



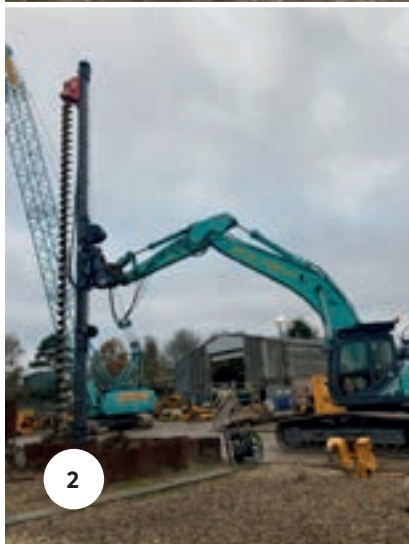
ALLU
One Step Ahead



MOVAX

**TOTAL STABILISATION
SOLUTION**





THE COMPANIES

PROVEN EXPERIENCE COMBINED

ALLU Oy and Movax Oy, are two independent, Finnish, privately owned companies specializing in piling & foundation, material handling and soil improvement.



Movax Oy, established in 1993, which specialises in the design, development and manufacturing of value-adding excavator-mounted piling and foundation equipment with advanced control and information management systems. Movax Oy, which is part of the Terra Patris Group, is located in Hämeenlinna, Finland and represented by a network of partners in more than 30 countries all over the world. Today more than 95% of MOVAX's business is international.

Excavator mounted side grip vibratory pile drivers, hydraulic piling hammers and piling drills as well as multi-tool piling leaders. Movax attachments offer an optimised way-of-working for higher productivity and significant savings - the MOVAX-way-of-piling - which is efficient, fast, versatile, accurate and safe.



ALLU Oy designs, manufactures and sells products for adding value to customers in numerous applications for processing, separating, sorting, mixing and crushing materials. Typical applications include e.g. soil and waste material recycling, processing contaminated soil, transforming waste to usable material. The history of ALLU goes back for over 30 years and today over 95% of the business is done with international customers globally. The serving network of ALLU consists today of own subsidiaries and a dealer network in more than 30 countries.

Excavator mounted screener crushers and soil improvement equipment for soil and material processing. ALLU attachments are designed to operate in demanding environments on demanding materials. ALLU's products are known for their quality, reliability and efficiency.

MOVAX PILING AND FOUNDATION EQUIPMENT

FAST. EFFICIENT. VERSATILE. ACCURATE. SAFE

ALLU SCREENER CRUSHERS AND SOIL IMPROVEMENT EQUIPMENT

HIGH QUALITY, RELIABLE. EFFICIENT.



THE SOLUTION

TOTAL STABILISATION SOLUTION

MOVAX+ALLU provides a total, excavator mounted solution for mass and column stabilisation. The solution includes the mechanical equipment for the storage and feed of the binder, the mixing of the binder into the soil in question and the fully integrated control and information management (3D/reporting) systems.

The MOVAX+ALLU solution is based on a standard 35 ton class excavator and comprises the following equipment:

- ALLU PF 7+7 Pressure feeder
- ALLU Processor for mass stabilisation
- MOVAX MSL-300 column stabilisation leader/mixer
- MOVAX mControl+ control system
- MOVAX mLogbook reporting system with connectivity to third party 3D-system

MAIN PURPOSES OF SOIL STABILISATION:

- To increase the strength of the soft soil
- To improve the deformation properties of the soft soil (reduce settlements)
- To increase dynamic stiffness of the soft soil
- To remediate contaminated soil

Soil stabilisation is done by mixing an appropriate amount of dry (or wet) binder throughout the volume of the treated soil layer (mass stabilisation) or by constructing a column (column stabilisation). The binder can consist of a single substance or be a mixture of various substances like cement, lime, fly ash or furnace slag. Mass stabilisation is done independently or it may also be combined with other stabilisation methods such as column stabilisation.

THE PROCESS

BINDER STORAGE AND FEED

ALLU PF 7+7 pressure feeder is a compressed air based system equipped with two (2) storage tanks utilised to store and feed dry binder material. The same system is used for both mass and column stabilisation. The ALLU PF 7+7 pressure feeder allows for the control of the amount of binder and the adjustment of both compressed air pressure and flow rate to suit both stabilisation methods.

The ALLU PF Pressure Feeder feeds dry binder from the container, through the hose, and directly into the middle of the mixing drums of the ALLU Processor or to the MOVAX MSL-300 column stabilisation leader/mixere. The unit is mounted on a tracked chassis and is remote controlled, allowing the unit to follow behind the excavator onto the site.



THE PROCESS

MASS STABILISATION

The ALLU Processor is a versatile hydraulic operated, excavator mounted mixing unit. When the Processor is attached to the excavator, the combination converts to an easily movable and effective mixing plant.

The ALLU Processor is able to handle very difficult and different kinds of materials effectively, such as clays, peat, sludge, mud and contaminated soil. The mixing effectiveness is based on the intelligent horizontal positioning of the drums and unique construction of the mixing elements. The drums move and mix material in all three dimensions simultaneously. The horizontal drums can transfer soil during the treatment and it enables to process materials in thinly layered sections to the desired depth. The reaching limit for Processor depends on the reach of the excavator.



THE PROCESS

COLUMN STABILISATION

MOVAX MSL-300 is an excavator mounted stabilisation leader equipped with a rotary drive and a mixer/mixer tip which is used to inject the binder into the soil.

When rotating the mixer/mixer tip into to the soil, compressed air is injected at a low pressure to avoid clogging the binder injection nozzles; with the compressed air pressure depending upon the depth of the column. When entering the soil the rotational speed of the mixer is kept as high as possible to minimize the air injected into the soil.

The binder is fed when the mixer ascends. Proper mixing of soil and binder is achieved by continuously rotating the mixer tip. The mixer is equipped with a four-level mixer tip. The binder is fed at the top level in order to avoid formation of a column below the feed level. The mixing is successful when the column diameter is the same as the diameter of the mixer tip. The rotational speed of the mixer tip and the ascent rate (upward velocity) is controlled in order to achieve an even mixing of binder and soil.

When injecting the binder the compressed air pressure is kept at the minimum value, however at a value which still ensures that the binder runs smoothly. The amount of binder injected into the soil can be controlled during the mixing process. The ascent rate (max 20 mm/r due to the four-level mixer tip) and the rotational speed (typically 180–200 rpm) can also be adjusted as needed. The binder feed is stopped 0,5–0,3 meter before reaching ground level.



THE BASIC DESIGN DATA

TOTAL STABILISATION SOLUTION

EXCAVATOR

Excavator class	ton	min 35
Track width	mm	1000-1200
Hydraulics		
general		two-way hydraulics
pressure, max	bar	350
flow rate, mass stabilisation	l/min	250-300 l/min @ 0 bar
flow rate, column stabilisation	l/min	240 l/min @ 350 bar
drain	bar	max 5
Mechanical connection		stick
		quick coupler, OilQuick OQ80
Binder feed, connection	DN	2" mass stabilisation
	DN	1 ½" column stabilisation

MASS STABILISATION

Stabilisation depth	m	8 (max)
Binder, size	mm	0-2
Binder flow rate	kg/s	15 (max)
Compressed air		
Pressure	bar	10 (max)
Flow rate	m ³ /min	11,7 (adjustable)
Feed distance	m	100 (feed size 3") 200 (feed size 2")

COLUMN STABILISATION

Column depth	m	12-20 m
Column diameter	mm	500-800
Binder		30/70 or 50/50 cement/lime stone
Binder, amount	kg/m ³	75-200, 125 typical
Binder, amount	kg/m	15-100, 30-40 typical
Binder flow rate	kg/s	0-3
Mixer tip, ascent rate	mm/r	10-20
Compressed air		
flow rate	m ³ /min	6,5
pressure	bar	2-8, max 10



THE TECHNICAL SPECIFICATION

ALLU PF 7+7 PRESSURE FEEDER

GENERAL

- compressed air based pressure feeder for dry binder equipped with two storage containers
- computer controlled

TECHNICAL DATA

Model		PF 7+7, 10 bar
Weight	kg	22 000 (empty) 38 500 (full)
Motor		CAT C4.1 ACERT
Turbo intercooled Stage V / Tier 4F		
Compressor*		
model		GARDNER DENVER CT 25D screw compressor
working pressure	bar	350
flow rate	m ³ /min	11,7
Container		
number	kpl	2
volume	m ³	6,9
capacity	kg	16 500
pressure	bar	10 (max)
Binder feed		
capacity, adjustable	kg/s	15 (max)
distance	m	100 (feed line 3") 200 (feed line 2")

*air flow and pressure



THE TECHNICAL SPECIFICATION

ALLU PROCESSOR



GENERAL

- powered by the excavators hydraulic system
- automatic torque adjustment
- sensors
 - RPM
 - temperature
 - oil

TECHNICAL DATA

Models:		
Processor 300HD	kg	2210
Processor 500HD	kg	2580
Bolt on extensions (optional):		
Extension 2 m	kg	770
Extension 3 m	kg	950

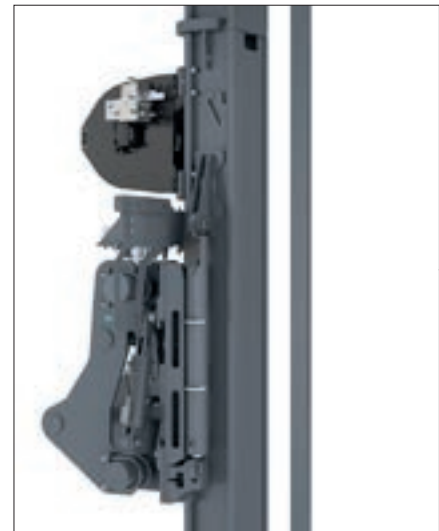
Working depth	m	5
Excavator class	ton	35 (25-40)
Hydraulic pressure	MPa	23-35
Hydraulic flow rate	l/min	200-300
Hydraulic power	kW	160

THE TECHNICAL SPECIFICATION

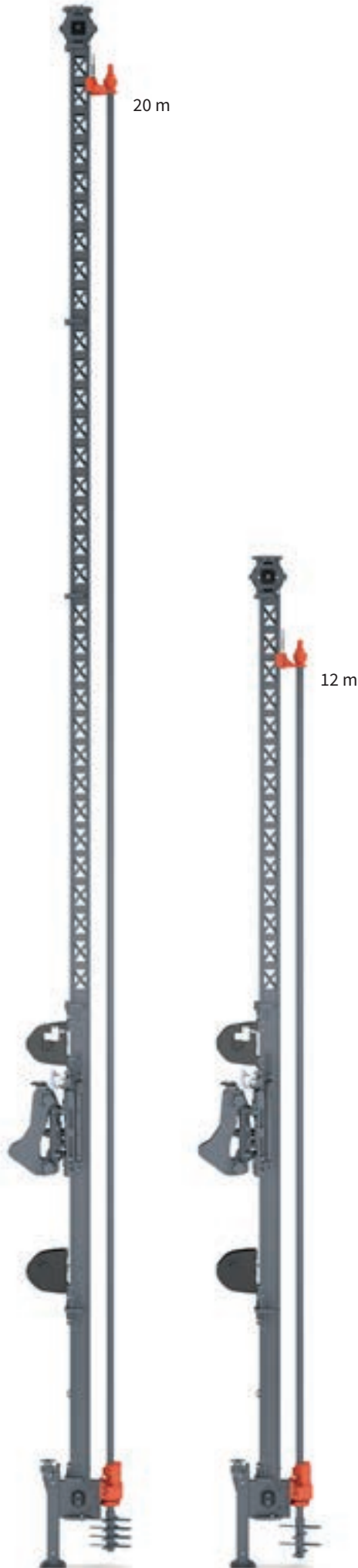
MOVAX MSL-300 COLUMN STABILISATION LEADER

GENERAL

- Excavator mounted stabilisation leader
- The leader and its tooling are designed to work on a standard excavator with normal auxiliary hydraulics; all required hydraulics is integrated into the leader itself
- Maximum depth 20 m; due to the modular design the leader can be shortened to 12 or 16 meter effective depth
- Column diameters between Ø500–800 mm due to interchangeable mixer tip
- Mixer tip vertical movement is achieved with two hydraulic winches
- Rotary drive incorporated into the lower section of the leader
- Binder feed at the top of the mixing rod to which a rotating joint for the binder hose is integrated. Flow measurement for monitoring binder feed and reporting.



TECHNICAL DATA



Leader		MSL-300
Column depth	m	20
Column diameter	mm	600 (500–800 mm)
Weight (w/o adapter)	kg	about 6500
Height	m	23
Tilt angle	o	+/- 8
Winches		
· number	pcs	2
· pull down/extraction force	kN	57/57
· speed	m/min	0–30
Binder feed, features		
<ul style="list-style-type: none"> · 1 ½" feed hose with Camlock quick connection · Rotary joint at the end of the mixing tube · Integrated flowmeter for binder monitoring to achieve steady feed through the system 		
Features / Main components		
<ul style="list-style-type: none"> · Roller mechanism on the rotary drive to apply torque and simultaneously allow feedthrough of the mixing tube · Integrated rotary drive and telescopic bottom foot at the end of the leader · Support bearing and rotary joint located at the top of mixing tube · Additional support for binder feed hoses and electric cables along the leader 		
Rotary drive		
Torque	kNm	20
Rotational speed	rpm	180–200
Features/instrumentation		
<ul style="list-style-type: none"> · rotation speed · rotation torque · column depth/ascent rate · binder flow rate · driving angle 		
Mixer/Mixer tip		
Mixer tip levels	pcs	4
Diameter	mm	600
Binder feed	kg/s	3,0
Compressed air, pressure	bar	10
Compressed air, flow rate	m ³ /min	6,5
Ascent rate	mm/r	20
Rotational velocity	rpm	180–200
Injection pipe		
length	m	21,3
inner diameter	mm	25
Support pipe		
length	m	21,3
size / wall thickness	mm	90 x 90 mm square/10 mm

THE TECHNICAL SPECIFICATION

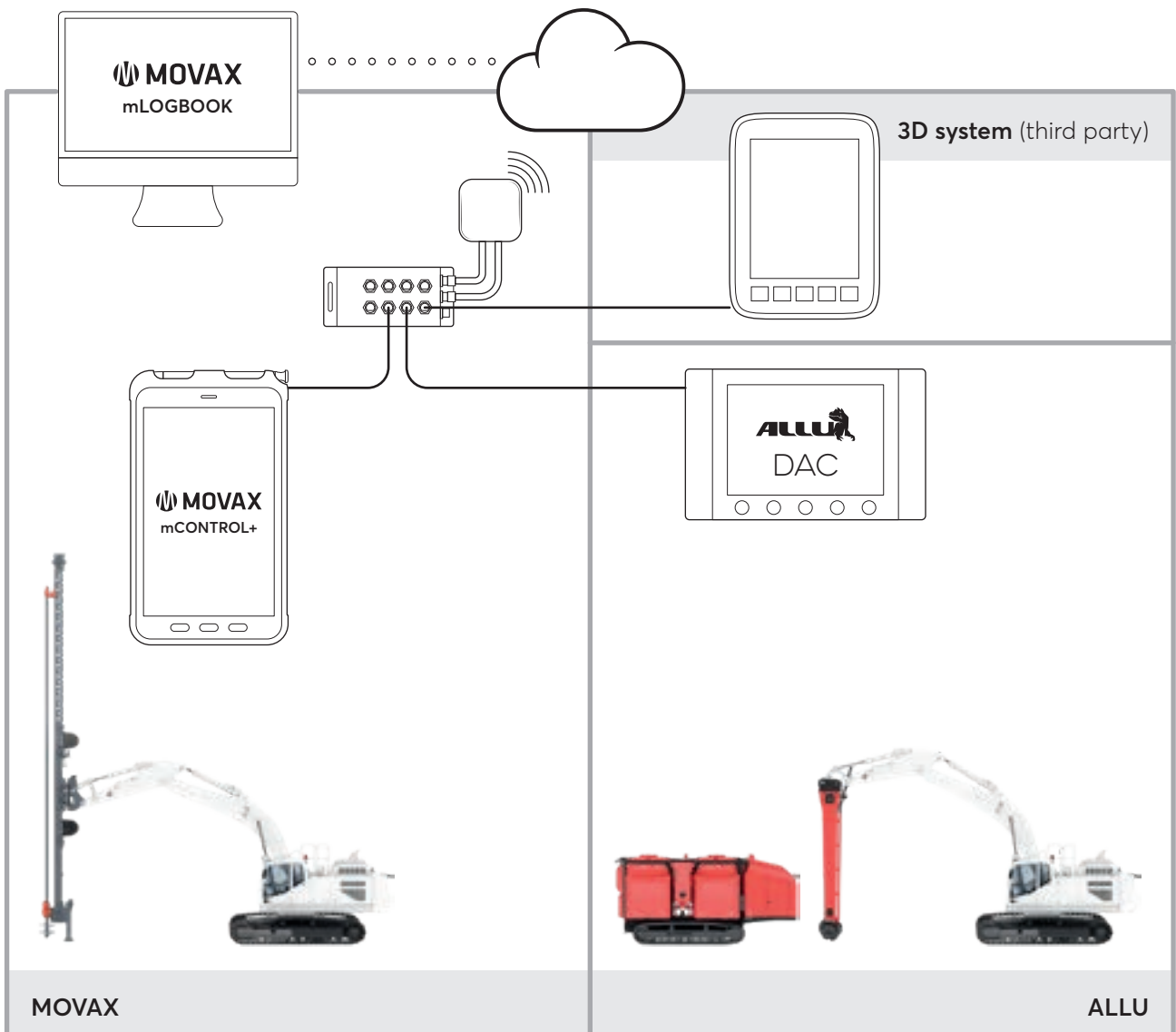
CONTROL & INFORMATION MANAGEMENT SYSTEMS

The control, monitoring and reporting system consists of the following systems which communicate with each other over the CAN-bus:

- MOVAX mCONTROL+ control system
- MOVAX mLogbook reporting system
- ALLU DAC control system
- Third party 3D system

Note! connectivity is available to Trimble, Leica and Novatron 3D systems

ARCHITECTURE: CONTROL, MONITORING & INFORMATION



THE WORK

The stabilisation work requires the plans and continuous monitoring of the work. Once the work is completed the operator has to see the result of the work.



WORK PLANNING

The stabilisation drawings and plans are accessed through the 3rd party 3D system. From the display the operator can see the planned location of the mass stabilisation fields or the stabilisation columns.



MONITORING OF WORK

The work flow is monitored utilizing MOVAX mCONTROL+ and the 3rd Party 3D-system. The location and positioning data is monitored utilizing the 3rd Party 3D system display. The mCONTROL+ -display is utilized to monitor all other stabilisation parameters such as;

- column stabilisation; for example binder quantity per column, ascent rate and rotational speed
- mass stabilisation; for example binder quantity, feed and mixing times

THE WORK

RESULT

The operator can view the result of the stabilisation work on the displays of the MOVAX mCONTROL+ and the 3rd Party 3D-system. The realised positioning data is shown in the 3rd Party 3D system whereas all other reported parameters can be found in the MOVAX mCONTROL+-system.



THE REPORTING



The mass and column stabilisation work is reported utilizing the 3rd Party 3D-system as well as MOVAX mLogbook reporting system.

The MOVAX mCONTROL+ system sends the data to a cloud-based server (mCLOUD) where all the information is stored. The user can access the information and ready made reports through a password protected web-based interface.

In addition to ready made reports the MOVAX mLogbook-reporting system also includes efficient tools for printing (pdf-format) and to transfer the data to for instance MS Excel.



THE BENEFITS

TOTAL STABILISATION SOLUTION

MOVAX+ALLU offers a fast, efficient and versatile excavator mounted total solution for mass and column stabilisation with the numerous benefits:

- Complete system solution for both shallow and deep dry mixing applications
- Complete system solution for foundation, remediation and solidification applications
- Mixers, feeder and the control & reporting system all designed to work seamlessly together
- Better cost efficiency, binder control and quality as a result of accurate computer controlled binder feed
- Ultimate, fast and cost-effective solution for the implementation of combination method geotechnical design on the jobsite
- Road legal equipment and easy to transport
- Light weight and agile solution compared to conventional equipment
- Fast and easy setup on the jobsite



TOTAL SOLUTION FOR MASS & COLUMN STABILISATION
FAST. EFFICIENT. VERSATILE. ACCURATE. ECONOMICAL.



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