



**NovoCrete®**

# **NovoCrete®**

**Innovative Solution for Infrastructure!**



**DURABLE, LONG LASTING AND ECONOMICAL SOLUTION FOR THE INFRASTRUCTURES OF MOTORWAY, RAILWAY, HEAVY LOAD STATIONS, HARBOUR AND WHARFAGE PREMISES**



**jags** innovative products

## Support to Development

Growth of the economy depends on the transaction volume of the logistic. Therefore transportation easiness and quality transportation infrastructure are directly proportional with the development level of the countries. To transport a good manufactured in a province and country to other provinces and countries with a rapid and economic way, supplying the connections via motorways, railways, harbors and airways without problems are making necessary to have a high quality infrastructure.

Ministry of Transportation, Maritime and Communication is planning to make 45 billion Dollars investment only for the railways until the year 2035, and this is an indicator how Turkey gives a great importance to the transportation.

**NovoCrete®**

To realize the transportation investments as long lasting and with low costs in world economics where the crisis are more often lived, become important for using the sources in most effective ways. Turning the innovations into the technological and economical solutions are creating advantages for competing.

With the infrastructure technology that it developed, NovoCrete® is supplying to realize the targeted investments in one step and not being repeated.

NovoCrete® is offering a durable, environmentally friendly, long lasting and economic soil mechanic system.

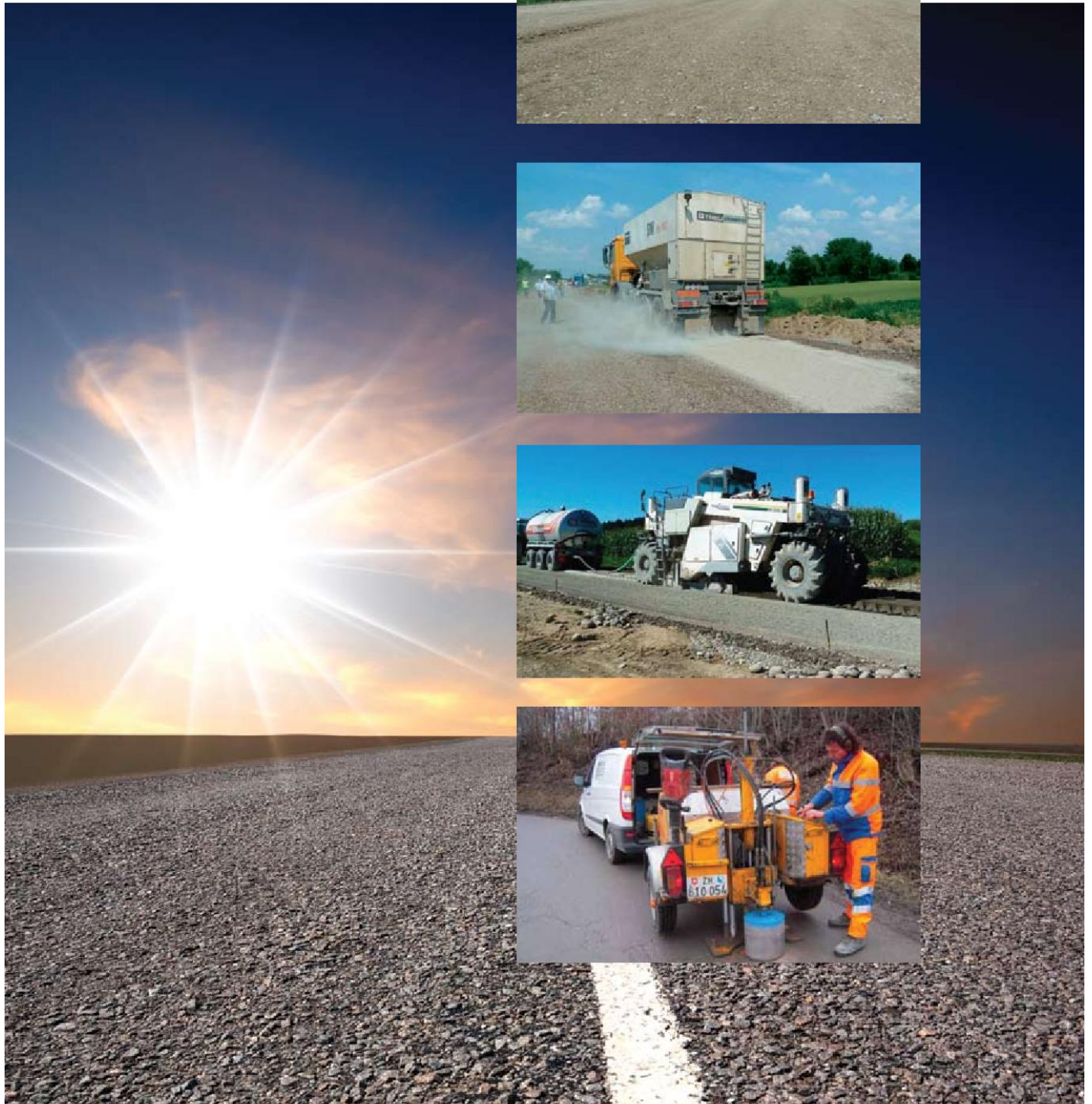
**NovoCrete®** TURKEY | JAGS INNOVATIVE PRODUCTS

### What is NovoCrete®?

NovoCrete® is made from 100% mineral contented alkaline and soil alkaline constituents. NovoCrete® is a powder mineral used as a concrete add mixture in "type 1, type 2" Portland cement. NovoCrete® combined with Portland cement and optimal water content increases the crystallize formations during the hydration process, resulting in higher psi strengths, neutralizes Ph levels, and provides water impermeability.

NovoCrete® is an environmentally friendly mineral and is 100% recyclable.

Product Information	
Product Name	NovoCrete®
Composition	100% mineral content. Consists of alkaline and Earth alkaline structures. It contains natural oxides, chlorides, sulfates and carbonate minerals.
Description	Mineral Powder of White colored, non-toxic, non detrimental for the health and environmentally friendly.
Origin	Made in Germany
Application	Soil stabilization and soil compaction of almost all kinds of soils including clay, sand, shale, even oil shale, salty soils, soils which are containing organic materials and even -according to the previously made analysis- contaminated soils.
Mechanism	Will be added into the standard cement in the ratio of 2-2,5% and mixed with the soil. NovoCrete® neutralizes the existing acids and supports the hydration process by allowing for longer crystals.
Features of NovoCrete® stabilized soils	It can transform almost all kinds of soils or bases into a very strong, typical 150MN/m2 foundation layer without replacing the existing soil in the field. (for a 30cm thick stabilized surface) The stabilized surface does not allow the penetration of the water or ice. Therefore it significantly increases the physical life of the stabilized layer and does not need maintenance costs for a long time. Stabilized surface is resistant against oil, salt, acids and chemicals.
Application Areas	Any type of roads,railways, storage and industrial surfaces, mines, rural roads, garbage dumping areas, airports etc.





## Areas of Use

■ Infrastructures of the motorways, country roads, ancillary roads, express highways, divided highways, forest paths and agricultural roads

■ Infrastructures of the railways, high speed train tracks, subways, harbor and airports

■ Infrastructures of the dam areas and roads, slope reinforcements, depth foundations, tunnels and tunnel roads, access routes and construction site roads

■ Infrastructures of the heavy load motorways, wharfage premises, logistic areas, wood storage areas, heavy metal areas, grain silos, container storage points

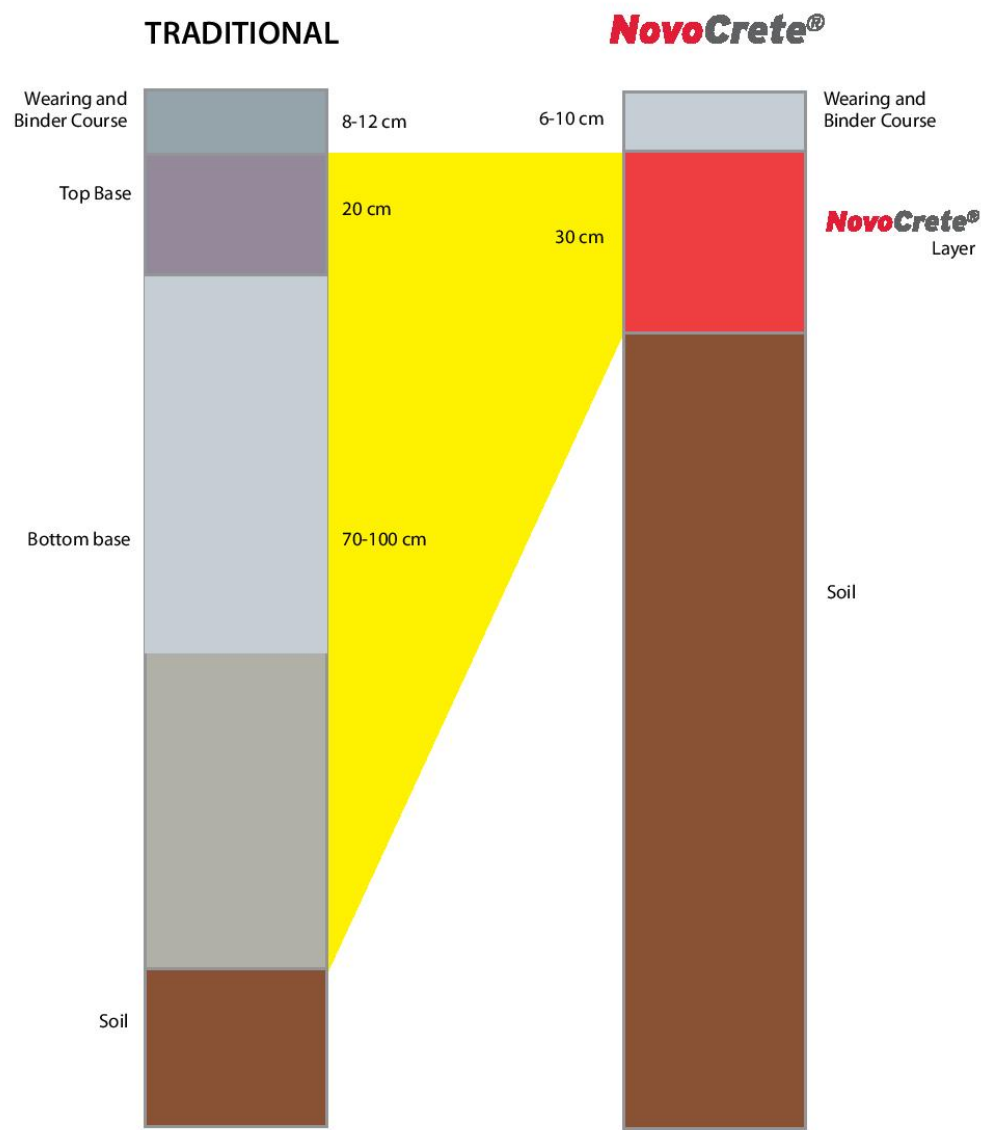
■ Infrastructures of the mining facilities, garbage dumping areas, biogas plants and industrial surfaces

■ Infrastructures of the soil stabilization, ground improvement, landfill sites, drainage, soil embankments, slope reinforcements and wayside

■ Infrastructures of the natural gas lines, oil pipe lines, water channels, sewage and waste treatment plants

■ Infrastructures of the Sport areas, parks and gardens, footpaths, forest paths, parking and holding areas, access roads of the site areas

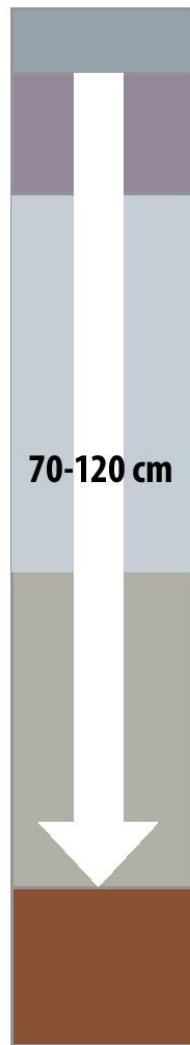
**Comparing NovoCrete® with the Traditional Infrastructure Method**



**Table 1 – Comparing NovoCrete® with the traditional infrastructure method on road construction layers**

**TRADITIONAL**

Excavation and hauling, Crushed stone transportation and spreading is necessary.



**NovoCrete®**

Native soil will be used; no excavation is necessary. For renovation of the old roads, asphalt can also be crushed and blended into the new base layer.



**Table 2 – Comparing NovoCrete® with the traditional method on road excavation works**

**Economy of NovoCrete®**

**Table 3 – Economy of NovoCrete®**

TRADITIONAL		<b>NovoCrete®</b>	
–	Excavation (Machinery-Manpower)	+	Generally no excavation is necessary
–	Transportation to the dumping area	+	No transportation and dumping costs
–	Soil dumping costs		
–	Aggregate-Material cost	+	No aggregate and transportation cost
–	Aggregate transportation cost		
–	Bitumen-wearing layer cost	+	Approximately 50% less bitumen-wearing layer cost is needed
–	Machinery-Manpower cost		
–	Necessary time	+	70% less construction time

**NovoCrete®**



**NO**

Transportation-Aggregate-Base Concrete



**LESS**

Manpower-Duration-Asphalt-Cost

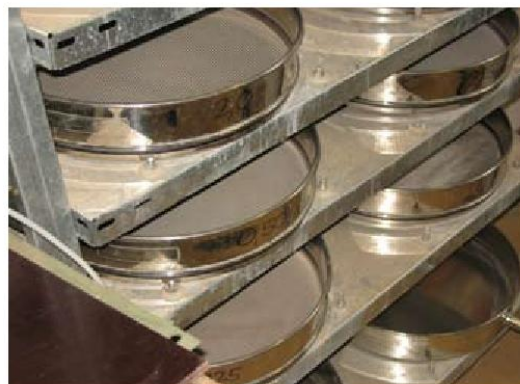
**NovoCrete® eliminates the weaknesses**



**Step by Step NovoCrete®**



**1** Taking the soil sample and measuring the CBR



**2** Determining the quantities of NovoCrete® + cement according to the CBR (generally on 30cm depth, for 1m<sup>2</sup> area 50 kg cement + 1 kg NovoCrete®)



**3** Leveling with a grader



**4** Spreading of NovoCrete® and cement mixture with spreading machine



**5** Mixing of NovoCrete®, cement and water with a soil-mixing Machine



**6** Irrigation of the surface



**7** Compaction the surface with vibrating drum roller



**8** Leveling the surface with single drum roller



**9** Result:  
Base mechanic is finished and it is ready for  
spreading the bitumen-asphalt layer

## Necessary machineries for a new road construction



Bulldozer



Grader



Vibrating Drum Roller



Drum Roller



NovoCrete®- Cement Spreader



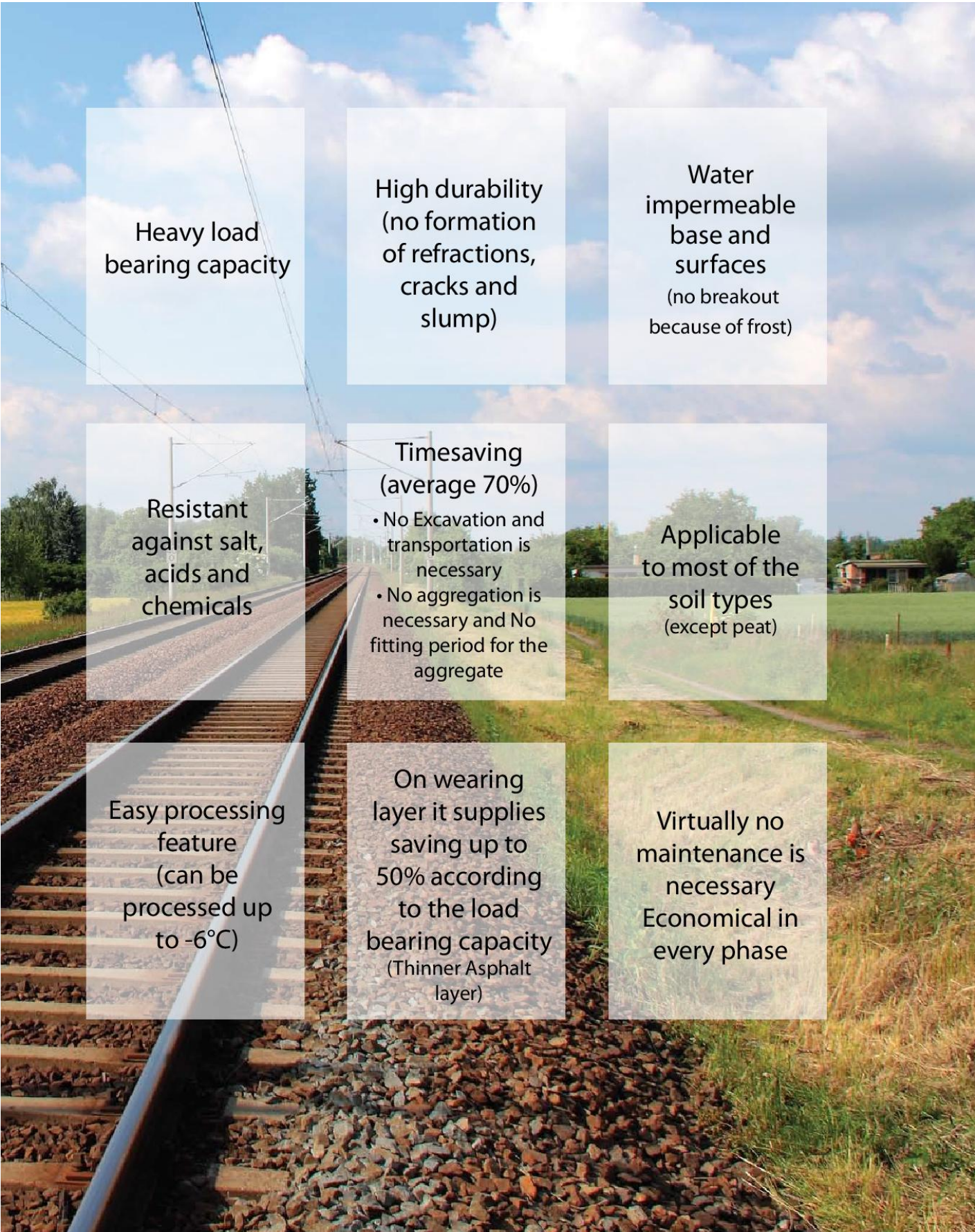
Mixer (manual)



Mixer (automatic)



## Advantages of NovoCrete®



Heavy load  
bearing capacity

High durability  
(no formation  
of refractions,  
cracks and  
slump)

Water  
impermeable  
base and  
surfaces  
(no breakout  
because of frost)

Resistant  
against salt,  
acids and  
chemicals

Timesaving  
(average 70%)

- No Excavation and transportation is necessary
- No aggregation is necessary and No fitting period for the aggregate

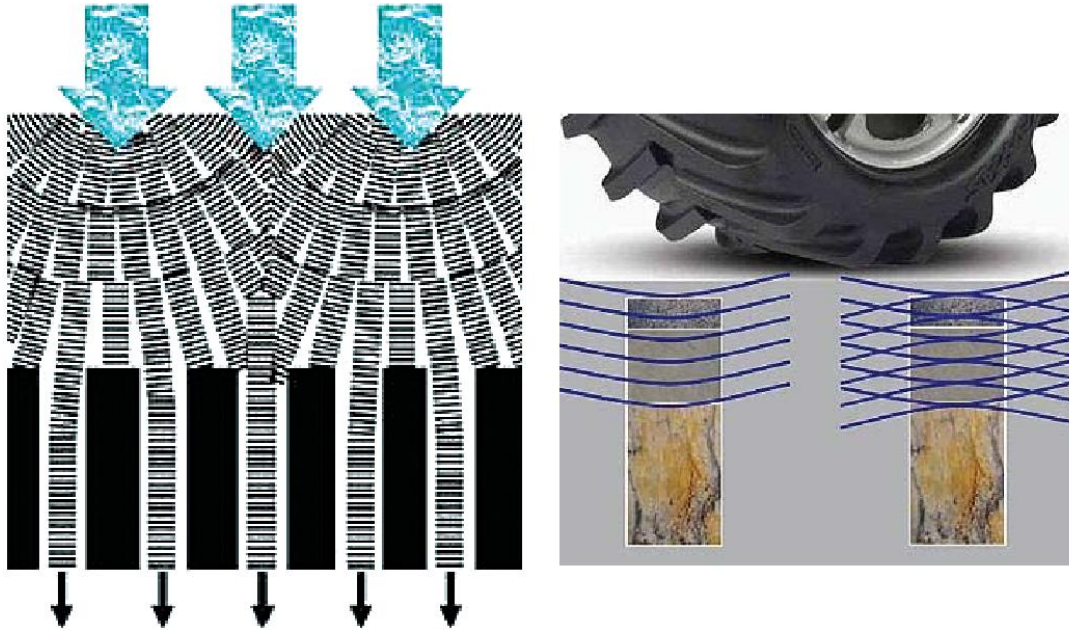
Applicable  
to most of the  
soil types  
(except peat)

Easy processing  
feature  
(can be  
processed up  
to -6°C)

On wearing  
layer it supplies  
saving up to  
50% according  
to the load  
bearing capacity  
(Thinner Asphalt  
layer)

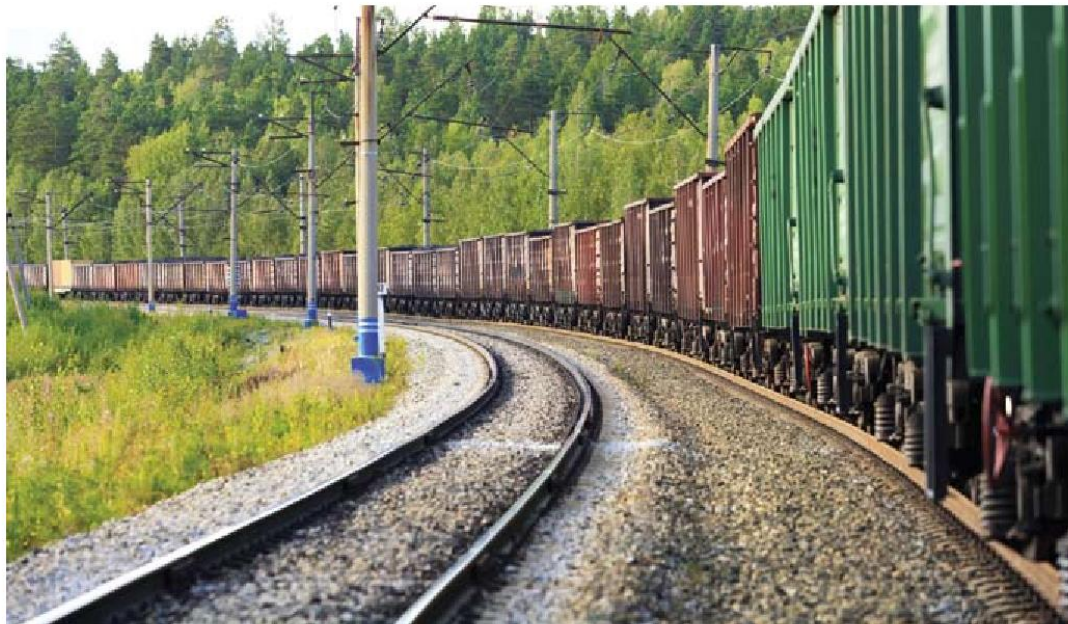
Virtually no  
maintenance is  
necessary  
Economical in  
every phase

### Heavy load capacity



The stabilized layers have a very high load bearing capacity due to the long needle like crystals (vertical dive) that form during the hydration process.

The stabilized layers generated are very high in tensile strength which allows for the absorption of vibration from heavy trucks and equipment. These layers achieve a flexibility that allows for the vibratory movement.



## High durability

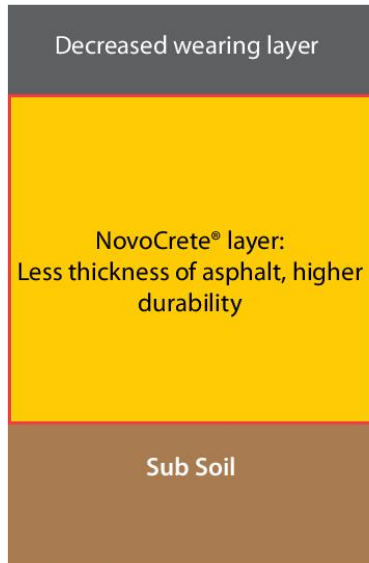


Table 4 – High Durability

## Resistant against acid, salt and chemicals

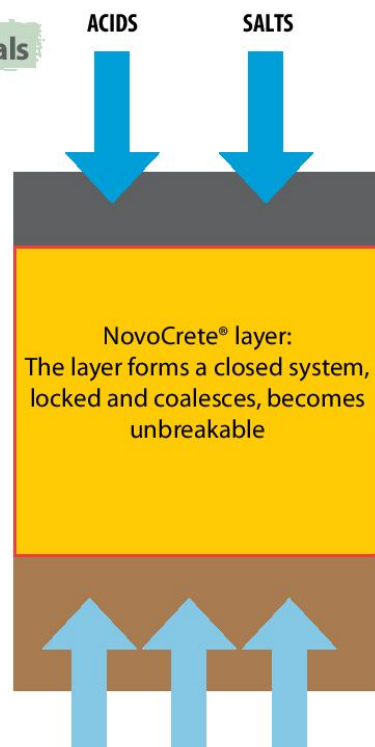


Table 5-  
Acid, salt  
and  
chemicals  
are not  
penetrating  
into the  
layer.

**Leak-Proof Surfaces**



When water penetrates into the traditional layer, the compression will be corrupted. However NovoCrete® forms water impermeability endurance. Thus, there will be no intricate, pothole and groove, it is frost resistant.

Table 6 – Comparing the NovoCrete® stabilization with the traditional method

TRADITIONAL	<b>NovoCrete®</b>
Stabilized layer allows water to penetrate due to cracks and open grain soils, thus not frost resistant.	Stabilized layer does not allow water/liquid penetration, thus is frost resistant.
Fluid spills may become very costly due to excavation, hauling and depositing.	Low cleanup costs due to fluid spills as they remain on surface.
Low life span due to aforementioned reasons.	Longer life span due to aforementioned reasons.
Life span may be lengthened with a friction surface via concrete or 4" – 7" of asphalt pavement.	Life span may be extended up to 20 years with as little as a 1" friction surface.

## Adaptable to most soil types



NovoCrete® can be applied to most of the soil types. Soils may include clay, sand, shale and even oil shale.

Single grain sands or organic matter can be stabilized.

Soils high in salt content can also be stabilized with NovoCrete®

**Table 7 – Comparing the NovoCrete® stabilization with the traditional method**

TRADITIONAL	<b>NovoCrete®</b>
High cement blends will cause failure with clay soils that are high in sulfates.	No failure with clay soils high in sulfates.
Unable to stabilize single grain sands or organic matter.	Able to stabilize single grain sands or organic matter.
Unable to stabilize soils with high salt content.	Able to stabilize soils with high salt content.
Unable to stabilize contaminated soils.	Able to stabilize contaminated soils.

## Virtually no maintenance is necessary



With NovoCrete® maintenance-repair costs decrease to minimum, because it does not necessitate the maintenance. There are no potholes to fill. There is less to no cracking in the asphalt layer. As the sub-grade does not fail, higher life span will be supplied.

**Environmentally friendly**

NovoCrete® is an environmentally friendly product. Contaminated soils can be stabilized and utilized within the new stabilized layer.

Able to reclaim roads back to native by grinding layer into soil, reshape and seed thus resulting in a more environmentally sound method than current methods.

Spills have low clean up costs due to the water proof surface.



**Table 8 – Comparing the NovoCrete® stabilization with the traditional method**

TRADITIONAL	<b>NovoCrete®</b>
Stabilized layer may fail within one year due to freeze/thaw without friction surfaces.	With proper blending, stabilized layer will outlast traditional method due to freeze/thaw issues.
Cannot be tailored blended for soil types.	Can be tailored to specific soil types.
Expensive repeated maintenance required.	Will significantly reduce maintenance costs.
Environmentally unfriendly.	Environmentally friendly.

## Time and manpower saving

Table 9 – Workflow and Daily Capacity for the Rural Local Road Projects Constructed with NovoCrete® System

Sequential process steps	Capacity-m <sup>2</sup> /day	Necessary Manpower
Preparing the surfaces	3000	5
Spreading NovoCrete®, mixing with soil, irrigating, compressing	3000	6



## Economic

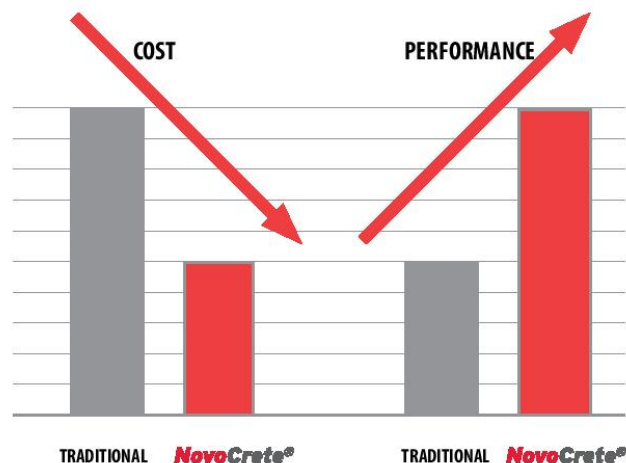
NovoCrete® decreases the storage costs.

Uses existing soil in construction of the foundation layers.

It allows soil with organic components to flow into the stabilization process.

It eliminates the use of crushed mineral-aggregates for foundation layer or base.

It slopes the sub-base to provide drainage of the construction area.



## Reference application - Motorway

Work : Restoration of the state road between Batina and the Serbian border using the cold-recycling technology and the cement additive NovoCrete®

Location: Batina-Croatia

Date: June 2011

Time Needed : 15 days

Mixture: 33 kg/m<sup>2</sup> (98% cement, 2% NovoCrete®)

Milling Depth: 30cm



Finished Area



Initial situation



Crushing the old asphalt layer



Spreading the NovoCrete®- Cement Mixture



Mixing the NovoCrete®- Cement-Soil-Old Asphalt Layer by adding water



Making the Static and Dynamic compression with Steel Drum Roller



Irrigating the Area



Leveling the Surface with Steel Drum Roller and Grader

## Reference application - Railway

Work: Ground improvement for the new railway track at the SSB line between Cham-Rotkreuz

Location: Cham-Rotkreuz, Switzerland

Surface: Approximately 5,000 m<sup>2</sup>

Date: October 2011

Time needed: 2 days

Mixture: 60 kg/m<sup>2</sup> (98% cement, 2% NovoCrete®)

Milling depth: 30cm



Starting situation (rough plane)



Special grubber in action



Stone Crusher in action



Spreading the NovoCrete® - Cement Mixture



Milling the NovoCrete® - Cement Mixture



Leveling the Surface



Surface after the stabilization and compression

**Some of our global references**



**Stuttgart, Germany**

Date: December 2011

Time needed: 2 days

Mixture: 56 kg/m<sup>2</sup> (98% cement + 2% NovoCrete)

Milling Depth: 25-40 cm



**Stockach, Germany**

Date: November 2011

Time needed: 3 days

Mixture: 62 kg/m<sup>2</sup> (98% cement + 2% NovoCrete)

Milling Depth: 30-35 cm



**Dunningen, Germany**

Date: October 2011

Time needed: 1 day

Mixture: 52 kg/m<sup>2</sup> (98% cement + 2% NovoCrete)

Milling Depth: 35 cm



**Berlin, Germany**

Date: October 2011

Time needed: 2 days

Mixture: 56 kg/m<sup>2</sup> (98% cement + 2% NovoCrete)

Milling Depth: 35 cm



**Ereke, Indonesia**

Date: September 2011

Time needed: 5 days

Mixture: 62 kg/m<sup>2</sup> (98% cement + 2% NovoCrete)

Milling Depth: 30 cm



**Vordemwald, Switzerland**

Date: October+June 2011

Time needed: 6 days

Mixture: 62 kg/m<sup>2</sup> (98% cement + 2% NovoCrete)

Milling Depth: 30 cm



**Pfullingen-Neu Buch, Germany**

Date: July 2011  
Time needed: 3 days  
Mixture: 62 kg/m<sup>2</sup> (98% cement + 2% NovoCrete)  
Milling Depth: 30 cm



**Hufingen-Behla, Germany**

Date: July 2011  
Time needed: 1 day  
Mixture: 60 kg/m<sup>2</sup> (98% cement + 2% NovoCrete)  
Milling Depth: 30 cm



**Bünzen, Switzerland**

Date: February 2011  
Time needed: 2 days  
Mixture: 60 kg/m<sup>2</sup> (98% cement + 2% NovoCrete)  
Milling Depth: 25 cm



**Rothenlachen, Germany**

Date: October 2010  
Time needed: 5 days  
Mixture: 60 kg/m<sup>2</sup> (98% cement + 2% NovoCrete)  
Milling Depth: 30 cm



**Gontenschwil, Switzerland**

Date: October 2010  
Time needed: 4 days  
Mixture: 60 kg/m<sup>2</sup> (98% cement + 2% NovoCrete)  
Milling Depth: 30 cm



**Wittenau, Switzerland**

Date: October 2010  
Time needed: 4 days  
Mixture: 62 kg/m<sup>2</sup> (98% cement + 2% NovoCrete)  
Milling Depth: 30 cm



**USA, Daimler Chrysler Laredo Texas test lane:** Renewal of a lane and making NovoCrete® base layer  
Surface: 10,000m<sup>2</sup>  
Date: May 2004  
Time needed: 2 weeks  
Mixture: 60 kg/m<sup>2</sup> (98% cement + 2% NovoCrete)  
Milling Depth: 25 cm



**Switzerland, Unterlunkhofen state highway:** Renewal of a lane and making NovoCrete® base layer  
Surface: 7,500m<sup>2</sup>  
Date: December 2006  
Time needed: Crushing 2 days, road construction 4 weeks  
Mixture: 62 kg/m<sup>2</sup> (98% cement + 2% NovoCrete)  
Milling Depth: 25 cm



**Poland, Renewal of the forest paths:** Making the NovoCrate® base and frost preventing layers of the forest paths used for timber transportation  
Surface: 25,000m<sup>2</sup>  
Date: June 2004  
Time needed: 2 weeks  
Mixture: 52 kg/m<sup>2</sup> (98% cement + 2% NovoCrete)  
Milling Depth: 25 cm



**Equatorial Guinea, Malabo Harbor premises:** Making the base layer of the pier on which the container traffic is performed with NovoCrete®  
Surface: 40,000m<sup>2</sup>  
Date: 2002-2003  
Time needed: 4 weeks  
Mixture: 50 kg/m<sup>2</sup> (98% cement + 2% NovoCrete)  
Milling Depth: 30 cm



**Malaysia, Jalan Pakoti Timur renewal of the agricultural Road:** Renovating the agricultural road goes between palm plantations and used by heavy load vehicles with nature-identical surfaces  
Surface: 11 km  
Date: August 2006  
Time needed: 6 weeks  
Mixture: 60 kg/m<sup>2</sup> (98% cement + 2% NovoCrete)  
Milling Depth: 30 cm



**Russia, Kaluga VW production building:** Making the NovoCrate® and frost preventing layers of the production building  
Surface: 10,000m<sup>2</sup>  
Date: October 2006  
Time needed: 1 week  
Mixture: 52 kg/m<sup>2</sup> (98% cement + 2% NovoCrete)  
Milling Depth: 40 cm



**Germany, Markgröningen container storage area:** Making the NovoCrete® base layer by applying double surface treatment (crushed stone and bitumen tar) against the high pressure created by the stored containers.  
Surface: 7,500m<sup>2</sup>  
Date: 2003  
Time needed: 1 week  
Mixture: 60 kg/m<sup>2</sup> (98% cement + 2% NovoCrete)  
Milling Depth: 35 cm



**Germany, Berlin timber station:** Making the NovoCrete® and frost preventing layer in the transportation and storage area where the heavy load vehicles are used.  
Surface: 80,000m<sup>2</sup>  
Date: 2003, 2005, 200  
Time needed: 2 weeks for each operation  
Mixture: 56 kg/m<sup>2</sup> (98% cement + 2% NovoCrete)  
Milling Depth: 30 cm



**Dortmund BMW Branch Office building:** To protect the stowage facility in the new planned building and transforming the existing inlay into the base layer.  
Surface: 5,000m<sup>2</sup>  
Date: September 2002  
Time needed: 1 week  
Mixture: 62 kg/m<sup>2</sup> (98% cement + 2% NovoCrete)  
Milling Depth: 80 cm (sandwich technique)



**Beek en Donk Holland building a Wharfage:** Making the surface base for a wharfage building without having an individual or excavated foundation, compressing the supporting elements directly in NovoCrete® base layer.  
Surface: 2,500m<sup>2</sup>  
Date: December 2001  
Time needed: 2 days  
Mixture: 72 kg/m<sup>2</sup> (98% cement + 2% NovoCrete)  
Milling Depth: up to 70 cm



**Salzwedel, Germany Construction of the sewage lines used by the "inter-plant mixing" processes:** Making the base and frost preventing layer of the natural stone basins used for the "inter-plant mixing"  
Surface: 20,000m<sup>2</sup>  
Date: 2002-2003  
Time needed: 4 days  
Mixture: 50 kg/m<sup>2</sup> (98% cement + 2% NovoCrete)  
Milling Depth: 30 cm



**Wroclaw, Poland building a logistic center:** Making the base and frost preventing layer of the transportation building and traffic areas of a logistics center.  
Surface: 22,000m<sup>2</sup>  
Date: December 2002  
Time needed: 2 weeks  
Mixture: 52 kg/m<sup>2</sup> (98% cement + 2% NovoCrete)  
Milling Depth: 25 cm



**Alikon-Abtwil, Switzerland widening K38 state highway:** Making the base and frost preventing layer with NovoCrete® for widening the state highway.  
Surface: 200m  
Date: August 2001  
Time needed: 1 day  
Mixture: 180 kg/m<sup>3</sup>  
Milling Depth: up to 30 cm



**Gemert-Bakel, Holland Bicycle paths:** Making the base and frost preventing layer with NovoCrete® of the areas used by the cyclists. Using the nature dential surface without adding any asphalt layer.  
Surface: 22,000m  
Date: August 2006  
Time needed: 1 week  
Mixture: 170 kg/m<sup>3</sup>  
Milling Depth: 25 cm



**Germany, Ostfildern-Scharnhausen Shipping company:** Making the base and frost preventing layer of the building, plant ground and transportation roads of a shipping company.  
Surface: 10,000m  
Date: December 2000  
Time needed: 2 weeks  
Mixture: 150 kg/m<sup>3</sup>  
Milling Depth: 100cm (in three stages)



**Salzwedel, Germany Construction of the sewage lines used by the "inter-plant mixing" processes:** Making the base and frost preventing layer of the natural stone basins used for the "inter-plant mixing"  
Surface: 20,000m<sup>2</sup>  
Date: 2002-2003  
Time needed: 4 days  
Mixture: 150 kg/m<sup>3</sup>  
Milling Depth: 30 cm

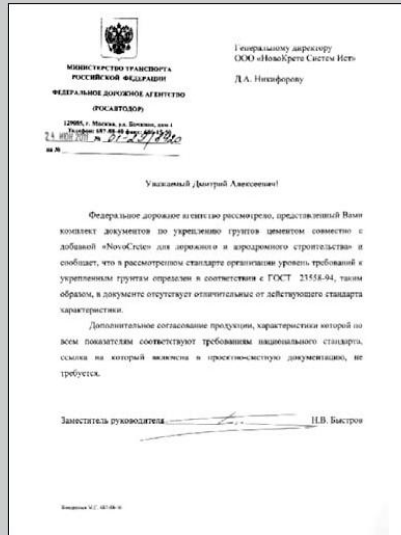


**Road Project in Malaysia;**  
-Four test lanes built with the traditional methods have been damaged in a short time.  
-The road, constructed with NovoCrete® created the difference.



**Rheinfelden, Switzerland Strengthen K292 state highway:** Making the base and frost preventing layer with NovoCrete® for strengthen the state highway.  
Surface: 990m  
Date: May 2006  
Time needed: 2 days  
Mixture: 180 kg/m<sup>3</sup>  
Milling Depth: 30 cm

## Laboratory Tests



### Russian Federation Ministry of Transport Federal Motorway Agency (Rosavtodor)

According to the investigation made for motorways and airport construction, stabilizing the soil with cement prepared by adding "NovoCrete", it is stated that it conforms to GOST 23558-94 standard.

24 June 2011  
No. 01-29/8420

### Hessen Federal State Construction Materials and Ground Test Office Test Report

For soil stabilization compressed resistance test  
Material: SAUDI P1 (sand-silt/rough soil mixture)  
Sample: Cylinder, diameter 100mm  
Code: 429a, b  
Results: 429a 429b  
E-module: a) 440 N/mm<sup>2</sup> b) 310 N/mm<sup>2</sup>  
Refraction resistance: a) 41,93 kN b) 31,33 kN  
Compression resistance: a) 5,33 N/mm<sup>2</sup> b) 4,50 N/mm<sup>2</sup>  
Mixing ratio: For each m<sup>3</sup> soil  
190kg additive, 98% cement, 2% Novocrete

### Hessen Federal State Construction Materials and Ground Test Office Test Report

For soil stabilization compressed resistance test  
Material: SAUDI P2 (sand-silt/rough soil mixture)  
Sample: Cylinder, diameter 100mm  
Code: 432a  
Result: 432a  
E-module: a) 500 N/mm<sup>2</sup>  
Refraction resistance: a) 35,30 kN  
Compression resistance: a) 4,49 N/mm<sup>2</sup>  
Mixing ratio: For each m<sup>3</sup> soil  
190kg additive, 98% cement, 2% Novocrete

## Innovative solutions that change the world

The life is meaningful with sustainable environment. Nowadays global economy is targeting the sustainable techniques and applications which take care about the ecological balance.

Therefore our contemporary world is discarding the technologies which stayed behind the scientific and technological developments. The innovative, environmental friendly, long lasting and economical solutions are recognizing as the basic dynamics of the development.

JAGS has started with the mission to offer the innovative and creative products and techniques for the furtherance of public welfare in services orientated to the basic areas of the life. It brings together the products and applications developed by the science and technology with the private sector, besides the public and local administrations.

As one of these NovoCrete® is an innovative, creative and at the same time natural and economical system in comparison with the traditional applications which are not using the sources in an efficient way, harmful for the nature and expensive.

The future will exist in the world of innovative and creative solutions.



**jags** innovative products

**NovoCrete®**

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