

BTIS

Concrete reconstruction and crack injection is our business



Impressum

BTIS

BetonTechnik - InjektionsSysteme

Artlenburger Landstraße 39
21365 Adendorf

Tel.: +49 4131 159 26 90

Fax: +49 4131 159 26 91

E-Mail: info@BTIS.de

Web: www.BTIS.de

„We start where others have to stop“

BTIS GmbH – Competent solutions in constructions!

We would like to introduce our company and our competences for structural repair work and especially for the complete refurbishment of structures. The focus of our technology is the MegaBond®-Injection-Process which we use in Europe!

This unique method has the following distinctions:

Low pressure

The MegaBond® -Injection-Process, with the specially developed machinery, works on a low pressure system (0 – 5 bar). Here it is guaranteed that due to the low pressure, the resin will fill even the finest cracks which cannot be reached by high pressure.

No drilling necessary

The combination of materials, machinery and appropriate experience enables the injection of the finest cracks, without drilling and without the use of packers or other assisting machinery. We use the existing opening of the crack for the injection; due to this process we cause no damage to the surface textures. Only, if absolute necessary, we use injection clip pins.

When the cracks are blocked up by dirt, build-up of lime scale or otherwise sealed up, so that no penetration is possible, the crack has to be drilled open slightly. Usually we reach the opening of the crack after a drilling depth of 5 mm. A clip pin will be fitted through which the resin is injected.

Micro-cracks

Due to the low pressure MegaBond® -Injection-Process, it is possible to repair cracks from the surface with only a width of 0.15 mm and reach the branching of the cracks with width of 0.01 mm, and even below. When the MegaBond® -Injection-Process is used at the beginning of damage to the structure, the micro-cracks will be fully sealed. Further extensions to the cracks will be limited.

Injection not only in dry conditions, also against oppressive water

The composition of our resins is distinguished as they can be used not only on dry surfaces, but also in wet conditions. Our standard resin “MegaBond® 2K” can be injected against oppressive water – also in statically stressed, water carrying cracks. A further development of the resin even allows the use of the process under water with temperatures of only 4°C. During the injection the resin pushes the water out of the crack.

Professional repair of construction components

The excellent qualities of the MegaBond® -Injection-Process enables us to carry the draw- and pressure strains, which are caused by temperature differences within the structure, in the shortest time so that these strains cannot have a negative effect on the bonding quality.

The MegaBond®-Injection-Process can also be used on dynamically stressed cracks. This is important due to the fact of moving traffic during the repair time.

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Not only an empty phrase. “With the MegaBond® -Injection-Process and the implementation of especially for that process developed low viscosity resins, we reach cracks through the low pressure system, which cannot be reached by high pressure”.

This has been verified by the tests done and the achieved results by the Hansa-Bau-Laboratory in Hamburg, which can be seen in the references on the last pages.

They tested an original sample which was taken from a bridge and which has been repaired by us. We used our standard resins with the name “MegaBond® 2K”.

Firstly, we could prove that the pressure stability of the injected concrete was returned to the former original stability or... it was slightly improved.

Secondly, through the microscopic tests it was confirmed that the “MegaBond®-Injection-Process”, with the low viscosity resins, really reached the finest parts of the cracks, filled and restored them fully.

The components of the resins are mixed directly on site. On the front of the injection area we have a special mixer head which has been developed for this reason. Then the resin is injected directly into the crack with pressures between 0 – 5 bar. Complicated installation of so called packers is unnecessary.

If it is not possible to access the crack because of dirt deposits, lime scale or others, we open the crack slightly on the surface with a diamond drill of only 10 mm diameter until we reach an opening to the crack. This is usually archived with a drilling depth of 5mm.

The drilling hole is fitted with the so-called clip pin's which is made of plastic and connected to a plastic hose with the mixer head.

The surface of the cracks will be sealed with a fast hardening filling paste. This is removed after injecting the cracks without leaving any traces to the surface. This process is called “Sealing”.

The injection process can be done now.

Depending on the structure of the cracks or the type of the repair work, we can leave openings in the filler in certain intervals to place more clips to control the resin-flow. Has the resin reached those openings they will be either sealed or they will be used to set more clip pins for further injection. After hardening of the resin components, the sealant and, if necessary, the clip pins will be removed and the little holes sealed off, finished.

This procedure has been done successfully for many years. Some of our projects you will find on the following pages.

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As a licensed company per **ZTV-ING** we work with a unique low pressure process (MegaBond®-Injection-Process) and repair, fast and long-lasting, damages on building structures.

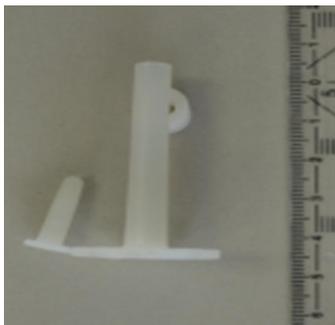
Further to this we also offer other work that might be necessary before or after the injection. Amongst others we offer:

- Cement repair as per ZTV-ING
- Coatings as per ZTV-ING OS-F, OS-D, etc.
- Tunnel repair and sealing
- Sealing against oppressive water (positive / negative up to 7 bar)
- Repair of sewage-works
- Overhaul of ducts / Sealing
- Stabilisation of underground
- Sealing of swimming pools
- Core drilling
- Restoration of facades
- Guniting works
- Jet works
- Protection against corrosion

Some examples of the terminology and our unique injection-technique



This is our mixer head, in which the components of the resin are mixed shortly before the injection



Here you can see a clip. On the left hand side is the sealing plug. This is used only if needed and will be connected with a plastic hose to the mixer head.



Example of an injection-pump. This pumps the components to the mixer head, in which, only then the mixing takes place. The pump controls the set pressure of the injection and automatically starts pumping when the set pressure drops.



In the following we would like to show you some of the work our team has done:

- **Damaged bridges over highway in Maschen,**
Hamburg, Page 8
- **Heat and power station Reuter West der Vattenfall**
Europe Berlin AG & Co. KG, Page 11
- **Bridges A261, BW 7503, 7504,**
Verden, Page 13
- **Cement water pipeline,** Thessaloniki / Griechenland, Page 15
- **Wind power plant,** Hamburg, Page 17
- **Holocaust-Memorial,** Berlin, Page 20
- **Supermarket,** Bochum, Page 21
- **Highway A7 / Underpass K2,** Bisingen, Page 23
- **Highway A 27,** Achim-Ost / Verden-Nord, Page 27
- **Airport Düsseldorf,** Page 29
- **Historical Harbour Övelgönne,** Hamburg, Page 31
- **Hamburgs Sewage Works,** Page 32
- **Underground Garages,** Hamburg Bahrenfeld, Page 33
- **Villa Elbchaussee,** Hamburg, Seite 35
- **Mining-damage / Medical rooms,** Erkelenz-Gerderath,
Page 36
- **Test report Hansa-Bau-Laboratory, Attachment**

„We begin where others have to stop“

BTIS GmbH – Competent solutions in constructions!

MegaBond®-Injection-Process **Low pressure-Injection-Process**

- No packers, no drill holes
- 2-Components, Low pressure
- Crack injection in the dry and wet
- Against pressing water and underwater
- Lowest and high temperatures
- From 0,15 mm crack width
- Penetration to 0,01 mm in branching out crack

Technical Solutions

- Crack injection without damage
- Filling in of cavities
- Corrosion protection of the reinforcement
- External reinforcement without air pockets
- Special –relining
- Extreme persistent against Gamma-Rays
- Protection of Monuments

Project:
Hamburg, Renovation of a highway bridge at the interchange Maschen, A1 and A7



1) Overview, building site at bridge Maschener-Interchange at A1. Emblem on right hand side of Hamburg's Michel, made of tiles



2) Preparation of the cap area for crack injection. The cap was cracked right through to the bottom area and was fully restored with the MegaBond®-Injection-Process.



3) Preparation of crack injection in the cap area. Because the cap area was cracked right through, the clip pins were set from the bottom and injected from there.

Project:
Hamburg, Renovation of a highway bridge at the interchange Maschen, A1 and A7



1) High pressure water jet as per ZTV-ING to expose the hollow areas and the corroded steel-reinforcement.

2) High pressure water jet as per ZTV-ING to expose the hollow areas and the corroded steel-reinforcement



3) Finished renovation of the underpass after high pressure water jets, foundation, first and second coating

Project:
Hamburg, Renovation of a highway bridge at the interchange Maschen, A1 and A7



1) Bridges steel carrier beam with first, red coating of corrosion protection after high pressure water jets as per ZTV-ING had cleaned away the damaged old corrosion protection.



2) Bridges steel carrier beam coated with second layer of corrosion protection in yellow as per ZTV-ING and the next step in transition the blue coating (right picture)



3) Bridges steel carrier with completed corrosion protection in blue.

Project:
Vattenfall, Heat and Power Plant

Customer:
Heizkraftwerk Reuter West der Vattenfall Europe Berlin AG & Co. KG

Crack overpressure:

- Oppressive-water-pipe (1,60 m), 3,5 m below the surface
- Sump pit (80 x 80 x 3,50 m), approx. 25 running meters of cracks with different crack width, with a concrete wall thickness of 40 cm.

Corroded reinforcement lead to cracking on both structures Through the unique low pressure process the MegaBond®-Injection-Process the reinforcement could be encased with the special resin and the water flow was stopped. The cracks (crack width 0,1 – 1,2 mm) were filled and completely closed. Through building specifications the entrance to the oppressive water pipe and the sump pit was only accessible from inside.

Crack injection:

The cracks in the basin wall from only 0,6 mm had to be fixed in order to avoid the cooling water to press forward and to cause damage. For this all of the cooling water of one half of the cooling tower had to be drained.



The work was carried out, without disturbing the production of the Heat and Power Plant Reuter West der Vattenfall Europe Berlin AG & Co. KG.

The complete cooling water of one half of the cooling tower had to be drained to be able to check the cracks in the basin wall. Even though the cracks were only 0,6 mm wide the danger existed that the cooling water would advance to the reinforcement and cause damage. The right task for our MegaBond®-Injection-Process.



The MegaBond®-Injection-Process is perfectly suited for crack width under 0,6 mm and even smaller branching of cracks.

Project:
Vattenfall, Heat and Power Plant



2) Without disturbing the production of the cooling tower a crack was injected at the basin wall.



3) After the excavation it is clearly visible, the crack carries water



4). Here we will fit our drill clip pins which will be drilled 10 mm deep into the crack with a wet diamond drill of 13 mm

Project:

Bridge overpasses A261, BW 7503 and BW 7504

Full restoration and sealing injection work at the concrete counterforts of the bridge as well as the bridge cap

Contractee:

Niedersächsische Landesbehörde für Straßenbau und Verkehr, Geschäftsbereich Verden, Leiter Herr Fricke Tel: 04231-9239214

Approx. 284 running meters of cracks were treated repeatedly in the past with a high pressure procedure without success. With the MegaBond®-Injection-Process the cracks were injected fully to its full depth (approx. 1200 mm) even though the crack-opening was blocked by previous high pressure injections.



1) MegaBond®-Injection-Process, injection with two injection pistols. It was necessary to inject 800 – 1000 mm into the counterforts.



2) The proof of the successful injection. A core drilling was done 450 mm deep. The core tip is approx. 200 mm long.

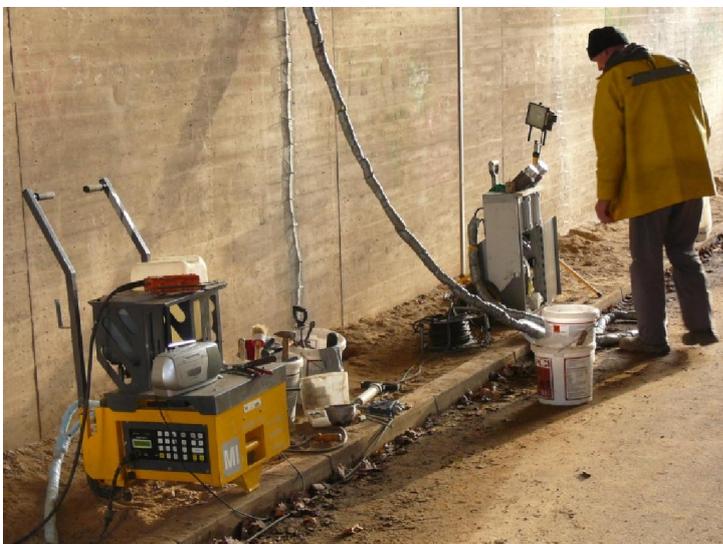
Project:
Bridge overpasses A261, BW 7503 and BW 7504
Full restoration and sealing injection work at the concrete counterforts of the bridge as well as the bridge cap



3) As the cracks were partially blocked up a core drill was used to drill 10 mm deep into the material to set our special clip pins.



4) After the core was taken out the drill hole, one can see the resin running out the drill hole.



5) To increase the production of the team, several injection pumps were used.

Project:
Thessaloniki, Greece
Reinforcing sealing of a concrete water pipeline

Customer:
ExelKAT, Athens

One of the main supply pipes of Thessaloniki shows over the total length of 50 km of cracks, which led to a serious water loss.

The main problem was that the crack injection had to be done, while the pipe was in use, and without having any access to the inside of the pipe.

Especially here the advantage of the low pressure aspect of the MegaBond®-Injection-Process came into full swing. The existing water pressure of 2 bar was used as a barrier from the inside.



1) The 2 m in the soil.



2) The force of the water after removing the outer cover.



3) The first clip pins was fixed to the crack.

Project:
Thessaloniki, Greece
Reinforcing sealing of a water pipeline



4) The relief or alternatively the injection pipes are fixed to the clip pins.



5) The spectacular result after removing the surface cover.



6) To restore the outer coating a carbon-fibre with epoxy resin was used.

Project:
Wind Power Plant, Ochsenwerder
Cracks in the foundation

Customer:
Windfang e.G. FrauenEnergie Gemeinschaft

The speed of wind threatened to lift the wind turbine out of the cracked foundation.



There is no sealant on the surface, therefore cracks developed.

Project:
Wind Power Plant, Ochsenwerder
Cracks in the foundation

Custom: Windfang e.G. FrauenEnergie Gemeinschaft

Bontech - Check / Analyse



Fertigstellung



Aufschüttung



übliche
Bauweise

**Professional restoration to the full strength
through the MegaBond®-Injection-Process**

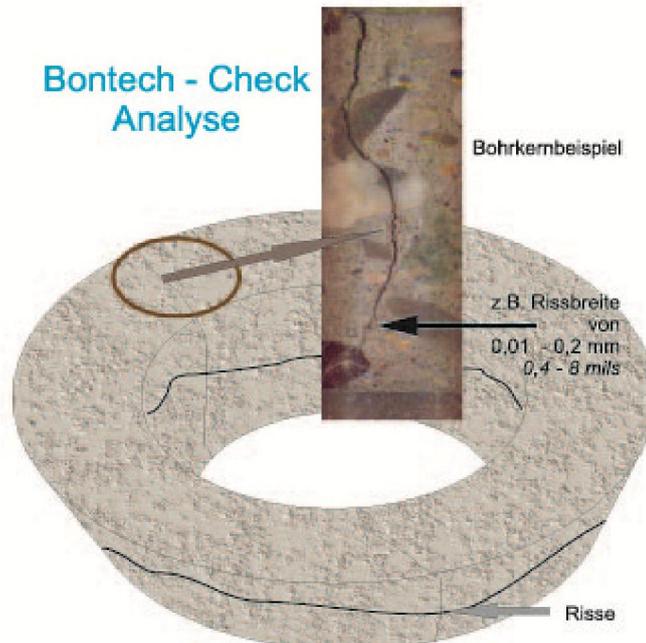
Durch kompetentes Know-how in der Sanierung- und Instandsetzung lösen wir Probleme bei Rissbildungen in den Windkraftanlagen - Fundamenten auf besonderer Art.

Im Umkehrschluss der sonst üblichen Fundament - Bauweise legen wir den Sockel im oberen Ansatz frei, um somit einen Zugang zum oberen und seitlichen Betonsockel bekommen.

Durch eine genaue Rissanalyse und einer Rissverlaufszeichnung wird ein exaktes Schadensprotokoll erstellt.

Dann wird mit dem Auftragsgeber die Vorgehensweise abgesprochen. Ziel ist es, dauerhafte, kraftschlüssige Riss-Sanierungs- und Instandsetzungsarbeiten fachmännisch umzusetzen.

Bontech - Check Analyse



Project:
Wind Power Plant, Ochsenwerder
Cracks in the foundation

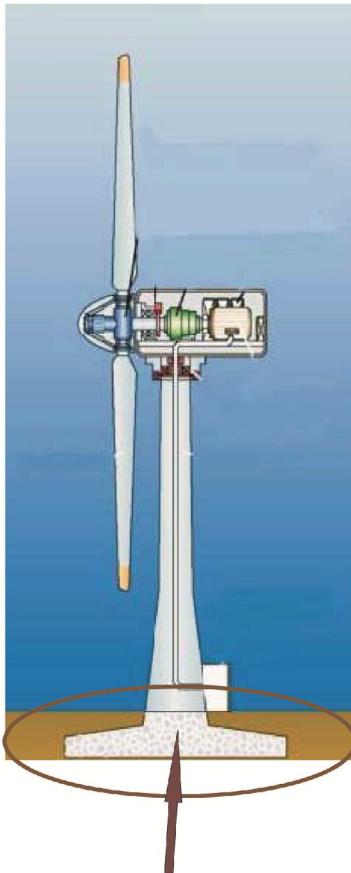
Customer: Windfang e.G. FrauenEnergie Gemeinschaft

Bontech-Sanierungskonzept

Nach der Schadensanalyse erfolgt das Bontech-Sanierungskonzept

Durch den Bontech - Check erhalten wir alle wichtigen Informationen, um ein Sanierungskonzept pro Anlage zu erstellen.

Dadurch finden wir die ideale Lösung um die effektivste Variante der anstehenden Instandsetzung umzusetzen. Dabei berücksichtigen wir alle bautechnischen Vorgaben in Verbindung unserer Bontech-Technologie zur Sanierung bzw. zur Instandsetzung aller Windkraftanlagen - Fundamente.



Unsere vollste Konzentration gilt den Betonfundamenten und anderen Baustoffgruppen, die für eine Bontech- Reparatur in Frage kommen.

Hierfür garantieren wir durch höchster Qualität in der Bau-/Instandsetzungs-ausführung



Bontech - Sanierungskonzept

1. Schnitt 5 cm tief mit Diamantscheibe für Stemmarbeiten um Erschütterung im Beton zu vermeiden
2. An der Innen- u. Außenstahlhülle wird ca. 5 cm tief Beton herausgestemmt, mit einem Abstand von 2 cm zum Stahl
3. Darauf wird 3-fach Aquafin 2K zur Abdichtung aufgetragen
4. Darauf kommt dann C 25 Beton mit Dichtmittel, mit 20 mm Abstandshaltung zur Innenmetallwand
5. Die Bewehrungseisen werden vor Korrosion 3-fach geschützt bzw. beschichtet
6. Die Außenfläche wird mit Vergussmörtel Indukret VK 115 beschichtet. Dabei bleibt ein 20 mm Abstand zum Pfeiler und das Material läuft von 30 mm bis 0 mm schräg aus. Das Regenwasser kann so konstant ablaufen.
7. Im offenen Abstand/Dehnungsfuge zum Pfeiler wird nun eine untere Lage eingebracht .
 - A. mit komprimierbaren Band +
 - B. eine Rundschnur
 - C. Darauf kommt PU-Material Induflex VK 6060 was sich zu allen Seiten verformen lässt.
 - D. Nach der Austrocknung wird ein weiteres Band + eine Rundschnur als 2. Lage aufgebracht.
 - E. Oben als Abschluss wieder VK 6060 PU.
8. Korrosionsschutzauftrag auf Stahlflächen.
9. Abschließende Rissinjektion mit MegaBond®-038-Epoxidharz zur kraftschlüssigen Verschließung restlicher

Project:
Holocaust-Memorial Berlin
Injection of cracks in the steles

Customer:
Geithner Bau, Groß Ziethen

The steles of the Holocaust-Memorial in Berlin are made of quaternions of different dimensions. The quaternions are hollow with a wall thickness of 12 cm. The cracks that developed in the steles are leading to seepage that seriously affected the visual aspect. Requirement of the repair work was not to leave any visible signs of the restoration. In addition the steles were covered with a special anti-graffiti-protection that prevented any surface covers to stick to them.



1) The Holocaust-Memorial in Berlin.

2) The crack was masked with a special tape whereby recesses were left open for the injection points. The injection with the MegaBond®-Injection-Process was carried out with rubber nozzles which were applied directly to the cracks. With a maximum pressure of only 1,5 bar the resin was injected. Uncontrolled discharge of the resin in the stele-inner was prevented through varying the injection intervals. After cleaning of the surface the crack is still visible but further calcium deposits are no longer possible.



Project:
Kaufland, Bochum; Filling hollows underneath tiles

Customers:
Hochtief, Essen

The tiles of the Kaufland market were laid on floor screed with an approximate thickness 15 cm. Shortly after the tiling it showed that the floor screed was very porous and the tiles started to float.

The task was to restore the bonding between the screed and the tiles while simultaneously the porous areas of the floor screed had to be filled.

This had to be done under the condition the injection would only be carried out through the joints, whereby the pressure of the injection had to be kept to a maximum (max. 2 bar).



1) With a core diamond drill of 6 mm the injection points were drilled into the cross joints.



2) From each point an expanse of approx. 1m² was injected.



3) The work area before cleaning.



4) The sealant removed and tiles cleaned. No traces of the injection process.

Project:
Kaufland, Bochum; Filling hollows underneath tiles

Customer:
Hochtief, Essen



5) Taking a core drilling of 75 mm for a visual check of the resin penetration.



8) Core 5-3: Like above. The epoxy resin which penetrated between the foils shines like metal.



6) Core 1-2 : Bonding of tiles, full penetration of the resin in the screed.



7) Core 5-3: Complete bonding and saturation of the screed. Resin penetrated fully through the separating foils.

Project:
Train-underpass of A7, Timmerloh near Bispingen
Crack injection at the counter forts

Customer:
Niedersächsische Landesbehörde für Straßenbau und Verkehr, Geschäftsbereich Verden

At the counterforts on the east side of the underpass, the cracks had been injected with a high pressure process. Because very little of the resin was absorbed, and the calcium deposits continued to occur, the MegaBond®-Injection Process was used for a complete elimination of the cracks.



1) Uncover of crack surfaces. The calcium deposits were removed.



2) The first 5–10 mm of the crack depth is blocked by the calcium and also by resin from previous injection attempts. Clip pins are drilled in and fixed.



3) The fast hardening surface sealants are applied.

Project:
Train underpass of A7 , Timmerloh near Bisingen
Crack injection at the counter forts



4) Injection process as per the 2 components low pressure procedure, the MegaBond®-Injection-Process



5) During work the trains continued running.

Project:
Highway A 7 – Underpass K2, Timmerloh near Bispingen
Cracks in the counter forts

Customer:
Niedersächsische Landesbehörde für Straßenbau und Verkehr, Geschäftsbereich Verden

On this project several attempts were made to inject with high pressure.

Because of this the surface of the cracks were blocked. It was necessary to drill them open with a 13 mm drill to gain access to the crack openings.



1) Uncovering crack.



2) Drilling through blocked surface.



3) Setting the clip pins.

Project:
Highway A 7 – Underpass K2, Timmerloh near Bispingen
Cracks in the counter forts



4) Applying the surface cover.



5) MegaBond®-Injection-Process



6) PCC-Coating in crack area.

Project:
Highway A 27 – Section Achim-Ost / Verden-Nord
Cracks in the road surface and emergency lane

Customer:
Niedersächsische Landesbehörde für Straßenbau und Verkehr, Geschäftsbereich Verden

On the highway A 27 substantial cracks occurred on the main lanes and emergency lane. The depth of cracks was about 12 cm.

Our assignment was to inject the cracks to restore full stability and to close the cracks in full depth.

The complete filling in of cracks was proven by a core drilling.



1) Taking the sample while it was rainy and cold.



2) Clip pins are fitted.



3) Applying the surface cover (1).



4) Applying the surface cover (2).

Project:
Highway A 27 – Section Achim-Ost / Verden-Nord
Cracks in the main lane and emergency lane



5) MegaBond®-Injection-Process



7) Penetration of resin to the lower concrete layer.

The cracks were blocked at the surface through tyre wear particles, sand and others.
Completion by temperatures around 4 °C.



6) Core drilling DN 50 mm.

Project:
Runway Airport Düsseldorf in August 2007
A reference is given by Mr Price from Airport Düsseldorf 0172 / 25 19 114

The runway showed 36 cm deep cracks in the concrete surface.



Here the surface cover was applied and the clip pins where set which are used for the admission of the resin.

Project:
Runway Airport Düsseldorf in August 2007

The cracks on the runway were injected to the full depth of 36 cm



The injection work was properly completed in the timeframe given by the airport authorities

Project:
Historical Harbour Övelgönne, Injection of cracks in pontoon

Customer: Amt für Strom- und Hafengebäude, Hamburg

The cracks in the relative thin pontoon walls and ceiling caused water penetration to the inner pontoon and impaired the stability of the pontoon.
The task was to restore the water density as well the full strength.



1) The Historical Harbour Övelgönne.



2) Injection pins were put close together to avoid resin flowing out at the other sides



3) A clutter of injection pins in the area of the fixture of the fender.



4) Core drilling after successful injection.
Crack width of approx. 0,1 mm completely filled.

Project:
HSE / Hamburger Stadtentwässerung – Repair of Sewers

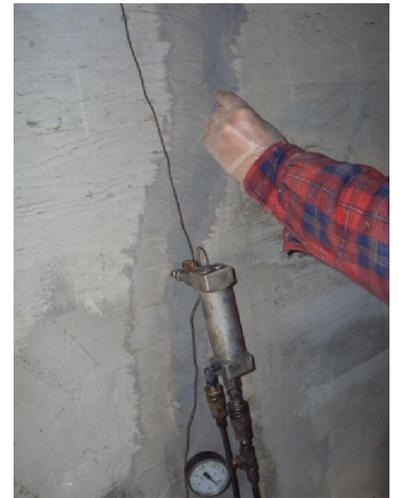
Customer:
HSE – Hamburger Stadtentwässerung

The sewer lays about 30 m underground and runs underneath the Elbe River.
Water carrying cracks showed in the concrete walls.

Target of the work was not only the sealing of the cracks, but also the restoration to former strength.



1) Corner-cracks in concrete wall, 2,5 m strong.



2) Crack sealed by the MegaBond®-Injection-Process with lowest pressure.



3) Water leaking out during the injection process. The resin pressed the water out of the crack!

Project:
Underground Garage Bahrenfeld, Hamburg

Customer:
Fa. Grundmann

The underground Garages belonging to private housing were only 1 year old and leaking in certain areas. Here we were aimed for a sealing against water as well as the restoration of full strength.



1) Water is seeping from the walls and ceiling.



2) Surface cover of cracks is done to prepare for MegaBond®-Injection-



3) Preparational surface cover and setting the clip pins.

Project:
Underground Garages Bahrenfeld, Hamburg



4) The injection was started at the lowest injection point. The resin pressed out of the next two pin points.



5) A micro crack of 0,1 mm in the window sill is injected.
One can see the resin flowing out at a non-sealed spot 15 cm above the pin.

Project:
Villa an der Elbchaussee

Customer: Mr. Von Hauenschild

Stress cracks formed in the surface rendering of the villa. To stop the loosening of bigger parts we had to seal all the cracks in the facade with the low pressure process.



1) Here you can see the cracks between the windows and the bottom chord. These cracks were successfully repaired by the use of the MegaBond®-Injection-Process.



2) This crack was sealed before the injection was carried out. Here we injected with nearly no pressure.



3) The crack in the facade has been sealed; the resin was injected through the pins. This is only possible with the MegaBond®-Injection-Process.

Project:

Dr. Bieger, Arztpraxis, Erkelenz-Gerderath

Customer:

Dr. Bieger, Sachverständiger Herr Immekus

Cracks were formed due to lifting forces of the damages caused by mining.



1) Crack in the living room. This crack was repaired force-fit by the MegaBond®-Injection-Process.



2) A continuous crack in the wall of a swimming pool. A force-fit injection should be carried out.