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well and borehole intensification

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TLM hydropuls® GmbH is an outsourcing of special business divisions of ELM Gesellschaft für Handel und Transfer mbH and Steinbrecher hydropuls® engineering company. In TLM, the years of experience and the technical know-how with regard to the regeneration of wells and development wells is combined. In doing so, the utilisation and enhancement of product and process patents concerning the hydropuls® process is central.

**Our range of services:**

- Production and distribution of hydropuls® units
- Regeneration of wells and development wells using the hydropuls® process
- Awarding licences and know-how



hydropuls® - 10ft Container



Well and borehole intensification with hydropuls®

The company pursues a strongly international orientation. It is the objective to establish the brand hydropuls® worldwide in the next 5 years.

On the German market, we are nationwide active primarily via our licence partner Berlin Water Group.



The company has introduced the quality management system according to the European standard DIN EN ISO 9001.

The hydropuls® technology complies with the standards of the European CE standard.

The director, Mr. Alexander Steinbrecher, is the owner of some patents and the international word mark „hydropuls®“.

## What is the **hydropuls** -process?

hydropuls® is a pulse process in order to increase or restore the productiveness of production wells and development wells as well as the restoration of the functional capability of groundwater measuring points.

### Process description

The basic principle of pulse creation by the abrupt expansion of a highly compressed gas or liquid has been used in both the seismic exploration and the oil production with different tasks since the beginning of the fifties.

At the beginning of the nineties, the first pulse technology modifications were developed to be used as well regeneration processes.

The mode of action is that pressure pulse sequences are created by pulsing inputs of gas or water portions under high pressure using a pulse generator that is inserted in the well attached to the pressure hose. The pulse generator is provided with a valve system that is able to release the energy that is accumulated in the generator in the form of high-tension gas or water within a very short switching time (milliseconds) by opening large cross sections. This creates hydraulic shock waves. At the same time, a cavitation effect is caused by the sudden volume change leading to the formation of a "vacuum bubble" that subsequently collapses and thus creates a hydraulic "suction wave".

The alternating effect of the pressure load and the pressure relief loosens the fine grain portions, iron cloggings, precipitations, etc. that have been inserted into the gravel layer and into the pore space of the water-bearing stratum. The „suction wave“ transports the loosened congestion to the centre of the well where it is pumped off.

According to the DVGW leaflet W 130, this process is an approved process.

### Process characteristics:

- Pulse creation speed is approx. 2000 m/s and can be adjusted within a certain spectrum during use
- Thus, creation of a soft pressure pulse by means of which extension materials like PVC, HD-PE, OBO and stoneware can be processed
- Creation of pressure pulse sequences the chronologies of which can be adjusted during use – according to the well characteristics, the process can be set to „more intensive“ or „softer“
- The pulse output pressure level can be adjusted, making an adjustment to the extension material and to the well condition possible, as well.
- Quick, cheap application due to little technical effort



### What are the advantages of the process?

From an ecological point of view, the hydropuls® process is completely harmless as during the application, there is no input of environmentally hazardous, foreign substances like e.g. chemicals and explosive gases.

It has a large effective depth combined with good dosability and a good effect.

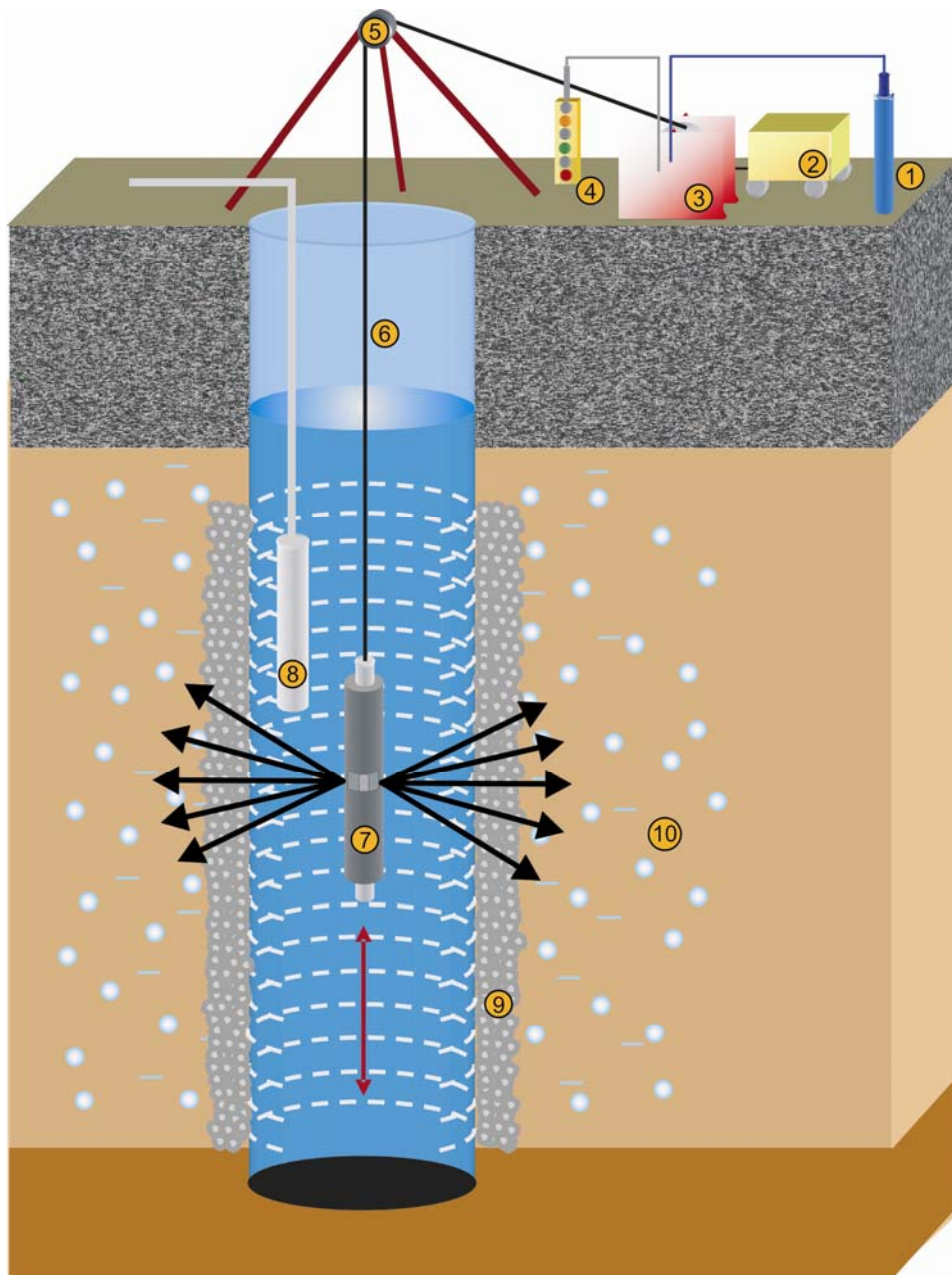
Due to the process specification, there is still the possibility of a targeted, depth-orientated processing of local, strongly congested areas in development wells / borings and/or gauges.



Photos: Well winding wire and PVC filter before and after completed regeneration using the hydropuls® process (source: pigadi)

### Schematic sketch - process procedure

- |   |  |    |                                 |
|---|--|----|---------------------------------|
| 1 | Compressed-air bottles                   | 6  | Compressed-air hose             |
| 2 | Electric generator                       | 7  | Pulse generator                 |
| 3 | Electric hose reel                       | 8  | Underground pump / Airlift      |
| 4 | Control unit                             | 9  | Filter pipe with gravel filling |
| 5 | Tripod with idler pulley and depth gauge | 10 | Water-bearing stratum           |



## Pneumatic **hydropuls** generators

Characteristics	GI	GII	GIII
Area of application	Wells Development bores Measuring points	Wells Development bores Injection wells	Wells Development bores Injection wells
Well diameter Operating depth	> DN 50 Down to 1000 m	> DN 100 Down to 1000 m	> DN 75 Down to 1000 m
Pulse generator length Pulse generator diameter Weight Working pressure adjust.	310 mm 40 mm 1,0 kg 1-10 MPa	570 mm 70 mm 8,0 kg 1-10 MPa	570 mm 60 mm 4,1 kg 1-10 MPa
Pulse release Pulse sequences Design	Automatic Adjustable Stainless steel Acid resistant	Automatic Adjustable Stainless steel Acid resistant	Automatic Adjustable Stainless steel Acid resistant
Energy deposit	Approx. 5 kJ Conform to 1,2 g TNT	Approx. 25 kJ Conform to 6-7 g TNT	Approx. 12,5 kJ Conform to 3-4 g TNT
Effective depth around the wells	ca. 5 m	ca. 25 m	ca. 12 m



Generator GIID50P



### Technique specifications

The hydropuls®-technique is manufactured according to customers request and the different special requirements. The installation of the singular hydropuls®-technique components electric hose reel, compressed-air bottles, electric generator, tripod and accessory parts can alternatively be installed in **containers, box bodies, trailers** or other **transport-vehicles**. Most suitable for easy transport and fast availability, even by airfreight, technique-containers are particularly qualified. Box bodies stand the test to be assembled on to different types of vehicles. In Central Europe mostly technique-trailers or vehicles with installed hydropuls®-technique are used.





**Technological applications**

	Raw materials extraction	Wells	Seismic
Application	Copper/ and uranium extraction with the ISL-method (In-Situ-Leaching)	Wells for water extraction (mineral/thermal/..water), injection/disposal/ producing wells, ground-water measuring points, construction of new wells	Seismic prospecting in wells
Technology	Regeneration and intensification of injections and producing wells	Regeneration, intensification, mobilization of underground pollutants, horizontal and vertical	Production of seismic vibrations without explosive
Depths	Down to 1000 m	Down to 1000 m	Down to 1000 m
Well diameter	> 50 mm	> 50 mm	> 50 mm
Lining material	Stahl PVC HDPE OBO Open ground	Stahl PVC HDPE OBO Open ground	Stahl PVC HDPE OBO Open ground



Electric hose reel for up to 500 m high pressure hose.

**Examples - Results from application of the *hydropuls* - technique**

	Rohstoffgewinnung	Brunnen
State / location	Kazakhstan, uranium mining, Muyunkum	Germany wells for water extraction Naunhof
User	KATCO	KWL/BSL
<b>Example 1</b> specification	Approx.. 370 injection wells well dia. 74 mm/93 mm, PVC Depth/Teufe 460-480 m	Well 43a well dia. 250 mm, depth 17,19 m, stainless steel
Delivery rate pre- regeneration	0,9-1,5 cbmh <sup>-1</sup>	12,22 cbmh <sup>-1</sup>
Delivery rate after regeneration	7,0-12,5 cbmh <sup>-1</sup>	23,14 cbmh <sup>-1</sup>
<b>Example 2</b> specification	Approx. 140 producing wells well dia. 200 mm, PVC depth 460-480 m	Well 45a well dia. 250 mm, depth 19,30 m, stainless steel
Delivery rate pre- regeneration	7,4 cbmh <sup>-1</sup>	22,55 cbmh <sup>-1</sup>
Delivery rate after regeneration	10,0-12,0 cbmh <sup>-1</sup>	36,90 cbmh <sup>-1</sup>

## A further development of the company - the **hydrolift**



Photo: **hydrolift** operation in Kazakhstan parallel or after pulsing with **hydropuls**® - process.  
Special development of TLM **hydropuls** GmbH for JV Katco (Areva-Kazatomprom)



## Global application of the **hydropuls** - process



**Brazil:**

User:

pigadi GmbH



**Denmark:**

User:

A. Højfelt A/S  
Søren Pedersen Brøndboring A/S

Distribution:

ROTEK AS



**Germany:**

User:

TLM GmbH  
pigadi GmbH



**France:**

User:

Areva AS (JV Katco)



**Italy:**

User:

Acque Servizi s.r.l.  
Artesia S.p.A.  
Ghiberti Domenico  
Idrogeo s.r.l.  
I.P.T.A. di Vassalli s.r.l.  
Negretti s.r.l.  
Ronchi s.r.l.

Distribution:

Hans Brand s.r.l.



**Croatia:**

User:

T.D.I. 90 d.o.o.



**Kazakhstan:**

**User:**

JV Katco (Areva-Kazatomprom)  
JV Inkai (Cameco-Kazatomprom)  
Kazatomprom (RU-6)  
Kendala KZ  
TOO Appak

**Distribution:**

ISV Ltd.



**Norway:**

**User:**

Ruden Ltd.  
Kraft Energie + Bronnboring AS



**Austria:**

**User:**

Plankel Bohrungen GmbH  
Plankel Grund- & Bohrtechnik GmbH



**Russia:**

**User:**

OOO UGF



**Sweden:**

**Distribution:**

Avanti System AB  
ROTEK AS



**Schwitzerland:**

**User:**

Gebr. Mengis AG



**USA:**

**User:**

Kleinfelder Inc.