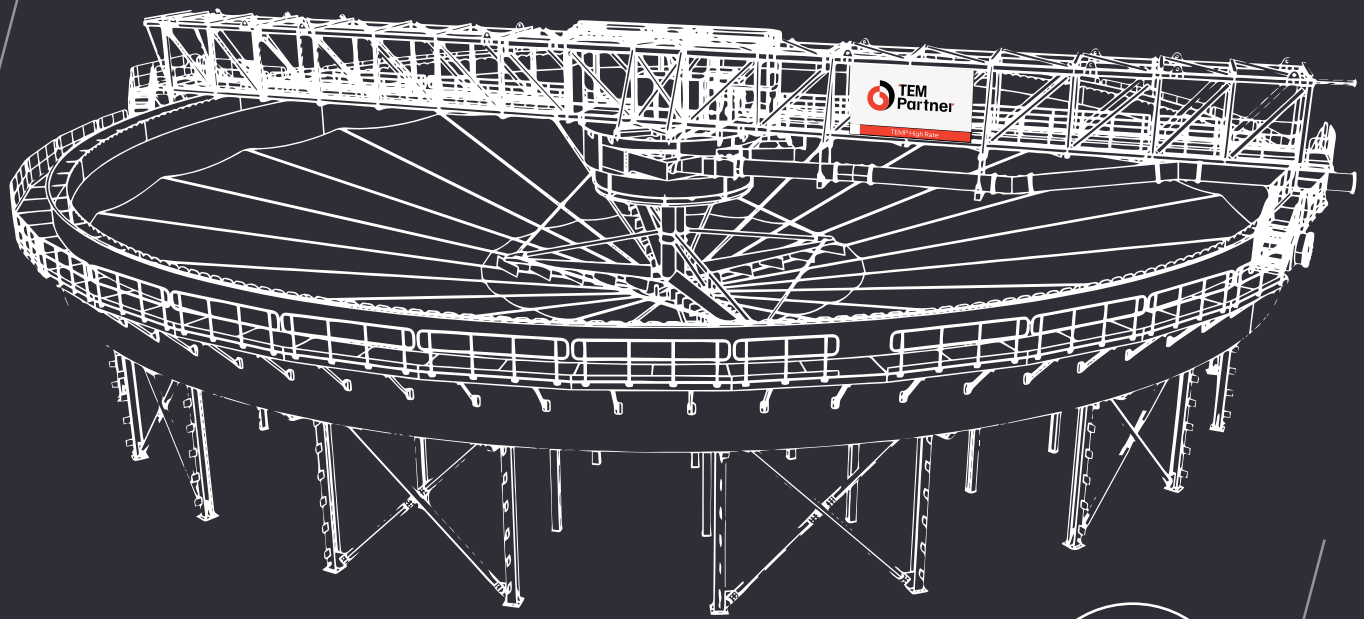
TEM Partner

Technology Equipment Manufacturing

Thickening equipment

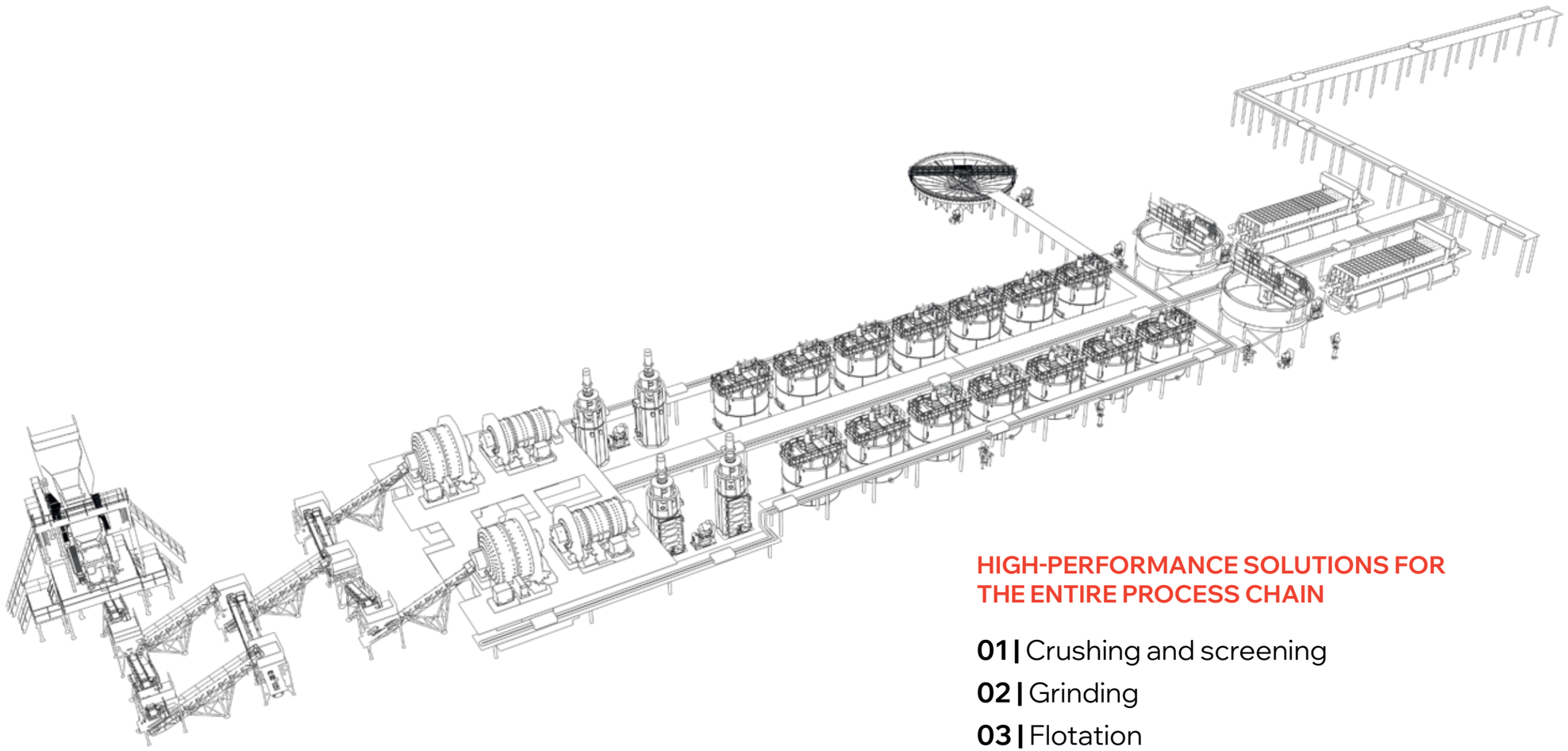


MADE IN RUSSIA • MADE IN RUSSIA •

COMPANY PROFILE

TEM Partner® is a Russia-based solution vendor and manufacturer of process equipment for the mining and metallurgical industries.

Leader in the design, manufacture and supply of state-of-art, high-efficiency thickening equipment.



20+ YEARS OF SUCCESS

TEM Partner® is a team of specialists with over 20 years of experience of work with mines around the world, with numerous projects successfully implemented in the mining industry.

TEM Partner

HIGH-PERFORMANCE SOLUTIONS FOR THE ENTIRE PROCESS CHAIN

01 | Crushing and screening
02 | Grinding
03 | Flotation
04 | Thickening
05 | Filtering
06 | Slurry pumps
07 | Engineering | Automation | Service

- Technology
- Engineering
- Equipment
- Production
- R&D Center
- Automation
- Service
- Spare parts

TEM PARTNER®
THICKENING EQUIPMENT

TEMP Conventional
conventional thickeners
3-100 m diameter
1-3.8 m tank wall

TEMP High Rate high-performance thickeners
100 m diameter
1-3.8 m tank wall

TEMP High Density
high-density thickeners
3-35 m diameter
4 m tank wall

TEMP Paste paste thickeners
3-35 m diameter
6+ m tank wall

TEMP Clarifier clarifiers
3-100 m diameter
1-3.8 m tank wall

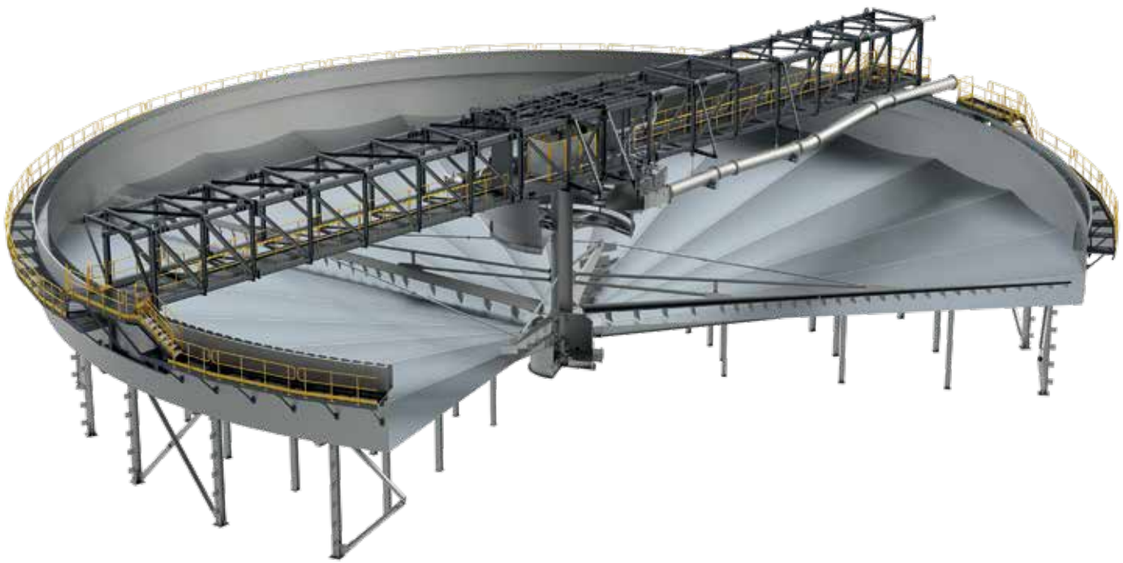
Flocculant/coagulant preparation and dosing stations

- Manufactured in Russia
- Patented TEM Partner® design
- Improved thickening efficiency
- Proprietary modern automation and control systems
- Supervised installation and commissioning
- 20+ years of experience in thickener design
- Thickener tests
- Equipment upgrade
- Process-related guarantees

∅ UP TO 100 M

ADVANTAGES TEM PARTNER® THICKENERS

- High performance with small diameter
- Smaller footprint
- Correct selection of the thickener type and size based on tests, with process-related guarantees
- Optimal flocculant consumption
- Effective feed system
- Robust design
- Thickeners can be mounted on metal supports or on the ground; welded or flanged connections are available
- Long service life with no need to replace parts
- Hydraulic drives and rake lifts protect thickeners against damage
- Low power consumption
- Simple thickener control and management system



THICKENER DESIGN

TEM Partner® thickeners are customised for each individual operation and deliver high performance due to optimal design that takes into account the parameters of the slurry to be thickened pulp to be thickened and location of equipment.

- Excessive sandoff is not a problem for our tanks due to their design
- Seismic, wind and snow loads are taken into account
- The tank structure can have welded or bolted connections
- A thickener bridge with a diameter of up to 50 m can be full-span and support a feedwell well and a drive
- With an increase in diameter, a central column is used to support the drive mechanism
- The rake structure is designed to move high density underflow to the underflow cone without forming a rotating mass of material on the rakes themselves
- The thickener drive is selected given thickener's behavior at the maximum underflow density
- The working torque is equal to 25% of the maximum one

LABORATORY THICKENER TESTS

To determine the thickener operating parameters, **TEM Partner®** engineers conduct tests in dynamic mode on a 100 mm diameter lab unit both in the laboratory and on-site. Based on the test results, the thickener size and design are calculated, and process-related guarantees are ensured.

THE FOLLOWING SLURRY PARAMETERS AFFECT THE THICKENER EFFICIENCY

- Particle size distribution in feed
- Slurry mineral composition
- Solid content in thickener feed
- Specific gravity of solids
- Specific gravity of liquid phase
- pH
- Viscosity
- Temperature

THICKENER FEED SYSTEM

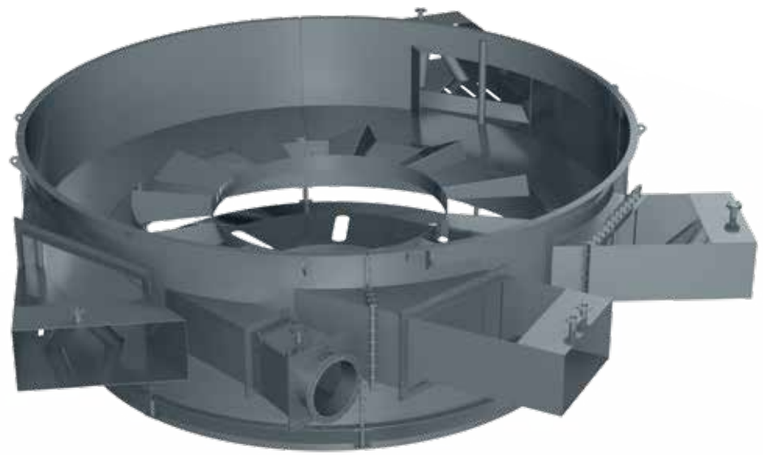
Thickener operation largely depends on how the slurry feed system is implemented and whether the slurry is properly diluted.

TEMP Feedwells are designed to maintain optimum solid content in the thickener feed to ensure efficient slurry flocculation and distribution over the tank area.

Feedwell configuration and its volume are customised for each specific project depending on the parameters of slurry to be thickened, which allows maintaining the required operational parameters of the thickener and its high efficiency with an optimal flocculant consumption.

TEMP FEEDWELL

- Ensures dilution of the initial feed to the required value
- Mixes and adds the final dose of flocculant to the process. Diluted flocculant is fed into the feedwell through nozzles
- Effective dispersion of the flocculant is ensured by the mixing action of the slurry
- Deaerates incoming slurry



ADDITIONAL EQUIPMENT AND COMPONENTS

The scope of thickening equipment supply depends on the production requirements. We can source and supply the necessary components for both greenfield and brownfield projects.

ADDITIONS TO BASIC THICKENER DESIGN

- Covers
- Tank heat insulation
- Drive protection for outdoor thickeners
- Underflow circulation system
- System for froth removal
- Crane girders for mounting the drive and feed pipes
- Crane girders for mounting underflow pumps
- Other additions and accessories according to customer requirements

FLOCCULANT PREPARATION AND DOSING SYSTEM

Thickener efficiency is dependent on the correct selection and dosing of the flocculant. Based on the tests we conduct, an automated flocculant preparation and dosing system is selected and proper reagents are chosen.

- Ensures that the correct concentration of flocculant solution is prepared
- Ensures that the flocculant solution is fed to the thickener without interruption, with the dosage required
- Provides the ability to regulate and control the thickening process
- Reduces the total consumption of flocculant
- Ensures reliable operation of the entire thickening unit

THICKENER DRIVE SYSTEM

- Single planetary gearboxes on thickeners with a full span bridge
- Multi-gear drives with a center column for large-diameter thickeners
- The rake drive uses a low-speed hydraulic motor combined with a high-performance planetary gearbox
- The rake lifter is fitted with a row of cylinders operating in parallel which lift and descends the drive framework
- Rake drives are customised for each specific project and are composed of ready-made components
- Hydraulic or electric drive

ADVANTAGES OF HYDRAULIC DRIVE

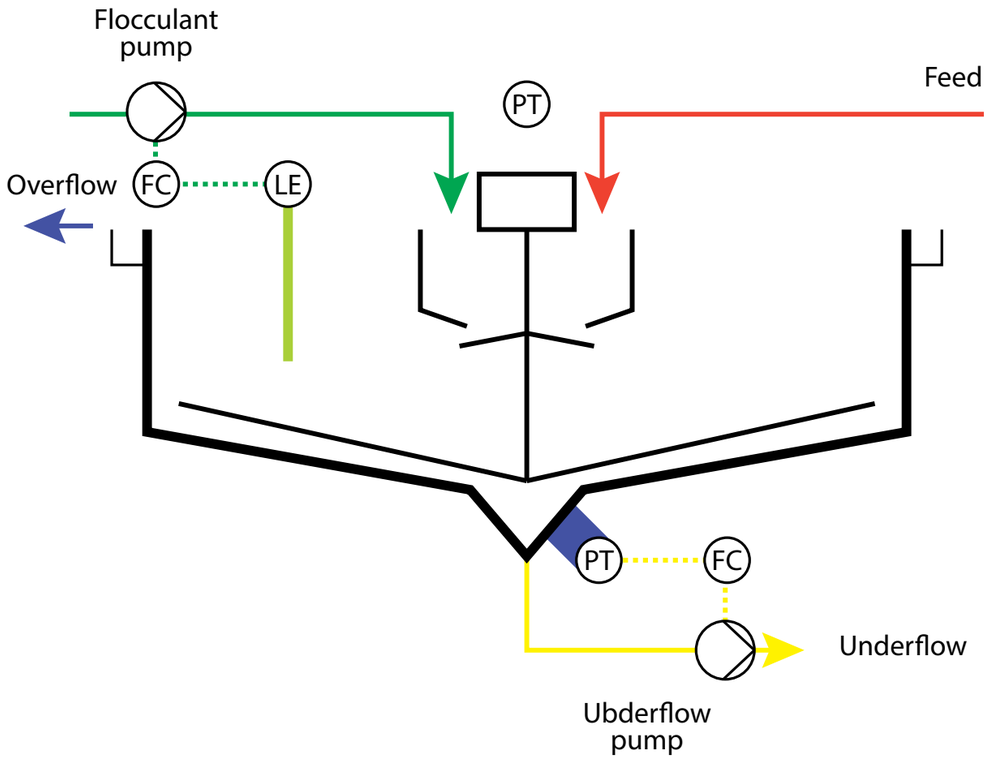
- Precise torque measurement via hydraulic pressure
- Three levels of drive protection
- Safe rake lifting
- Reversal option
- The pressure in the hydraulic drive is monitored by a pressure transducer which activates lifting/descending of the rakes
- The independent pressure relay monitors the system pressure and activates the alarm system and the hydraulic motor relay in case of reaching the higher pressure threshold
- The final protection level is provided by actuation of the bypass valve in the line ensuring that the design torque is not exceeded
- Prevention of torque overload during startup or operation

TEM Partner® high-performance drives are custom designed to facilitate maintenance. Standard drives are available with torques

to **6,500** kNm.

THICKENING AUTOMATION

All TEM Partner® thickeners come with proprietary custom controls to improve performance, safety and energy efficiency.



- Drive and rake lift control
- Oil station control
- Oil cooler control
- Oil heater control

- Alarms, warnings and general readiness of the unit
- Additional system monitoring via the «Event Log»
- Tracking thickener operation trends

THICKENER UPGRADE

TEM Partner® can implement projects to retrofit or upgrade thickeners while retaining the existing thickener tank.

UPGRADE GOALS

- Increased performance
- Thickening process flow optimization
- Thickening/dewatering process automation
- Tackling bottlenecks - feeding, discharging, etc.
- Increased requirements for thickening parameters
- Stabilization of thickening parameters
- Improved equipment reliability and maintainability

POSSIBLE SCOPE OF SUPPLY

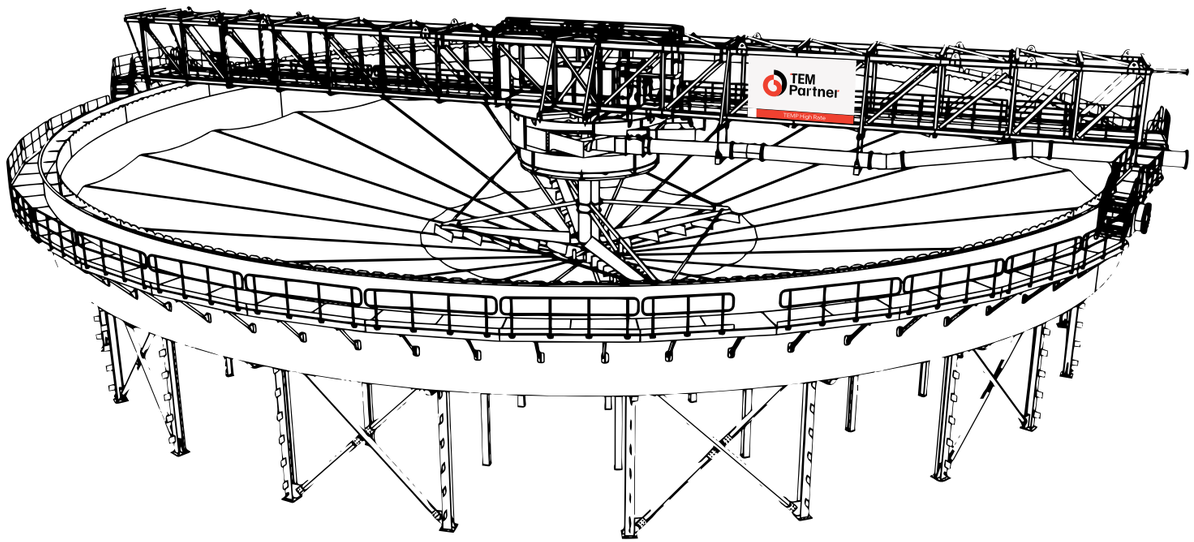
- Support column
- Bridge
- Shaft
- Rakes
- Control panel
- Feedwell
- Underflow cone
- Overflow launder

SUPPLY OF THICKENING UNITS

The thickening result is dependent not only on the operation of the thickener itself, but also on the correct selection and efficient operation of auxiliary equipment.

THE PACKAGE SUPPLIED INCLUDES

- Flocculant/coagulant preparation and dosing station
- Pumps
- Valves
- Sumps
- Feed boxes
- Instrumentation
- Automation system



TEM Partner

T ECHNOLOGY

E QUIPMENT

M ANUFACTURING

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