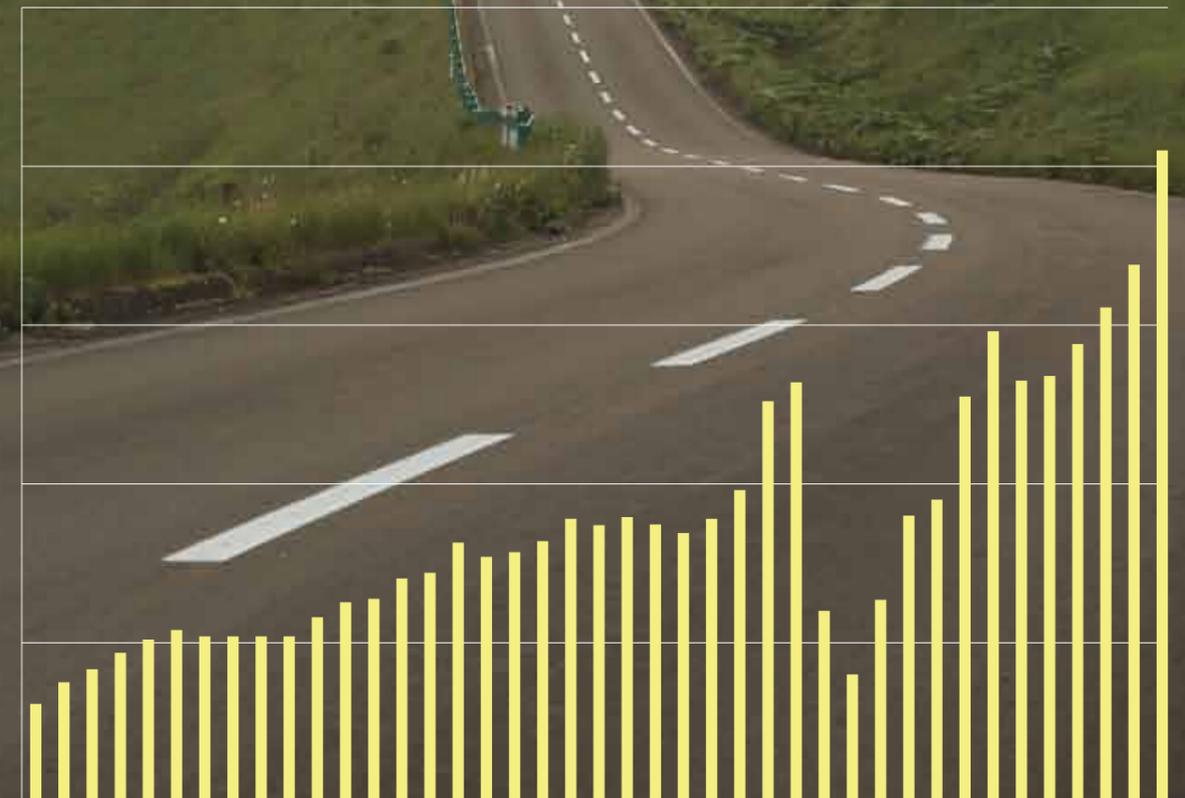
Besides substituting SBS and other polymers, Road+ also reduces the need for addition of fibres.

## *High quality ingredients*

It is of paramount importance for the performance of the modified bitumen and asphalt that the rubber powder being used is uniform in size and chemical composition. As the world's largest manufacturer of rubber powder from scrap tyres, Genan has the technology to live up to these requirements.

Since Vestenamer® is produced by Evonik, the world's premier company in specialty chemistry, the development of Road+ has been strongly supported by their technical know-how.

Butadiene price development over the last ten years



# Where to use Road+

*"Road+ can be used in all known standard types of bitumen and asphalt."*

Several million square metres of road have now been paved with Road+ modified asphalt. Road+ is not only suitable for the top layer, but also for the binder layer as well as the base layer. Excellent results are documented in Stone Mastic Asphalt, Asphalt Concrete and Noise Reducing Asphalt and SAMI (stress absorbing membrane interlayer). Road+ is suitable for all climates, cold as well as tropical, and is able to resist large day/night temperature fluctuations.

## *Noise reduction*

Road+ modified asphalt is ideal for noise reduction purposes, whatever the surface layers are made of, e.g. Stone Mastic Asphalt, Asphalt Concrete, Porous Asphalt or special noise-reducing asphalt recipes.

A heavily trafficked road in Köln (Cologne), Germany, along the Rhine Riverside, was designated "Baustelle des Monats" (construction site of the month) because of the dramatic reductions in noise.

# How to use Road+

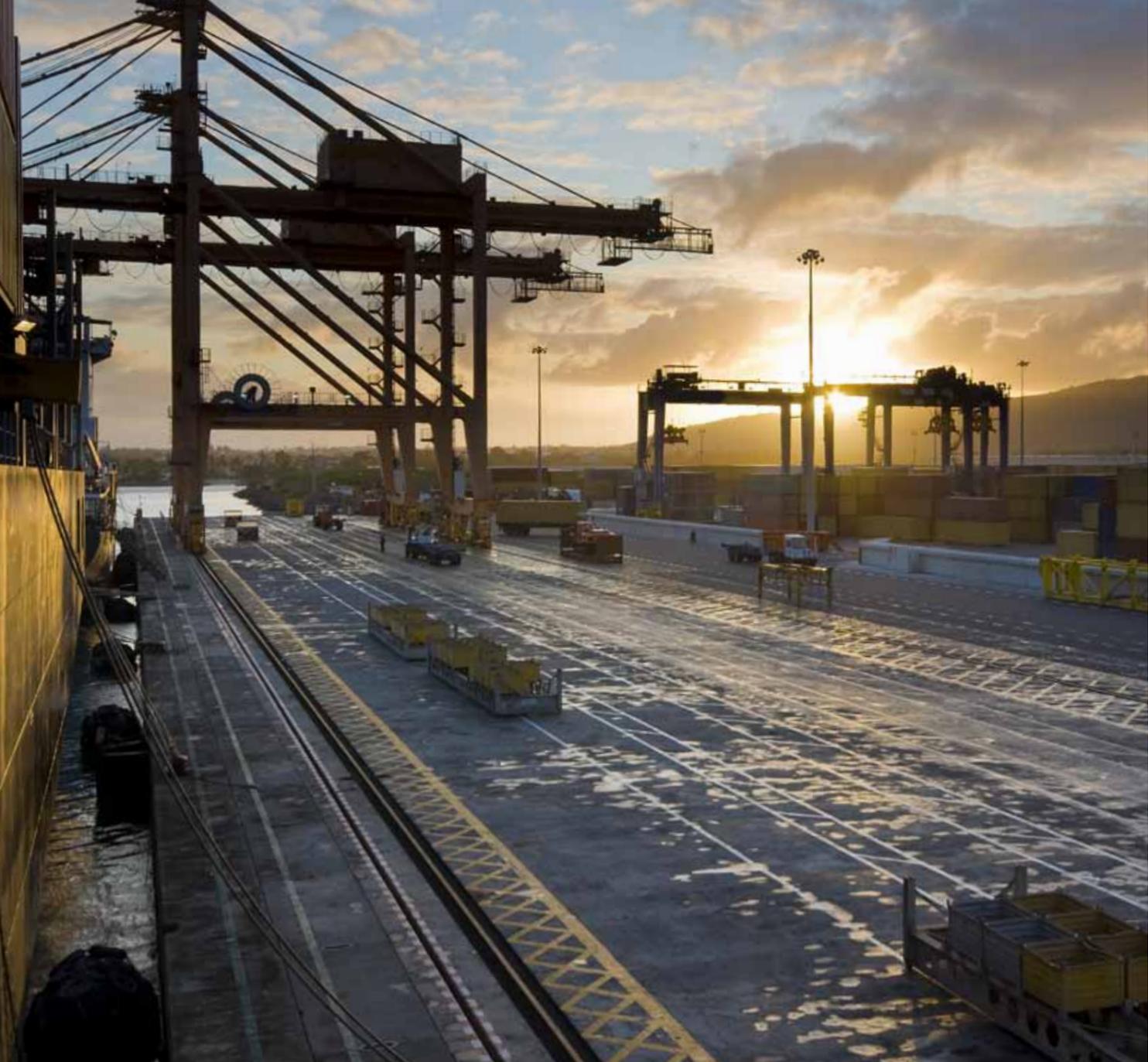
Road+ is available for direct use in the asphalt mixer (dry process) or for blending with the bitumen (wet process). Road+ is flexible to use. The combination of various bitumen qualities and Road+ content opens up new and extensive range of asphalt recipes. Depending on the exact properties required, you can design the optimal mix also when recycled asphalt is used in the asphalt mix. Compared to other polymer-modified asphalts, Road+ can be laid at lower temperatures. This increases the time window for paving, saves energy and reduces emissions.

Because of the good workability, a Road+ modified asphalt is particularly well-suited for manual labour-intensive jobs, e.g. roundabouts, curves and driveways, as well as for thin-layer asphalt.



## *Asphalt types applicable for Road+*

- Asphalt Concrete for surface layers
- Asphalt Concrete for binder layers
- Asphalt Concrete for basic layers
- Stone Mastic Asphalt
- Mastic Asphalt
- Porous Asphalt
- Noise reducing Stone Mastic Asphalt
- Noise reducing Asphalt Concrete
- Noise reducing Mastic Asphalt
- Very Thin Layers on sealing
- AC for Very Thin Layers
- Soft Asphalt
- Hot Rolled Asphalt
- Chip seal
- SAMI



# The ultimate environmental solution

## Benefits for the finished road

### *Uniform quality throughout the year*

As the rubber content in Road+ is produced from scrap tyres in large-scale plants with a stable input distribution of the different kinds of tyres, the product quality stays uniform throughout the year. A study by a German asphalt institute, which has tested the main properties of Road+ modified bitumen throughout the year, concluded that Road+ is a consistent and uniform product. A copy of the report can be downloaded from the Genan website.

### *Excellent resistance to rutting, cracking and aging*

Comprehensive studies have compared Road+ modified asphalt with corresponding conventional polymer-modified asphalts and found it to be equal or even better on properties like rutting, fatigue resistance, cracking and aging. In particular the force ductility is far greater than in conventional polymer-modified asphalts, thus making Road+ modified asphalt ideal for industrial sites which are subject to heavy loads.

### *Recyclability*

Road+ asphalt is fully recyclable producing lower emissions during the mixing process than normal recycled asphalt. A study documenting the recyclability can be downloaded from the Genan website [www.genan.eu](http://www.genan.eu).

### *Emission*

An emission study has been carried out by the German research institute, FABES, identifying critical compounds during production in the hot mix plant as well as paving in the field. No emission of N nitrosamines was detected, and the emission of volatile and semi-volatile compounds was lower for Road+ modified asphalt compared to conventional polymer-modified asphalt (PMB). A summary of the study can be found on [www.genan.eu](http://www.genan.eu).

### *Life Cycle Assessment*

Comprehensive and peer-reviewed life cycle assessment studies have shown significant environmental benefits in areas like greenhouse gas emissions, acidification and fossil fuel demand if scrap tyres are recycled and used for substitution of virgin materials instead of being incinerated. The greenhouse gas benefit is minimum 1.7 tons of CO<sub>2</sub> per ton of Road+.

For more information about life cycle assessment and greenhouse gas savings, order Genan's executive summaries or download them from [www.genan.eu](http://www.genan.eu).



# Road+

gives you all the benefits



- ✓ Proven technology
- ✓ Substitutes virgin materials, e.g. SBS
- ✓ Prevents rutting
- ✓ Prevents cracking
- ✓ Easy to work with
- ✓ Flexible
- ✓ Good for noise-reducing asphalt
- ✓ Recyclable
- ✓ Applicable at low and high temperatures

- ✓ No emission hazards
- ✓ No migration
- ✓ Does not stick to metal
- ✓ No fibres necessary
- ✓ Outstanding force ductility
- ✓ High fatigue resistance
- ✓ High aging resistance
- ✓ Climate friendly
- ✓ Competitive price

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*Genan is the world's largest recycler of scrap tyres with 3 large recycling plants in Germany (Oranienburg/Berlin, Dorsten/NRW and Kammlach/Bayern), one in Denmark and one in the USA. The technology has been developed since 1990 and the plants are highly sophisticated and fully automated. The tyres are recycled into their original components: rubber, steel and textile. The end products*

*are uniform and clean and therefore very well suited for high quality applications. Recent life cycle assessment studies have shown that significant environmental benefits in areas like greenhouse gas emissions, acidification and cumulative energy demand are achieved if scrap tyres are recycled instead of incinerated or used for civil engineering purposes.*