

Innovative technological solutions

RSS Flüssigboden® Liquid Soil



Power Lines

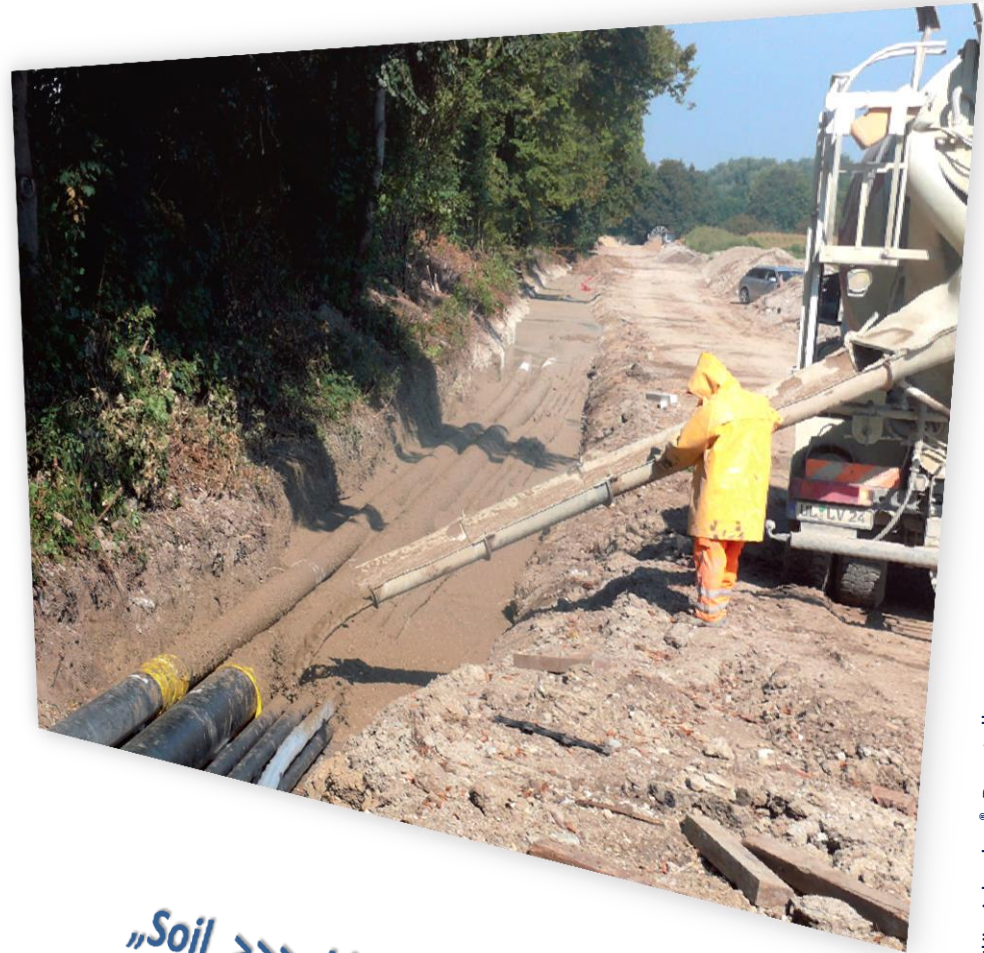


Railway

What is RSS Flüssigboden® Liquid Soil?

It's basically ...

- ... new technique for processing and re-using nearly **any kind of excavated soil** with temporarily **free flowing** consistence.
- ... backfilling **without inserting foreign material**.
- ... **easy to remove**.
- ... for **many different applications** in the fields of infrastructure and geotechnique.
- ... **18 years of development** in cooperation with national and international researching partners.



„Soil >>> Liquid >>> Soil“

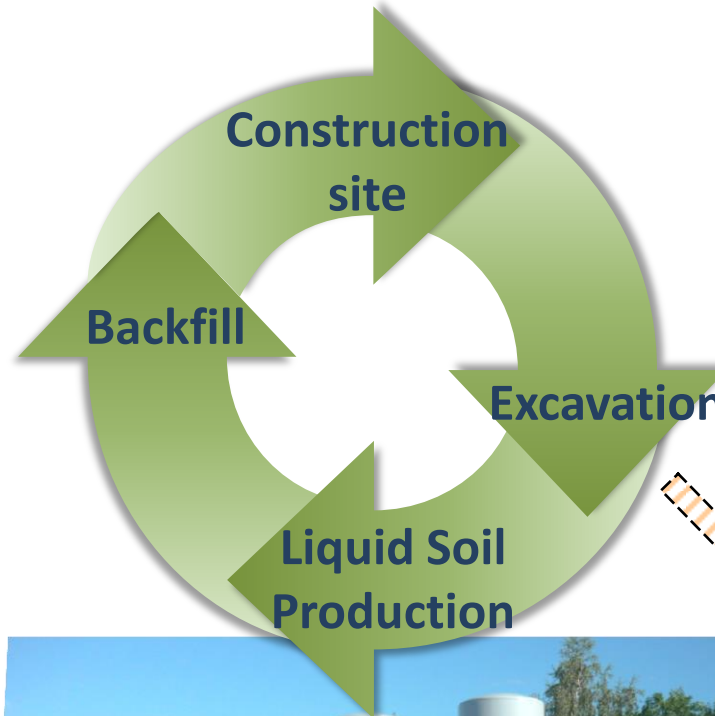
What is RSS Flüssigboden® Liquid Soil?

Make profit from protecting the environment!

Recycling soil excavation



Refilling of trench



SkanCraft conditioner & lime dosing unit preparing soil

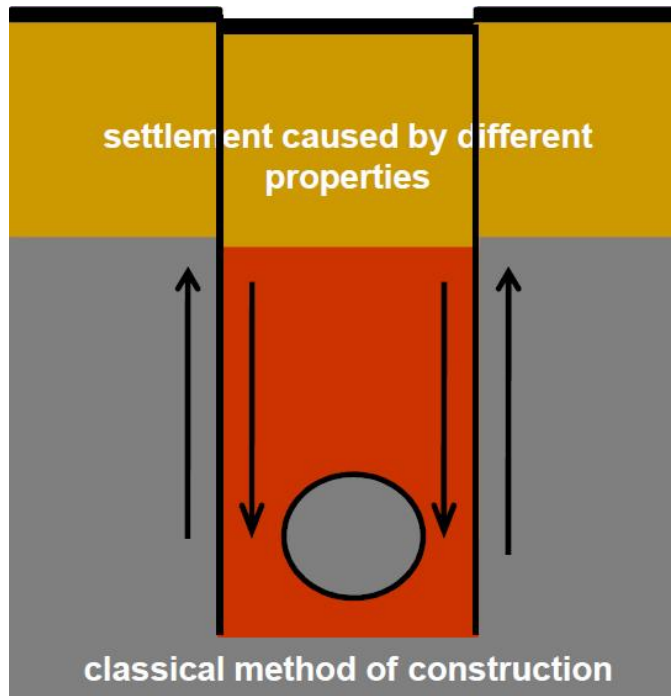


Mobile compact system to produce RSS Flüssigboden®

No Disposal!

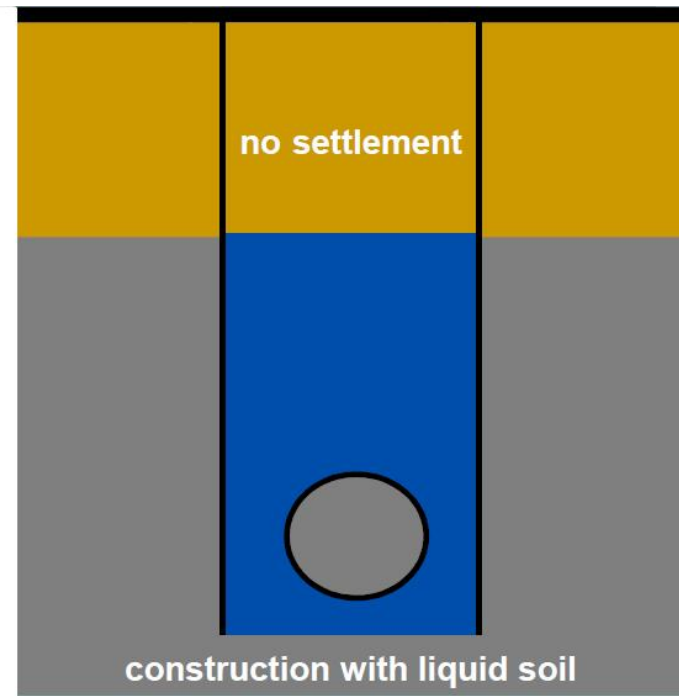
Main Innovation of RSS Flüssigboden® Liquid Soil

Prevention of settlement which usually causes pipe- and road damages



soil foreign
behavior of filling material

(different layers, different characteristics)



like surrounding soil
behavior with homogeneous body

No shrinking, no settlement

High & Maximum Voltage Power Lines

Problems of conventional method of bedding



Shrinkage of hydraulic-bound mixtures leads to:

- **isolating** effects by forming **gaps**
- **decreasing transmission** capacities by warming of cables
- **heat emission** to earth's surface:
 - endangering natural wildlife
 - creating problems for agriculture

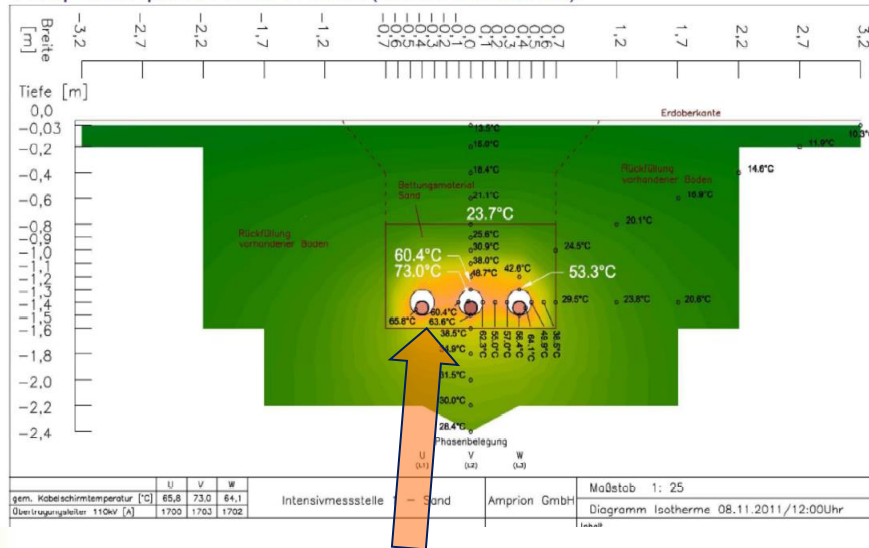


RSS Flüssigboden® Liquid Soil:

- ✓ **Optimal embedding**
- ✓ **No hollow space**
- ✓ **No washout**

Experiences with RSS Flüssigboden® Liquid Soil as thermic stabilizing bedding

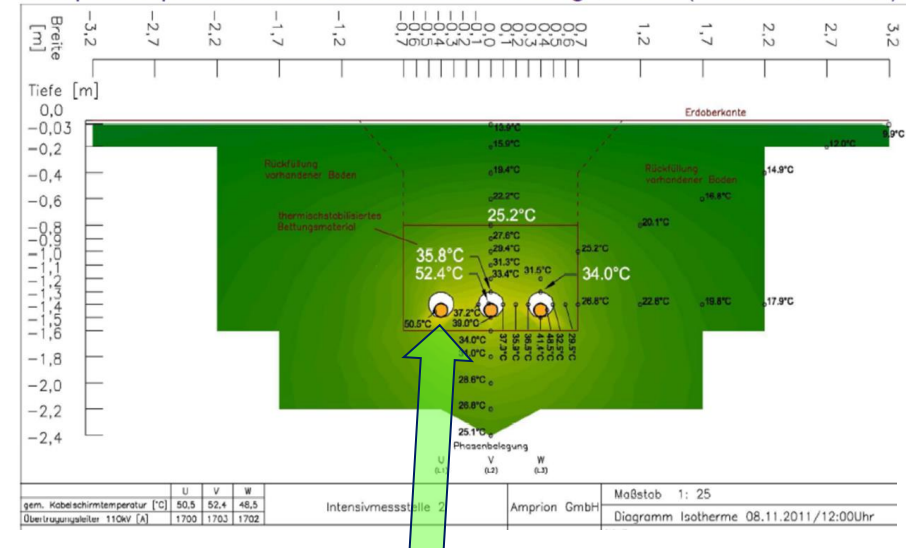
Temperaturprofil Sand 1700 A (Kabel-Grenzlast)



Temperature profile of maximum voltage power line bedded in **Sand** (at limit load)

- Temperature reaching up to **73°C**
- Sand bedding reduces heat conductivity
- Decrease of transmission capacity

Temperaturprofil thermisch stabilisierte Bettung 1700 A (Kabel-Grenzlast)



Temperature profile of maximum voltage power line bedded in **RSS Flüssigboden® Liquid Soil** (at limit load)

- Temperature measuring max. **52,4°C**
- RSS Flüssigboden® increases heat conductivity
- Higher transmission capacity of lines
 - Aluminium instead of copper
 - reducing cross-section of cables

Using RSS Flüssigboden® Liquid Soil for...

...construction of high & maximum-voltage power lines



420 kV GIL-Line by Siemens (gas-isolated lines)



150 kV power line, Switzerland

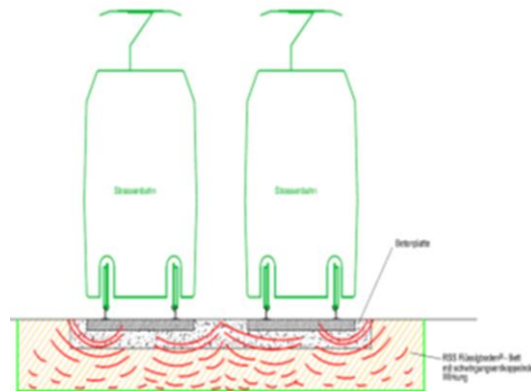


Amprion 380 kV line in Raesfeld

- Higher durability
- Lower operating temperature
- 30-40% better transmission performance
- Less costs
- Worldwide innovation
- Partners: Siemens, RWE, Amprion, Tennet

Using RSS Flüssigboden® Liquid Soil in...

... Railway construction



Applying RSS Flüssigboden® Liquid Soil to reach ...

- **High load carrying capacity**
- **Vibration decoupling**
- **Easy removeability**

Using RSS Flüssigboden® Liquid Soil in...

... Railway construction and tunnel construction



Stabilization of unsuitable underground with floating floor slab

- re-use of contaminated excavation material in form of immobilized RSS Flüssigboden® Liquid Soil

Application in tunneling

- Base layers
- Filling hollow spaces
- Re-laying pipes and lines
- Water difficulties
- Vibration decoupling

Advantages ...

Why to choose RSS Flüssigboden® Liquid Soil!

- Durable networks by optimal bedding properties
- Less masses to be moved
- Fast progress of construction at less required space
- Saving time and resources (capital, energy and environment)
- Long-time experience
- Approvals and certificates for many european countries
- New technologies with high efficiency
- Supporting Smartgrid with combi-routes
- Variety of adjustments to meet special requirements:
 - ✓ vibration decoupling,
 - ✓ heat dissipation or isolation,
 - ✓ targeted formation of friction force,
 - ✓ relaxation,
 - ✓ variable water permeability etc.

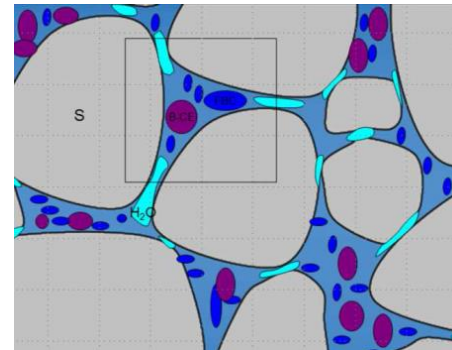


What are the characteristics of RSS Flüssigboden® Liquid Soil?

- **Temporarily flowable/liquid**
- **Without polluting additives**
- **Cohesive-frictional reconsolidating by stabile water bindings**
- **Self-compacting**
- **No formation of fixed foreign structures**
- **Without tunnel effect (relaxing)**
- **Depending on mixture:**
 - heat dissipation
 - heat isolating
- **After reconsolidation/hardening**
 - Properties like surrounding soil
 - selectively controllable properties

Definition:

- Liquid Soil belongs to the group of temporarily flowable, self-compacting materials and...
- ... it should retain typical properties of soil without forming rigid structures of hydraulic binding agents such as cement



Company profile

- Founding year : 1998
- Number of employees: 34
- Engineering services : EUR 4.5 milion per year
- Areas and spaces: own office spaces in Leipzig, 850 m², own laboratoy and production spaces in Eilenburg, 7000 m²
- Branches:



District heating lines embedded in RSS Flüssigboden®



PROV - Produktions- und Vertriebsgesellschaft mbH	FiFB - Forschungsinstitut für Flüssigboden GmbH	LOGIC - Logistic Engineering GmbH
<ul style="list-style-type: none"> ➤ Sales and distribution of RSS System components 	<ul style="list-style-type: none"> ➤ Testing laboratory ➤ Research & Development 	<ul style="list-style-type: none"> ➤ Consultation ➤ Expert activity ➤ Independent engineering office

- References: Siemens, RWE, Amprion, Tennet

History

- Development of corporation is characterized by **high efforts on research & development** of RSS Flüssigboden® Liquid Soil and by continuous advancement and new applications
- **World-wide leader** in the field of Liquid Soil through research & development
- RSS Flüssigboden® Liquid Soil is grown to a **fully-developed method** and **established on the market** for over 18 years
- RSS® systems technology is proven on the market



420 kV GIL-Line by Siemens

Benefits for environmental protection:

- **Avoid truck transports** (4 million per year)
- **Avoid landfill volume** (30 million m³ per year)
- **Avoid landscape destruction** through gravel mining (3 million m² per year)
- **Avoid pipe damage** in sewer system (80 % of all pipe damages result from damages and errors while construction)
- **Avoid traffic restrictions** and detours due to road damages caused by settlements

Outlook

- Increasing demand
- Increasing range of new application for RSS Flüssigboden® Liquid Soil method
- Expanding technological leadership worldwide
- Using RSS Flüssigboden® Liquid Soil for constructing power lines in Great Britain created good reputation and increasing demands from abroad (mostly Europe)
- orders from abroad exclusively with strong partners

Market volume

(e.g. canalization in Germany, 2010):

- Sewer system in Germany:
 - 1.200.000 km
- Annual new building / redevelopment:
 - 1.70 % (50% in open trench construction)
- Engineering services:
 - 60.000.000 €
- Liquid Soil:
 - 16.000.000 m³

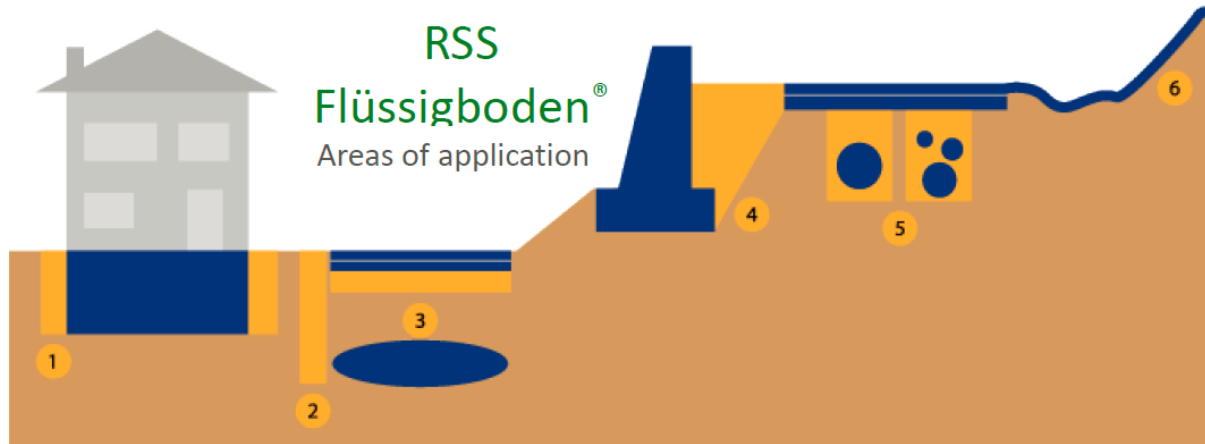


Mobile compact system to produce RSS Flüssigboden®



Pipe laying in groundwater with RSS Flüssigboden®

Application examples of RSS Flüssigboden® Liquid Soil



- Maximum voltage power lines & power plant construction
- Railway constructing and tunnelling (2, 3)
- Further application:
 - ✓ Building protection (1)
 - ✓ Civil engineering under influence of groundwater
 - ✓ Backfillings of buildings (4)
 - ✓ Canal and pipeline construction (5)
 - ✓ Flood protection and dyke construction
 - ✓ Immobilisation of contaminants, waste dump redevelopment
 - ✓ Slope stabilisation (6)



RSS Pipe fix laying aid



RSS Flüssigboden® in winter time possible

This is RSS Flüssigboden® Liquid Soil!

Conclusion – *RSS Flüssigboden® Liquid Soil is ...*

... saving:

- Costs
- Time
- Space
- Impacts on Environment
- Transportation

... offering:

- New technologies
- New planning solutions
- New material properties
- New quality
- New markets

We got your attention?

Find out more!



FiFB

**Forschungsinstitut für Flüssigboden GmbH
(Research institute)**

Dipl.-Ing. Olaf Stolzenburg

Wurzner Straße 139

04318 Leipzig

GERMANY

Tel: +49 (0)341/241 27-51

Fax: +49 (0)341/241 27-53

E-Mail: O.Stolzenburg@fi-fb.de

Internet: www.logic-engineering.de