FOR NATURE
AND
ENVIRONMENT!

GGT
ECOLOGIC

Significant reduction in the

Footprint

UNDERBOLD-POD30

History

The company **Underbold GmbH** began developing its **UNDERBOLD** product in 1999.
After testing and analyzing the product under various conditions, UNDERBOLD was registered with the Munich Patent and Trademark Office in 2000 and then tested under real conditions. In 2010, UNDERBOLD was confirmed as efficient, sustainable and highly effective, as confirmed by TÜV Rheinland and other renowned institutions.

In 2011, **UNDERBOLD-POD30** and other German-GreenTec technologies began to be utilized and applied worldwide.
Today, **UNDERBOLD-POD30** is used in several sectors and industries: In the construction and rehabilitation of roads of all categories, in airport infrastructure construction, in the construction of industrial and construction roads, as well as logistics and storage areas.
In 2019, **GGT** was successfully restructured and run as the following Company:

German-GreenTec Ecologic GmbH

Basic information about the product first:

Note on Authorisation in the area of soil improvement!

The ingredients of the "***ADDITIVE***" **UNDERBOLD-POD30** comply with worksheet W347 (in particular with regard to the permissible total content of the trace elements arsenic, lead, cadmium, chromium and nickel, which are demonstrably not contained in the additive) of the German Technical and Scientific Association for Gas and Water and are not subject to approval according to ZTV-E-StB 2017. They therefore do not require separate approval, as the standardized binders (cement) used at the same time in accordance with DIN197-1, DIN 197-4, DIN 1164-10 and DIN EN459,1 is subject to constant quality control by the respective manufacturer in accordance with these aforementioned regulations.

**With the UNDERBOLD-POD30 process,
the German Federal Soil Protection Act (BBodSchG)
is implemented 100 %.**

The problem

A huge investment backlog in road construction in many countries, road links in a poor condition, with no hope of cost-effective and high-quality rehabilitation options, mean that a rapid improvement in conditions is lost in the chaos of potholes.

Upcoming road renewals are failing due to the high costs of removing the more or less hazardous waste materials from road construction that are produced according to current standards and laws.

Due to a shortage of resources, suitable road construction materials will continue to drive up prices in the future and thus contribute far more to empty coffers for public and private developers.
For many developers, the need to build new roads is limited to a few short sections each year or even made impossible by rising costs.

The solution

A construction method that minimizes soil requirements reduce the cost of soil movement and therefore reduces or eliminates disposal costs for contaminated soils.

In order to ensure frost resistance and to absorb the loads caused by traffic movements, it is possible to do without the usual cost- and material-intensive surface courses.

The fossil binder layers are reduced to the necessary for a road surface to ensure skid resistance and the drainage of surface water.

A carriageway that meets all the requirements of modern traffic and also fulfils the toughest industrial operating conditions.

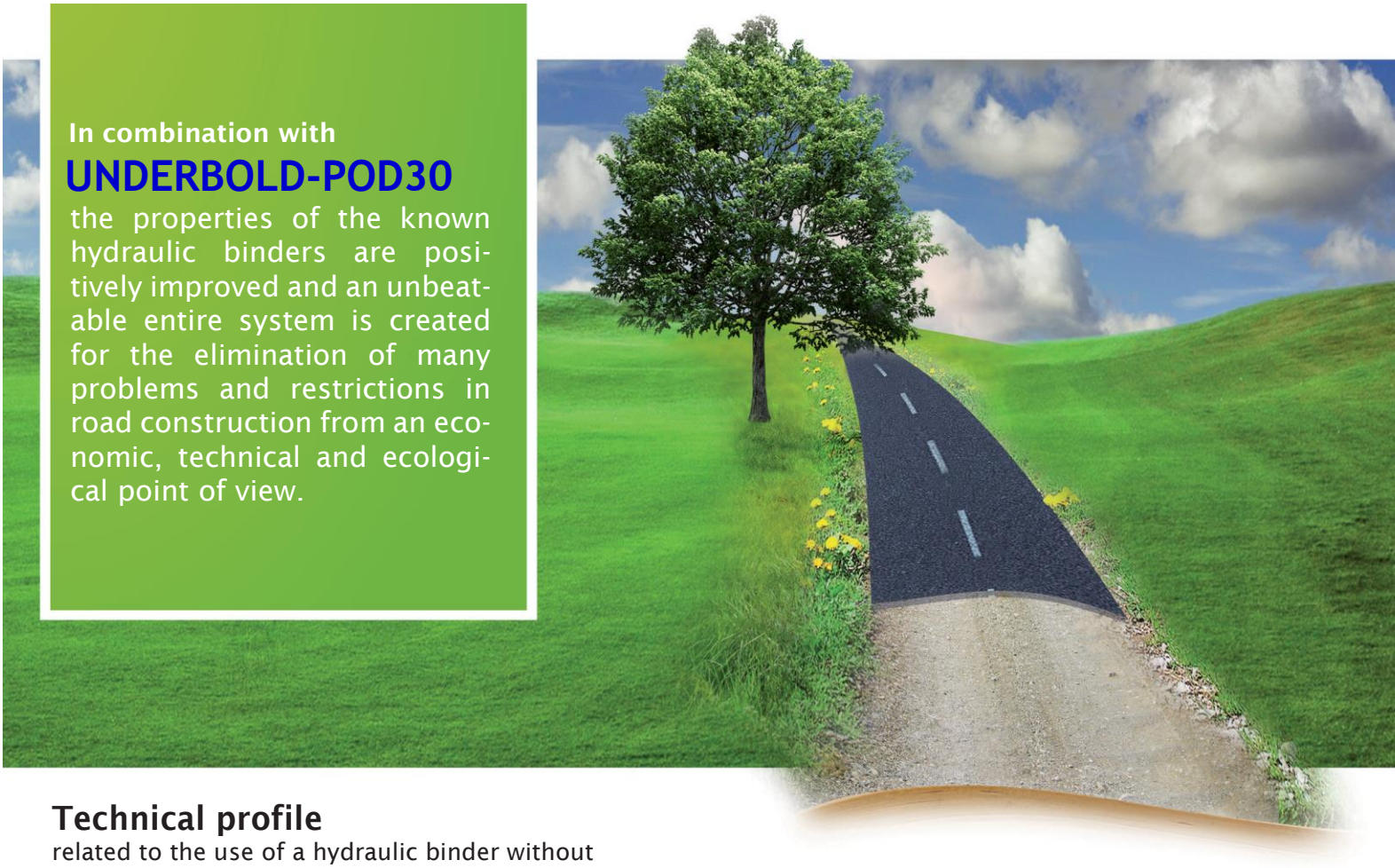
The result is an overall system of conventional construction techniques and the outstanding properties of modern biological additive.

This makes the road surface less susceptible to repairs, durable and particularly resistant.

In combination with

UNDERBOLD-POD30

the properties of the known hydraulic binders are positively improved and an unbeatable entire system is created for the elimination of many problems and restrictions in road construction from an economic, technical and ecological point of view.



Technical profile

related to the use of a hydraulic binder without the use of

UNDERBOLD-POD30

- Increase in compressive strength
- Increasing the load-bearing capacity
- Increase in the stiffness modulus
- Increasing elasticity
- Reduced tendency to shrink and therefore free from cracking
- No notching or stretching required
- Hydrophobic setting and reduction of water penetration depth
- Reduction of micropores and capillary effect
- Complete frost protection
- Reduction of the setting time outside the processing period
- Can be combined and extended with improvement measures and reinforcement of the building substrate

UNDERBOLD-POD30

- Can be combined and extended with measures to improve and reinforce the building substrate.
- Complete avoidance of pollutant discharge from treated soils and contaminated superstructure layers.
- Makes any soil material agglomeratable: the soil material is coated by the **UNDERBOLD-POD30** wax emulsion and thus and therefore bonds better with the binder.
  The entire soil material treated in this way develops a lasting hydrophobic effect, repels penetrating water and dries out the constructing structure again and again.
  Capillary formation is permanently prevented.

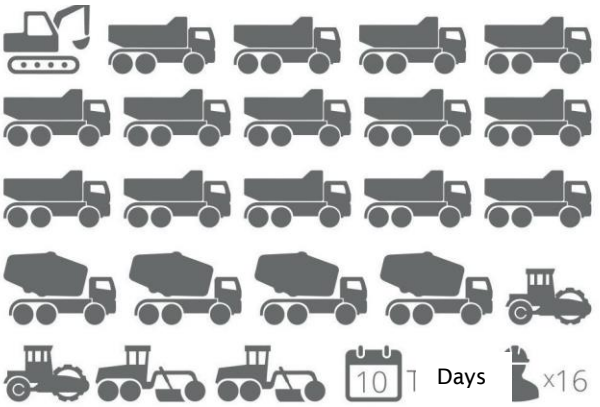
1 Levelling of the surface, removal of the organic top layer and rough profiling.

2 Mixing in the UNDERBOLD-POD30 emulsion. Crushing and mixing the soil with the **UNDERBOLD-POD30** emulsion and water.

3 Distribution of the binder on the surface.

Example for 1 km

Conventional road construction



4 cm
Asphalt-Top Layer

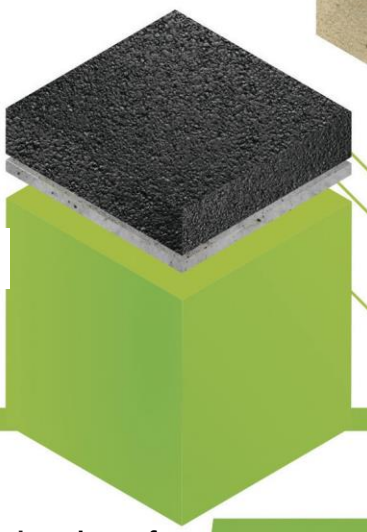
8 cm
Asphalt- Binder Layer

14 – 18 cm
Bituminous Base Layer

15 cm
Gravel

25 – 45 cm
Frost Protection Layer

road construction
with
UNDERBOLD-P30



4 - 8 cm
Asphalt layer
1 – 5 cm
Primer or gravel
0/16
40 cm
UNDERBOLD-POD30
plus binder

Economic Profile

- <u>Significant time savings</u> due to <u>shorter construction time</u> of the entire overall product
- **Reduction of the layers** of the bounding superstructure to layer thicknesses depending on the traffic loads volume
- **Reduction in cement requirements** using regarding the load-bearing capacity requirements
- **Extended shelf lifespan**
- **Lower** maintenance costs
- **reduction** or avoidance **of ground movements** outside of gradient adjustments
- **Elimination of landfill and disposal fees** outside of gradient adjustments
- Reducing the influence on flowing traffic
  less traffic jams

Processing

- The application of **UNDERBOLD-POD30**
- does not require any special or additional equipment or systems compared to conventional stabilisation.
- The optimal um mixing ratio of the additive with the cement and the mineral mixture (soil or rock) is determined using based to the soil parameters to be tested and adapted to the client's specifications (suitability test).
- Sampling and control tests to verify optimum quality success are based on the application and the client's specifications.
- **UNDERBOLD-POD30** has convincingly demonstrated its properties in use in many countries around the world.

4 Mixing the soil with the binder.

5 Maximum compaction of the mixture.

6 Final profiling of the desired slope.

With the Underbold-POD30- Procedure
the Federal Soil Protection Act (BBodSchG) is implemented 100 %.

Significant savings in construction site resources
- Transport vehicles - construction equipment - personnel - construction time -
cause significant
„CO_2- Savings“
for the entire project.

CO_2- Balance sheet

Comparison of conventional construction and the Underbold-POD30- Technology

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In a model calculation for the refurbishment or new construction of a
1 km long and approx. 10 m wide
section for a 2-lane rural road
(with hard shoulder)
+ asphalting to a width of 8 meters the following comparative values between a conventional rehabilitation and a rehabilitation using with our additive **UNDERBOLD-POD30** determined.
In the following CO_2- Results for two different conventional construction methods:
A) on the one hand by building a base course "in situ".,
B) on the other hand by the **Completely new structure** a base layer
(with prior removal of the old base course, which is only necessary when using a conventional construction method)
the saving of CO_2- emissions made clear.

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In order to determine a meaningful CO_2- footprint research and calculations calculations, the findings/results shown here were achieved.
During the extensive research into the CO_2 „Production“ of various machine related services in conventional road construction and using the **UNDERBOLD-POD30**- technology, as well as the
CO_2-„Production“, required for the production of aggregates in both systems (Cement + **UNDERBOLD-POD30**), expert facts provided by recognized experienced construction specialists and and producers have been applied.

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Removal / installation a base layer Conventional: 52 cm – UB-POD30: 40 cm			**Installation of a base course „in situ“** Conventional: 30 cm – UB-POD30: 40 cm	
Conventionall	**Underbold-POD30**	CO_2-**Production** in tones	**Conventionall**	**Underbold-POD30**
6.132	**1.548**		**2.329**	**1.548**
4.584		**Savings in tones**	**780**	
74		**Savings in %**	**33**	

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Due the minimization or reduction of subsequent maintenance as a result of the high compressive strength compressive strength of the road substructure,
CO2 emissions are also reduced.

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We are also happy to carry out calculations for your projects as required.
Please inform us using our CO2 questionnaire, which you can send by e-mail to
underbold@web.de
facts and circumstances, and you will receive a detailed and comprehensive
detailed and comprehensive CO_2 – Calculation based on your requirements.

22 years of international experience, gained in successful projects worldwide with

UNDERBOLD-POD30

Slovakia

rehabilitation of local roads in 94621 Velke-Kosihy

Germany

Procter & Gamble Industrial road in 74564 Crailsheim

Germany

Mercedes Benz parking area in 71088 Holzgerlingen,

Russia - (Sibiria)

before (2008) **after completion (2008)** **Condition 2018**

In 2023, the entire road (approx. 18 km) is in excellent condition, which was confirmed by the client in 2008 and 2018 without being asked in reference letters. The road is still only "graveled" and not asphalted.

Russia - (Sibiria)

Barnaul

Iran

Tabriz

Oman

rehabilitation of Residential Area in Muskat

Stabilization with desert sand in Muskat

Brazil

Pilot Project: Federal State St. Catarina, Pomerode

Follow-up project: Pomerode

Brazil

Timbó, Federal State St. Catarina

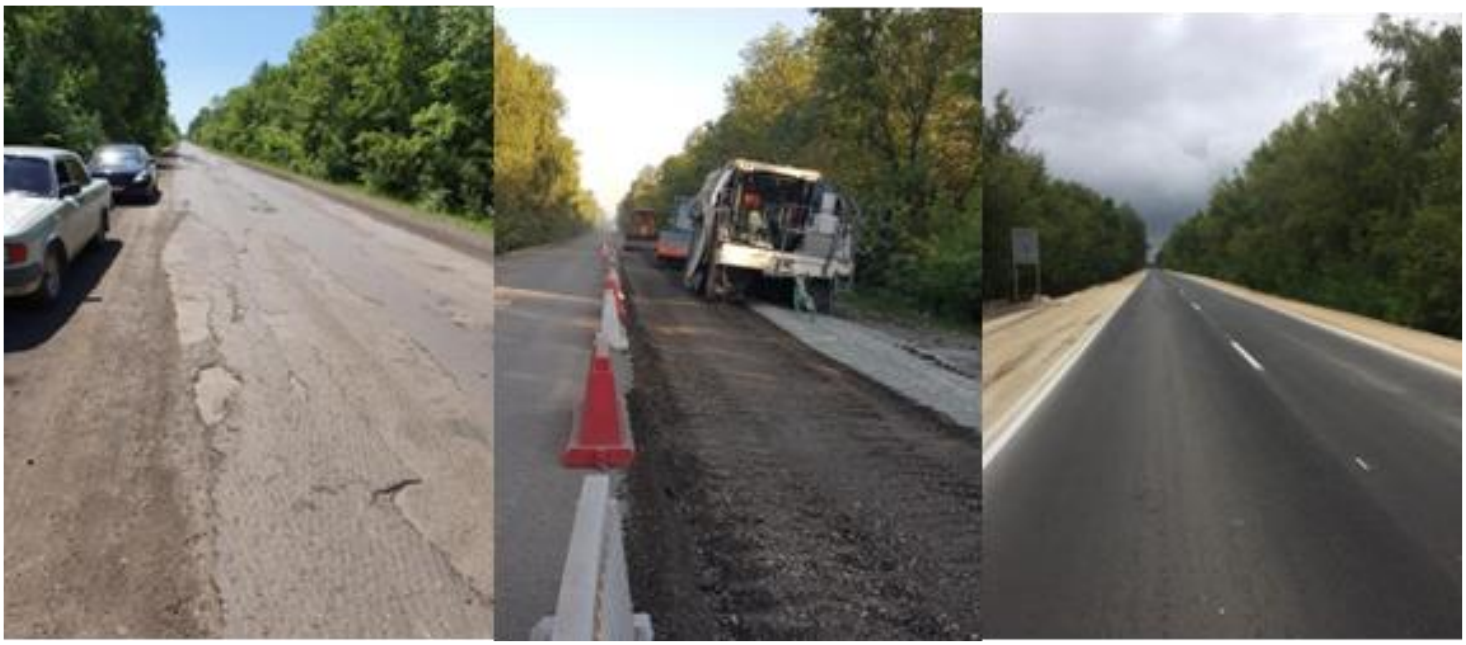
Latvia

Riga

Bulgaria

Sosopol at Burgas

Russia



Krasnoje in the district Lipezk

Teofipol, Ukraine

Pilot project federal road

Follow-up project

Russia - Altai region, Sibiria

from Talmenkha to Larichikha

from Kuritchkhina to Akutikha

Liberia

Buchanan

UNDERBOLD-POD30

for quickly soil stabilisation and

1. Prepare the construction site Rough planum	2. Underbold-POD30 distribute and mill in homogeneously	3. Binder distribute and homogeneous milling	4. Intermediate compaction (by step 2) and final compacting

Grader + GPS

a-mag-MFT3 (20,000 litres) + Trailed milling machine

Cement spreader with Suction device

a-mag-MFT2 (7.500 litres) + trailed milling machine

Single drum 16 t — Tandem roller 12 t

a high quality construction with sustainable ecological substructure/superstructure

Sustainability, shown after testing in the test laboratory:

WITHOUT UNDERBOLD-POD30

Test-abort after 5 days

WITH UNDERBOLD-POD30

Test-End after 12 days

100%

ENVIRONMENTALLY FRIENDLY

Ecological Profile

- UNDERBOLD-POD30 is ecological Safe to manufacture and use (ISO 9001:2008)
- Protects resources when extracting raw materials and dangerous goods landfilling
- Reduction of CO2 emissions during production and use
- Longevity protects the Environment

GGT
ECOLOGIC

We help you to realize your project with our product
and our know-how
to realize your project.

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POD

Scan me!

Climate protection