

DEGAROUTE®

DEGAROUTE®
DESIGNING SAFE TRAFFIC



RÖHM

TRADITIONALLY **INNOVATIVE**



**Safe, durable and eco-friendly—
that is what road markings based
on DEGAROUTE® stand for.
The systems' longevity makes them
reliable, environmentally friendly and
cost-effective. Thus, making them
an innovative solution which decision-
makers, contractors, formulators and
all road users can depend on.**

**For more than 50 years, Röhm has
been drawing on their vast experience
with methacrylate reactive resins to
continuously enhance performance
and safety features of DEGAROUTE®
based road markings.**

DEAR READER,

As the world's population is growing, traffic is becoming more dense because an increasing number of road users is participating in road travel, whereby traffic safety and environmental aspects are becoming top priorities. More and more people are moving from the country to the city, demanding access to mobility. Finding traffic solutions for the rising share of urban population is posing new challenges for infrastructure and traffic planners. Road infrastructure must be efficient so that all road users can safely get from point A to point B — whether by car, bus, bicycle or on foot.

DEGAROUTE® based road marking technology provides unique solutions to address these new challenges. Road markings play a decisive role in road safety by guiding traffic and showing the way at day and night, even in misty or wet conditions. Furthermore, road markings serve as delineation and segregation and of lanes to enable safe and smooth interaction between different road users, for instance, they separate public transport from automotive traffic by prioritized bus lanes. Moreover, road markings such as pedestrian crossings or bicycle lanes help to protect vulnerable road users.

Apart from visual information depending on their shape and structure, road markings can also provide an audible and haptic signal. Profiled road markings, for example, produce a loud sound with a rumble effect when driven over by a tire. These signals can effectively alert an unobserving driver who is about to deviate from the road. In addition to their signal functionality, road markings also provide other in-built safety features to the road, such as a well-adjusted level of skid resistance.

As authority representatives, road designers, formulators or contractors, you are facing the challenges of change every day. Therefore, we would like to support you with our inventive skills and know-how, which has evolved over the last 50 years. DEGAROUTE® based road markings provide you with a particularly long-lasting, resource saving and cost-effective option. Low VOC, low microplastic emission, fast curing in a wide range of temperatures and versatility in any shape or color count among the many advantages of DEGAROUTE® resins. Numerous certifications and applications around the world demonstrate the contribution of DEGAROUTE® to the improvement of road safety.

On the following pages we would like to show you exactly how DEGAROUTE® evolves from raw material to application and what makes our resin so sustainable and a true milestone on the road. Please join us as we explore all that DEGAROUTE® has to offer.

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DISCOVERING THE RAW MATERIAL OF SAFETY FROM RÖHM

Röhm focuses on methacrylate chemistry and supplies DEGAROUTE® binders to its network of formulators who are preparing ready-to-use material by adding fillers, pigments and additives. The ready-to-use formulation is passed on to the applicator, who mixes in the correct curing component and applies the material on the road, either manually or by means of marking machines.

MMA AND METHACRYLATE

Methyl methacrylate, in short MMA, is the basis to produce versatile polymers. In addition to the „classic“

polymethyl methacrylate (PMMA), known as PLEXIGLAS®, these so-called methacrylates include binders for paints, varnishes, coating systems and other products.

On the road it all began in the early 1960s, when chemists at the company Röhm conducted research on reactive resins based on methyl methacrylate (MMA) and its copolymers. In the process, they discovered the resins' versatility as a road marking system.

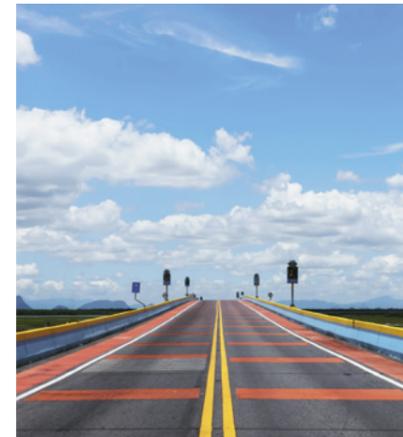
Back then, as well as today, the developers were able to utilize a

decisive advantage: existing in-house monomer and polymer research which provided them with a globally unmatched multitude of methacrylate based raw materials. These scientific findings were the foundation of the DEGAROUTE® binder and its ongoing optimization.

When adding a curing component to the combination of DEGAROUTE®, fillers, pigments and additives, the coating resin is transformed into a material which is exceptionally durable and lasts for years. Therefore, it has the ideal properties to produce road markings.



A CONNECTION FOR THE WORLD



Whether in America, Europe, Africa, the Middle East or Asia — the requirements being placed on improved road safety are increasing worldwide. The solutions must offer high performance and be cost-effective, sustainable, adjustable and readily available at the same time.

The production of DEGAROUTE® is seamlessly back-integrated into

Röhm's MMA network, ensuring reliability of raw material supply for its customers. Interconnected logistic processes provide an adequate availability of DEGAROUTE® based road markings around the globe, while maintaining compliance with their high-quality demands.

Furthermore, the DEGAROUTE® team supports its customers and associates worldwide with technical

advice and expertise, as well as with training courses and further marketing services. All of this has one goal: to make safe road markings available in all parts of the world.

1962

The brands DEGADUR® and DEGALAN® are registered and become the foundation for the development of cold plastic road markings based on methacrylate resin

1966

Market launch of the first 2-component cold plastics extrusion machines with powered, speed-proportioned pumps

More than 50 years of cold plastic resins – a chronology

1963–64

First trial coatings at the Frankfurt Airport and Degussa factory in Hanau

1974–75

First approval of 13 cold plastic markings by BAST (German Federal Road Research Institute). Renaming of all road marking products and registration of the DEGAROUTE® brand

1982

For the first time, bicycle lanes are marked in color with cold plastic area markings based on DEGAROUTE®

1988

The first profile markings increase visibility in wet conditions and produce warning sounds when being crossed over by vehicles

1990

The introduction of structure markings offers high visibility in darkness and rain

2011

The introduction of fast curing DEGAROUTE® resins (curing time within 2 minutes)

2019

The start of Röhm GmbH with high focus on methacrylate chemistry

2012

In the name of sustainability: Life cycle analysis (LCA) of the environmental impacts of DEGAROUTE® based road markings certified by independent experts

2015

The introduction of DEGAROUTE® based road markings with anti-dirt pick-up effect



FORMULATION

Road marking materials are formulations consisting of binders, fillers, pigments and additives. Modern road marking systems also comprise glass beads to ensure wet-night visibility. There are many decisive factors for defining the right formulation, among others traffic flow, road surface, climatic conditions and traffic load. The choice of the resin as binding agent is important for the application characteristics of the road marking material and the durability of the final road marking system under traffic wear.

The main binder-based road marking systems in use today are:

- solvent-based paints of high solids content that are sprayed on and dry physically by evaporation of the solvent (emission of VOC); only thin layers (< 1mm) feasible
- water-based paints that are sprayed on and dry physically by evaporation of the water and a small solvent and ammonia component (almost no VOC emission); only thin layers (< 1mm) feasible

- thermoplastics that, after being heated to 200 to 220 °C (390 to 430 °F) are sprayed on or extruded as a melt, and cure by solidification (VOC free); thin and thick layers feasible
- cold plastics that, mixed with a curing component (hardener), are sprayed on or extruded at ambient temperatures and cure chemically by polymerization (almost no VOC emission); thin and thick layers feasible

DEGAROUTE® FOR COLD PLASTIC ROAD MARKINGS

Cold plastics are reactive two- or multicomponent systems formulated with DEGAROUTE® binders and brought to polymerization by adding a curing component prior to application. The system cures chemically after a certain lapse of time (pot life), when the volatile resin components are chemically bound in the resulting inert polymer. Thus, the application can be considered as almost free from VOC emission.



For decades, DEGAROUTE® reactive resins have been used to manufacture high performance road marking materials. Cold plastic road markings based on DEGAROUTE® binders provide long lasting functionality, a variety of colors and shapes, and make our daily way safer and more lively, too. Due to the high durability, DEGAROUTE® based cold plastics provide most resource efficient and environmentally friendly road marking solutions.

One basis for many applications

DEGAROUTE® as binding agent for cold plastic road markings makes all the difference, especially when compared to traditional road markings. The benefits at a glance:

- durable and resistant against abrasion, heavy traffic loads and winter services
- visual, acoustic and haptic guidance, even in rain, snow and darkness
- wide processing window -10 °C/14 °F to +60 °C/140 °F), special solutions for high and low temperatures
- easy to apply in any shape, color and area size
- rapid application with short curing times, minimal road closure
- no heat required, providing greater safety to applicators
- multiple renewals of retro reflection properties, adding thin layer of cold spray plastic and glass beads onto the old cold plastic road markings
- anti-dirt pick-up effect for clearly visible road markings
- resource efficient and environmentally friendly with almost no VOC emissions



DEGAROUTE® RESINS FOR COLD PLASTICS

The program of DEGAROUTE® resins is designated by three-digit numbers. The numbers 401–499 represent resins with higher viscosity used for thick-layer cold plastics. Materials that are made with these resins can be applied manually, by means of push-cart road marking units or by automatic extrusion machines.

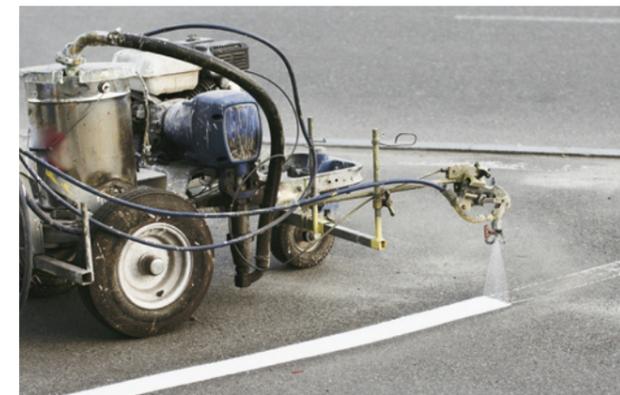
State-of-the-art reactive resins like DEGAROUTE® 465 provide good wetting properties for fillers and can be processed easily. Furthermore, this resin has a high in-build flexibility

to formulate cold plastics for almost all tasks without using external plasticizers. Structured road markings made of DEGAROUTE® 465 have proven their durability in the extremely cold climate of Alaska as well as in the Brazilian heat. DEGAROUTE® 465 is also suitable to formulate materials for area markings that provide enough flexibility to cover larger surface areas such as bicycle lanes or zebra crossings.

DEGAROUTE® RESINS FOR COLD SPRAY PLASTICS

The numbers between 601 and 699 represent resins with low viscosity

used for spray application. Resins such as DEGAROUTE® 655 or DEGAROUTE® 661 provide fast curing, even at thin layers. DEGAROUTE® 655 is particularly suitable for application at elevated temperatures. These grades are suitable for 98:2-machines and in combination with their accelerator-free resin-version (e.g. DEGAROUTE® 655 with DEGAROUTE® 659) for 1:1-machines as well.



STANDARD SUPPLY PROGRAM OF DEGAROUTE® RESINS

DEGAROUTE® grade	Application	Accelerator-free version	Surface temperature range	Typical application
465	Thick-layer 98:2; 1:1	469	+5° C/41 °F* to + 60° C/140 °F	Flat, structured or profiled lines
465	Area marking 98:2		+5° C/41 °F* to + 45° C/113 °F	Bike lanes, zebra crossings etc.
661	Thin-layer spray 98:2	663	+5° C/41 °F to + 40° C/104 °F	Flat lines
661	Thin-layer spray 1:1		+5° C/41 °F to + 40° C/104 °F	Flat lines
655	Thin-layer spray 98:2	659	0 °C/32 °F to + 50°C/122 °F	Flat lines
655	Thin-layer spray 1:1		+5° C/41 °F to + 50°C/122 °F	Flat lines

* With addition of accelerator down to - 10° C/14 F on dry and clean substrate



FORMULATION OF DEGAROUTE® BASED COLD PLASTIC READY-TO-USE MATERIAL

Cold plastic road marking materials based on DEGAROUTE® binders are formulated by the respective binder type, pigments, fillers, additives and glass beads. Coarse fillers and intermix beads may also be added. A formulation for cold spray plastics consists of binder, pigments, additives and fine fillers.

During the preparation of DEGAROUTE® cold plastic ready-to-use material, the following basic precautions must be taken:

- Equipment must be explosion-proof.
- Barrels or containers must only be opened with non-sparking tools. MMA evaporates when the resin is stirred or filled into other containers. The evaporation loss should be kept as low as possible. The mixing container must be closed or at least covered. The stirring speed

should be adjustable. Long stirring times and heating of the material over 40 °C/104 °F must be avoided.

- The respective DEGAROUTE® binder is poured into the mixer. Subsequently additives, pigments and fine fillers are added while stirring. Finally, coarse fillers and intermix beads are stirred in.
- Adjustment of viscosity is depending on wetting properties of fillers, pigments and used additives. This must be considered regarding the sedimentation and flow behavior as well as for the application of broadcast material (reflective beads).
- The bottom outlet should have a diameter of at least 5 cm (2 inch) to allow discharge of high viscose cold plastic material.

FURTHER RECOMMENDATIONS

DEGAROUTE® binders contain paraffin which is necessary for tack-free hardening. After long storage periods at lower temperature, paraffin can

migrate to the surface. In this case, the paraffin must be homogenized with an explosion-proof (e. g. air-driven) barrel mixer to guarantee equal distribution in the individual batches.

DEGAROUTE® resins should be stored at maximum 30 °C/86 °F without direct exposure to sunlight. In general, the storage stability of DEGAROUTE® ready-to-use material is very good especially if the material contains titanium dioxide. For ready-to-use materials prepared without titanium dioxide, an early gelling may occur under unfavorable conditions (e. g. high storage temperature). Therefore, we recommend adding a small amount of titanium dioxide (approx. 1 wt %) to yellow marking materials. Besides, heavy spar should not be used as filler in these cases.

In case of a 1:1 system, the non-accelerated component must be processed in a separate mixing



container with a separate steerer to avoid contamination with the accelerated component.

Additives

Carefully selected thixotropic agents (e. g. Byk® D410) and thoroughly tested wetting agents (e. g. Disperbyk® 163) may be used to adjust viscosity. Other additives, such as solvents and air release agents (e. g. silicone oil), should be avoided as they have a negative impact on curing of the cold plastic material and may prevent tack-free hardening. Our DEGAROUTE® technical team will be glad to help you determine suitable additives for your cold plastic formulation.

Pigments

Mostly titanium dioxide (rutile) is used. Please be aware of moisture that will cause thickening of the RTU material and organic post treatment agents that may cause yellowing or tackiness of the pigments. Only

thoroughly tested pigments with good UV stability shall be used. Our DEGAROUTE® technical service team will help you determine and testing suitable pigments.

Fillers

Commercially available fire-dried fillers in various sizes can be used for the formulation such as quartz powder, dolomite, feldspar, calcined flint or quartz (cristobalite), calcite and heavy spar. Fine fillers with large surface or high oil absorption and hydrophobic qualities are not suitable. Depending on the formulation, intermix beads with a size of 0,05 to 0,8mm may be used as fillers to control rheology of the formulation.

Drop on beads

Reflective drop on glass beads must be broadcast to the applied road marking to achieve the required day and night visibility. Much larger reflective beads (up to 2,5mm) are used for improved wet-night visibility.

Cold plastic is typically broadcasted with approx. 150 to 400 g/m² and cold spray plastic typically with 400 to 600 g/m² of reflective drop on beads. Drop on beads may contain a smaller fraction of anti-skid aggregates to adjust skit resistance. If too many or too fine glass beads and anti-skid aggregates are applied on a road marking, an excessive soiling of the surface could happen.

Intermix and reflective glass beads with silane treatment provide improved adhesion to cold plastic materials. Uncoated or glass beads coated with silicon treatment should not be used since they provide only poor adhesion to cold plastic materials. Silicone treated glass beads must not be used as drop on beads for cold plastic since they cannot provide long-lasting retro-reflectivity in road service.



FROM 0 °C (32 °F) UP TO 60 °C (140 °F) AMBIENT TEMPERATURE



With cold plastics based on DEGAROUTE®, contractors can mark road lanes quickly and easily. Once applied on a dry substrate, it is instantly rain-save and not washed out by rain. Whether spray applied, extruded as a flat or structured line, or even applied to the entire road surface as an area marking, DEGAROUTE® can be processed in any shape and color.

Röhm offers assistance and guidance when determining the right product, application method and equipment for any project. From providing contacts of machine manufacturers to supporting contractors on the proper use of the different machine types, Röhm is there every step of the way.

APPLICATION OF DEGAROUTE® ROAD MARKINGS

In general, the bonding performance of any road marking material depends on the substrate quality. Both,

pavement surface and ambient air temperature must be in accordance with the temperature limits as specified in the DEGAROUTE® technical data sheets. DEGAROUTE® based markings must be applied to dry, clean, mechanically intact road surfaces that are free of oil. Markings are usually applied at surface temperatures of 5 °C /41 °F to 60 °C/140 °F depending on the DEGAROUTE® resin and application technology in use. Application at temperatures as low as -10 °C/14 °F is feasible with additional accelerator.

Re-coating of old cold plastic or acrylic paint road markings with cold spray plastic is feasible due to good interlayer adhesion. Other road marking systems (e.g. thermoplastics, alkyd or water-based paint) should be removed to achieve ultimate adhesion of to the substrate and durability of the cold plastic road markings.

Stone mastic asphalt

On stone mastic asphalt or asphalt concrete substrate adhesion is typically achieved with cold plastic. However, on freshly installed pavements adhesion issues might occur due to flux oils or lose laitance.

Asphalt concrete

Good adhesion. Tar asphalt and emulsion type pavements may not be suitable for cold plastic installation.

Cement concrete

Fresh concrete must be cured completely (minimum 28 days after installation), moisture content of the concrete should exceed a level of 4 %. Laitance and concrete surface treatment agents need to be fully removed. The concrete surface must

be dry, free of any loose particles, dust, dirt, oil, grease etc.

Porous surface texture is required to ensure good resin penetration for a high adhesion. It should be noted that, some concrete formulation components (e.g. post treatment additives, waxes) as well as potential surface contaminations may have negative impact on bonding.

In case of doubt it is advised to test adhesive strength of the marking on the actual substrate, (DIN EN ISO 4624). A pull off strength of minimum 1.5 N/mm² should be achieved in general.

To achieve best possible adhesion performance and durability of cold plastic, the following must be considered:

- Depending on the concrete quality and pavement contamination, cleaning by broom or steam cleaner could not be enough. If necessary, a pre-treatment by e.g. high-pressure water jet blasting or grinding and vacuuming is recommended to open the substrate.
- Depending on DEGAROUTE® grade and formulation, concrete priming with a suitable primer is necessary. Typical primer consumption ranging from 100 to 500 g/m², depending on the absorption of concrete (puddle formation must be avoided in any case).



The DEGAROUTE® based system portfolio – basis for a wide application range



Structure Road Markings

When it rains, the three-dimensional structure allows for optimal water drainage, revealing glass beads that reflect the headlights of passing vehicles. Depending on the actual structure, the marking may produce a soft vibrating sound at higher speed that warns the driver in case of tire contact. High resistance is provided against winter services, especially snowplows.



Area Markings

The use of area markings for crosswalks, bus lanes, bicycle lanes and parking zones provides a strong signaling effect and high friction surface. Applied with a thickness of 1 to 3 mm, DEGAROUTE® area markings are very resistant against wear, offer outstanding color stability and can be fine-tuned according to special demands.



Profile Road Markings

A warning sound, created by the profile structure, increases the driver's attention when crossing over the marking. Regardless of high outdoor temperatures and heavy truck traffic, these markings maintain their original shape, allowing for the regular elevations to remain visible, also during rainfall.



Spray Road Markings

Due to their low viscosity, road markings based on DEGAROUTE® can be sprayed as a thin layer with a thickness of 0.3 to 1.0 mm in an airless or a pneumatic process. This thin layer system offers a good balance between durability and cost efficiency due to fast application and curing speed.



Flat Line Markings

The smooth, permanent marking with a thickness of 1 to 3 mm provide the ultimate in durability. These thick layer markings are suitable for the manual or mechanical application of lines, crosswalks and legends. Reflective glass beads can be added to increase visibility.



High Friction Surface

Heavy rain and tight curves are dangerous conditions making roadway crashes more likely. By applying DEGAROUTE® cold plastic High Friction Surfaces the skid resistance of the road is increased without having to redesign cause of the problem.



HARDENER DOSAGE AND APPLICATION CONCEPTS

BPO hardener (dibenzoyl peroxide) – mostly as powder with 50 wt % BPO (hardener powder) or in liquid form containing typically 40-50 wt % BPO (liquid hardener or liquid BPO) – serves as hardening agent for cold plastics or cold spray plastics. Typically, 1-2 wt % hardener is used for application in a wide range of temperatures. For application at extreme temperatures, the mixing ratio may be adjusted to control pot life and curing speed. Guidelines for adjustment of hardener dosage are given in the technical data sheets of the respective DEGAROUTE® resins.

Manual or semi-automatic application:

Hardener powder is most suitable, whereby the powder is manually feed and mixed with a stirrer to the cold plastic before charging it to a screed box, for instance.

Machine application with fully-automatic dosage and mixing:

Liquid BPO is used for fully automatic machines operating with a fixed mixing ratio, whereby two major machine concepts (mixing ratios) are used:

98:2 system

98 wt % reactive cold plastic to 2 wt % liquid hardener with direct liquid BPO metering.

1:1 system

This 3-component system requires one reactive cold plastic ready-to-use component and one inactive accelerator free cold plastic ready-to-use component. Prior to process-

ing, 4 wt % of hardener powder (3rd component) is mixed to the accelerator free component off-line on the job site. The inactive cold plastic component requires an accelerator-free DEGAROUTE® grade providing enough stability to the premix with the hardener. We recommend clear marking of the containers with the two components to avoid confusion. The two components (reactive component and premix with hardener) are then poured into separate tanks and machine fed, mixed and sprayed or extruded in a ratio of 1:1.

1:1 spray applications are also typically used in smaller walk behind spray equipment for legend as well as striping applications.

Caution:

- Once the hardener has been added, the stability of the “non-accelerated” component may be limited to 1 to 2 hours only depending on temperature.
- Even slight contamination of the reactive component with Dibenzoyl peroxide (BPO) hardening agent must be avoided. In case of a 1:1 system, the non-accelerated component must be processed in a separate mixing container with a separate steerer to avoid contamination with the accelerated component.

MANUAL APPLICATION

Direction arrows, symbols as well as letters and numbers are drawn on the pre-cleaned road surface, typically using templates and chalk. Templates are removed and edges masked with tape. The masked area will be filled and smoothed to the

desired thickness with the catalyzed marking material (smoothing trowel).

The tape should be removed before the curing is completed. Additionally, reflective beads and an antiskid agent may be sprinkled over the freshly marked surface. So-called draw boxes can be used for stopping lines and nontraffic zones. Such applicators consist of variously constructed metal frames with a slit to release marking compound at the rear. The width of the draw box determines the width of the marking line. The release slit height determines the layer thickness.

APPLICATION BY MEANS OF ROLLERS

Flexible DEGAROUTE® resins are offered especially for area markings. Usually, the material is applied in 1 or 2-layers by means of rollers as colored area markings or anti-skid marking for bike and walk ways, bridges, bus lanes and hazardous points like school zones or roundabouts. To mask the edges, templates or tape can be used.

APPLICATION BY MEANS OF HAND GUIDED MACHINES

Various favorable marking devices for flat-, profile-, as well as for structure markings that can be transported easily have been developed for the application of center and side lines as well as for pedestrian crossings with widths of 10-50 cm.

All these marking devices function according to the draw box principle. The catalyzed material flows into the box which is opened and closed



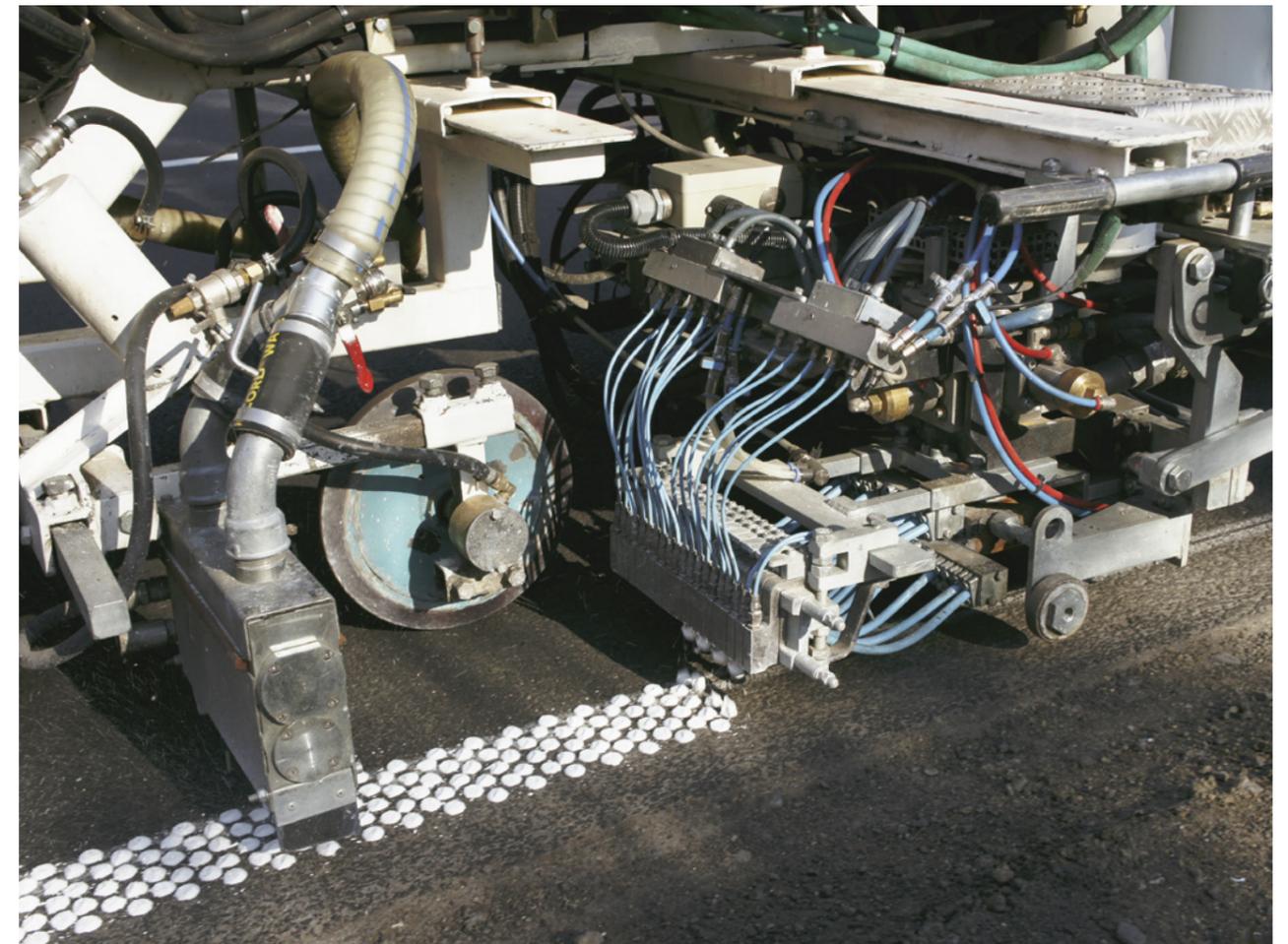
manually by means of a system of levers. When using these units, the beginning and end of the line must be marked off beforehand.

FULLY AUTOMATIC APPLICATION

For thick layer (flat-, profile- as well as structure marking) as well spray applications, self-driven machines with automatic line length device are used for the application of

large batches, e. g. on highways and national roads. For these purposes, machines that are working according to the 98:2 system and 1:1 system are available.

All equipment contaminated with catalyzed cold plastic (e.g. application head) must be purged with suitable solvent during interruption of application process.





ROAD MARKINGS ARE AN IMPORTANT CONTRIBUTION TO ROAD SAFETY



About one third of all road accidents happen at night and in wet conditions, which is exactly when many types of road markings lose their visibility. Due to integrated glass beads and the three-dimensional structure, road markings based on DEGAROUTE® provide the advantage of a significantly higher wet-night visibility. Therefore, they offer the best performance when road users need guidance the most.

Even in hot and dry climates where traditional road markings turn black under traffic DEGAROUTE®-based road markings stay clearly visible thanks to anti-dirt pick-up technology.

Especially on highly traveled roads, any interference with traffic flow can cause delays, thus increasing

CO₂ emissions and posing major safety hazards. The application of DEGAROUTE® based road markings requires minimal road closure time. Since the marking is fast curing, roads can be reopened for traffic within a short period of time and the risks that are typically present during the application process are drastically reduced.

Cold plastic markings can cope with extreme traffic and climatic conditions, as well as with high snowplow activity. Confirmed by independent wear simulation tests of the German Federal Road Research Institute (BASt), cold plastics have been found to be far more resistant against wear than other markings. Furthermore, their outstanding longevity makes DEGAROUTE® based

road markings cost-effective and resource-saving, since they need to be renewed less often.

Traffic all around the world is getting more and more complex. This requires new solutions for safety on the roads. Whether flat, structure, profile or area markings are concerned, cold plastic markings based on DEGAROUTE® can be applied to the road in any shape, color and grip, both mechanically and manually. Thus, DEGAROUTE® based road markings contribute to innovative guidance systems which enhance safety for pedestrians, cyclists and drivers.



LIFE CYCLE ASSESSMENT

ENVIRONMENTALLY FRIENDLY MARKINGS – LIFE-CYCLE ASSESSMENT OF ROAD MARKING SYSTEMS

The more advanced science becomes, the more need there is for strategies which take advantage of this development, without harming the environment. Markings based on DEGAROUTE® offer solutions for tomorrow's traffic, while preserving the environment for our children.

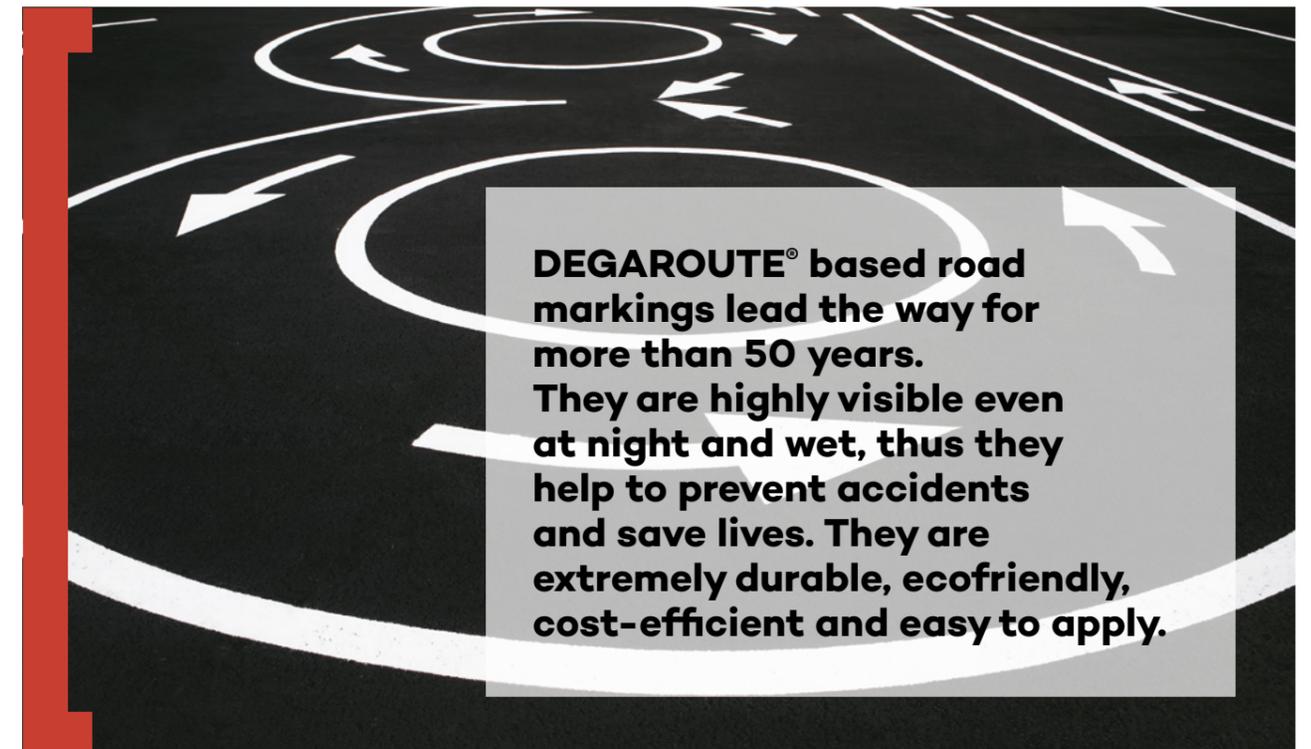
Avoiding traffic jams also means avoiding CO₂ emissions. Cold plastic markings hardly interfere with traffic, which makes them sustainable in more ways than one. Being fully set shortly after application, they are more durable and thus need to be renewed less often.

The impacts on the environment are playing a role of growing importance in the decision-making processes of contracting authorities. Röhms supports this change and has examined the environmental impacts of DEGAROUTE® based road markings compared to alternative marking systems. Creating an ecological balance sheet, the entire life cycle was assessed: from the production of raw materials and tracers, to the on-road application and use, as well as the removal and disposal of old markings. The study was conducted in compliance with the latest environmental standards (ISO 14040), monitored by independent experts and certified according to ISO 14044.

Environmental impacts, like the global warming potential, were

compared in the study based on the initial equipment and maintenance of a two-lane reference road with a length of 1 kilometer over a period of 10 years. The environmental impact was determined by the durability of a sprayed or extruded marking under real traffic conditions. The results show an advantage for DEGAROUTE® based markings, which achieved the best evaluation in terms of environmental impacts based on their longevity.

For further information and the results of the Life Cycle Assessment please visit: www.degaroute.com



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07/2021/HSP