IMPULSE COMPACATION
System TERRA-MIX

The economic alternative for ground improvement

We compact the ground down to a depth of 7m*!
* .... depending on the ground conditions down to 9 m
**IMPULSE COMPACTION**

System TERRA-MIX

The economic alternative for ground improvement

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**IMPULSE COMPACTION**

The TERRA-MIX system is an innovative method for ground improvement down to medium depths. With this system all compactable grounds can be quickly and economically compacted.

In combination with a replacement base layer or stone columns even cohesive soil can be turned into good bearing soil!

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**AREAS OF APPLICATION**

Impulse compaction can for instance be used in the following areas:

- **Above ground construction**: shopping centres, hall constructions, logistics- and storage centres, container-storage areas, dwelling houses
- **Infrastructure**: roads, motorways, railroads, bridges, sub-construction for taxiways...
- **Water and foundation engineering**: high water protection dams, retention basin

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**OPTIMAL ALTERNATIVES**

to conventional methods of soil improvement such as: vibration/stuffing/pressure method, soil replacement, drilling poles, ductile poles, jet grouting, DYNIV...

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**DISTANCE TO CONSTRUCTIONS**

For adjacent buildings, roads and dams this work can be carried out without hesitation. If needed shock measurements are done directly at the constructions.

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**BUILDING COST SAVINGS**

Due to the high quality of the compaction savings can be made in the statics or in the dimensioning of the foundations. Hence the total building cost for the construction will be reduced.

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**QUALITY ASSURANCE**

Every project has complete documentation of all relevant data for all compaction points:

- like: GPS-co-ordinates, date, time, applied energy, number of impulses, settling per impulse....

Based on these data the compaction result can be reproduced during as well as after the work process.

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**GENTLE ON RESOURCES**

Usually the soil material at hand can be processed. Extraneous material is mostly only needed to a lesser extent. Thereby the building site produces a favourable ecological footprint (CO²-balance).

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**TIME SAVINGS**

With thorough preparations the construction activity using impulse compaction can usually be accomplished quicker than with other foundation building alternatives, since this system is very efficient.

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**LEADING COMPANY IN EUROPA**

As a result of our long lasting experience as well as our intensive research and development work we have become the market leader in the area of impulse compaction.

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**WEBSITE**

[www.terra-mix.com](http://www.terra-mix.com)
THE IMPULSE COMPACTOR

consists of five main elements:
- 50° cantilever
- Compactor foot
- Compactor cap
- Hydraulic hammer
- On-board computer incl. GPS-system

The compactor foot leads to a steel plate with a diameter of 1.5m. Depending on the application steel plates of 0.8 or 2.0m can be deployed. The impulses are transmitted vertically from the hydraulic hammer via the foot to the ground. As undercarriage serves a chain excavator with the appropriate equipment.

The principle of impulse compaction consists of dropping a weight of 90t with a high blow frequency (40-60 blows/min) from a defined height repeatedly on to a steel plate, the so called “Compactor foot”. The plate remains in constant contact with the to be compacted ground, thus ensuring an efficient energy transfer. In this way the sub-soil is locally compacted by every impact. The thus formed crater is filled in with suitable material and in turn compacted by the impulse compactor. In this manner an additional homogenisation of the sub-soil takes place.

THE PROCESS OF IMPULSE COMPAC TION

DOT MATRIX

The ground improvement follows an exact defined plan. Each individual compaction point is shown on a distribution plan and this is subsequently transferred into the on-board computer.

Examples

2 x 2  2.5 x 2.5 + finish  3 x 3 + finish
NUMBER OF TRANSITIONS

The point distances in the grid as well as the number of transitions are individually adapted for every project.

After having completed the calibration field and having evaluated the probes the parameters are readjusted.

The modern software enables a work accompanying control of performance and quality.

EFFICIENCY COMPARISON OF DIFFERENT DYNAMIC GROUND IMPROVEMENT METHODS

<table>
<thead>
<tr>
<th>STATIC ROLLER</th>
<th>DYNAMIC ROLLER</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.2 m</td>
<td>0.4 m</td>
</tr>
<tr>
<td>0.5 m</td>
<td>1.0 m</td>
</tr>
</tbody>
</table>

1. 0 m

5 m

9 m* (depending on ground conditions)

average depth effect

max. possible depth effect

* (depending on ground conditions)
**MODE OF OPERATION**

### DEPTH EFFECT

This depends on the type of soil and its layer composition. Under consideration of the soil properties an individual compaction program is determined. With favourable prerequisites it is possible to reach compaction depths of 9m.

<table>
<thead>
<tr>
<th>Type of soil</th>
<th>Factor A</th>
<th>Depth Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grit</td>
<td>Up to 2.5</td>
<td>7 to 9 m</td>
</tr>
<tr>
<td>Sand</td>
<td>Up to 2.7</td>
<td>Also more than 9 m</td>
</tr>
<tr>
<td>Fine grained</td>
<td>1.0</td>
<td>4.1 m</td>
</tr>
<tr>
<td>Fine grained grit</td>
<td>1.5</td>
<td>5.7 m</td>
</tr>
</tbody>
</table>

### PERFORMANCE

**A RATIONAL METHOD**

the TERRA-MIX impulse compaction method allows a safe, economic and quick method of ground improvement.

**IMPULSE COMPAC TION**

Energy = \( m \times g \times h \)

**DYNIV**

Power max. 6.4 MNm/min

E = 9 000 kg \( \times 9.81 \text{ m/s}^2 \times 1.2 \text{ m} = 105 948 \text{ Nm} \)

Blows: 40 - 60 /min

Power: 4.2 - 6.4 MNm/min

Power max. 4.4 MNm/min

E = 10 000 kg \( \times 9.81 \text{ m/s}^2 \times 5 \text{ m} = 490 500 \text{ Nm} \)

Blows: 1 - 2 /min

Power: 0.5 – 4.4 MNm/min

E = 15 000 kg \( \times 9.81 \text{ m/s}^2 \times 15 \text{ m} = 2 207 250 \text{ Nm} \)

Blows: 1 - 2 /min

Power: 0.5 – 4.4 MNm/min

**IMPULSE COMPAC TION**

WWW.TERRA-MIX.COM
COMPACT ON CONTROL

The achieved compaction can most efficiently be verified by dynamic probing or with CPT (Cone Penetration Test) before and after the compaction. Continuous recording, storing and documentation of all relevant compaction parameters for every compaction point ensure the quality.

The following data are recorded for every compaction point: Date, exact locations by means of GPS, settling per impact as well as total settling, settling curve, number of impulses and applied energy.

DOCUMENTATION

All above mentioned data can be provided daily via mobile internet as a table or graphically onto the CAD-plan.

We are the only company worldwide having a completely automatic data recording system for impulse compaction!

Verification of the ground compaction

Due to the complete compaction protocols the successful ground compaction can be proven without difficulty.