CASE STUDY

FROM 100 TO 600+ T/H

MATERIAL-SPECIFIC CONVERSION ENGINEERING FOR AN EXISTING NON-SCHADE RECLAIMER

At a cement plant in the Far East, an existing third-party bridge-type reclaimer designed for approximately 600 tonnes per hour (t/h) was achieving only around 100 t/h with the site's cohesive limestone mixture.

SCHADE analysed the machine and material behaviour and developed a new reclaiming concept tailored to the existing installation.

PROJECT HIGHLIGHTS

600+ T/H ACHIEVED
From approximately 100 t/h before conversion to more than 600 t/h after commissioning.

ENGINEERED AROUND THE MATERIAL
The reclaiming concept was developed around the investigated behaviour of the cohesive limestone.

EXISTING MACHINE CONVERTED
The existing bridge-type reclaimer was adapted around two newly manufactured SCHADE active harrows.

INDUSTRY
Cement

MATERIAL
Limestone mixture

REGION
Far East

SOLUTION
Conversion with two active harrows

PROJECT SCOPE
Engineering, reclaiming concept & required machine modifications

SPECIAL CHALLENGE

Despite being in generally good condition, the existing reclaimer was achieving only around 17% of its intended capacity when handling the cohesive limestone mixture.

THE SOLUTION
A RECLAIMING CONCEPT ENGINEERED AROUND THE ACTUAL MATERIAL BEHAVIOUR

THE CHALLENGE

THE MATERIAL DEFINED THE CHALLENGE

The existing non-SCHADE bridge-type reclaimer was generally in good condition and well maintained. The key challenge was the limestone mixture itself: its flow behaviour placed significantly different demands on the reclaiming process. Before defining any modifications, SCHADE therefore had to understand the interaction between the bulk material, the existing equipment and its structural interfaces.

MOISTURE-SENSITIVE MATERIAL

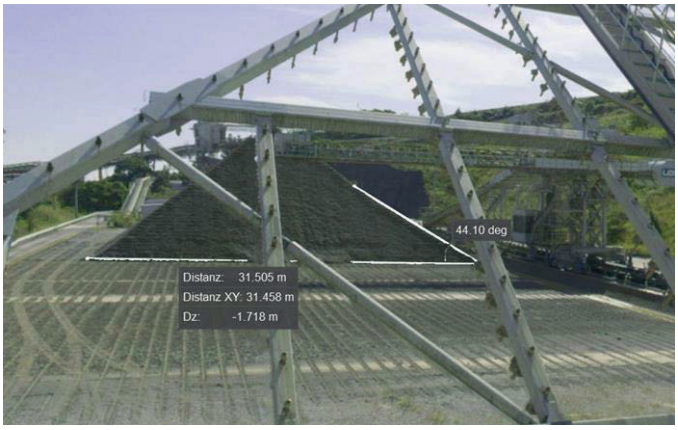
Laboratory tests showed increasing cohesion with rising moisture. At around 4% moisture, cohesive behaviour began and higher shear stresses were required to activate the material.

VARYING MATERIAL CONDITIONS

Samples from the reclaiming pile, stacking pile and open quarry showed moisture contents of approximately 5.5–7.5%. The reclaiming concept therefore had to account for the investigated range of material conditions.

EXISTING MACHINE, NEW LOAD CONDITIONS

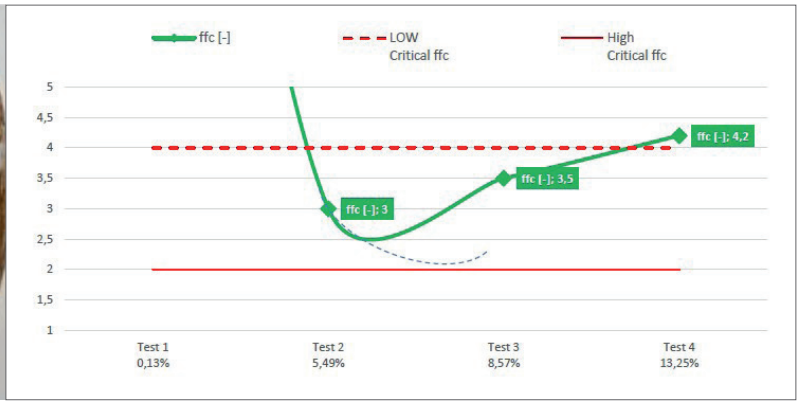
The existing reclaimer and its interfaces remained the basis for the conversion. Any new reclaiming concept therefore had to be assessed against the existing bridge structure, harrow tower and other structural interfaces under the resulting load conditions.



Third-party bridge-type reclaimer.

Bulk Material	Limestone mixture
Material Samples	Reclaiming pile / stacking pile / open quarry
Measured Moisture	Approx. 5.5–7.5%
Existing Machine	Third-party bridge-type reclaimer
Required Capacity	Min. 600 t/h

Limestone sample used for material testing.



Flowability behaviour at different moisture levels.

PROJECT OBJECTIVE

The objective was to define the modifications required to achieve at least 600 t/h across the bulk-material conditions represented by the samples provided, while integrating the new reclaiming concept into the existing machine.

ENGINEERING & SOLUTION

ENGINEERED FOR THE EXISTING MACHINE

Based on the investigated material behaviour, SCHADE developed a new reclaiming concept specifically for the existing non-SCHADE bridge-type reclaimer. The engineering combined the required reclaiming performance with the machine's existing geometry, structural interfaces and electrical infrastructure. The resulting conversion integrates new reclaiming equipment with targeted mechanical, structural and electrical adaptations to the existing machine.

NEW RECLAIMING CONCEPT

Two newly manufactured SCHADE active harrows with patented SCHADE Pile Crackers (active ploughs) form the mechanical basis for achieving the required reclaiming capacity.

MATERIAL-BASED DESIGN

The mechanical configuration was dimensioned using loads derived from the investigated bulk-material behaviour.

STRUCTURAL INTEGRATION

Stress and buckling analyses defined the required adaptations and stiffening of the existing bridge and harrow-tower structure.

ELECTRICAL INTEGRATION

A separate electrical system for the active harrows was integrated with the existing installation via a PLC signal interface.

PROJECT SCOPE

- Engineering study & existing-machine assessment
- Bulk-material investigation & 3D laser scan
- Development of the new reclaiming concept
- Two SCHADE active harrows with Pile Cracker
- Mechanical, structural & electrical integration engineering

TWO ACTIVE HARROWS: INTEGRATED INTO THE EXISTING RECLAIMER

The conversion combines two newly manufactured SCHADE active harrows with Pile Crackers and the required adaptations to the existing machine.

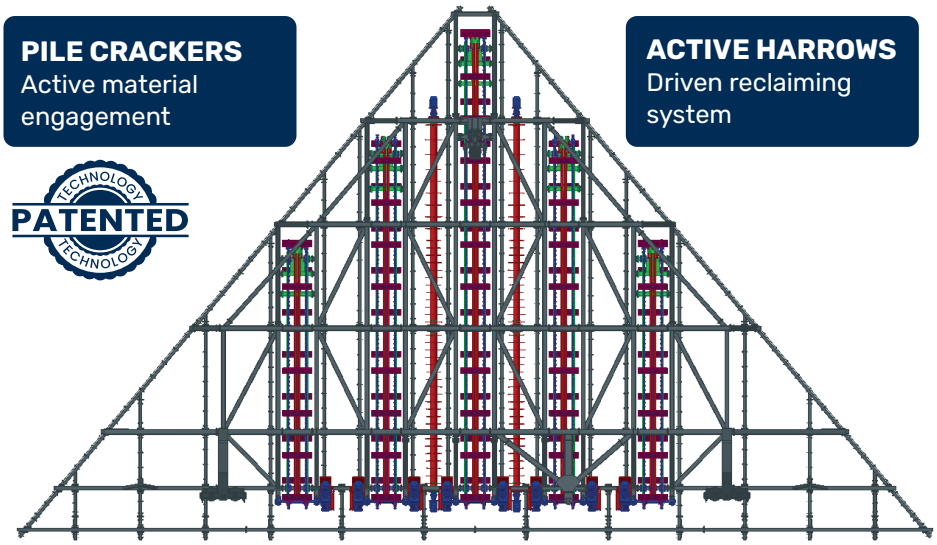
RIGID TRUSS GIRDER
Integration of the reclaiming system

DRIVE UNITS
Scraper-chain and plough drives

PILE CRACKERS
Active material engagement

PATENTED TECHNOLOGY

ACTIVE HARROWS
Driven reclaiming system



New harrow design

RESULTS & CUSTOMER BENEFITS

600+ T/H ACHIEVED

Following commissioning, the converted reclaimer consistently achieves more than 600 t/h.

DESIGNED FOR THE INVESTIGATED CONDITIONS

The reclaiming concept was designed for 600 t/h across the bulk-material conditions represented by the samples provided.

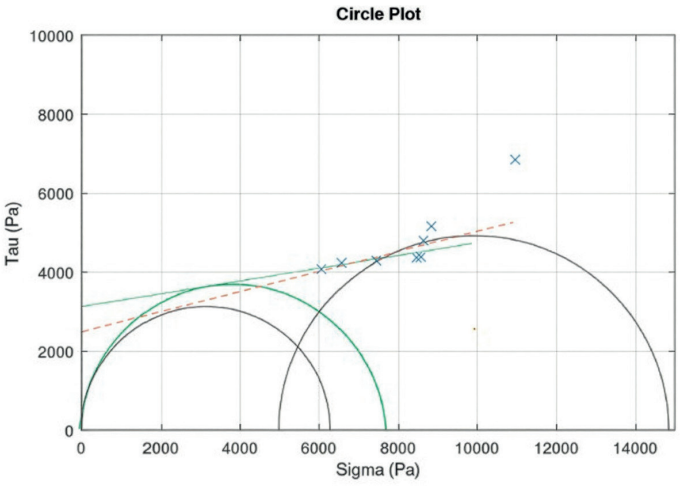
EXISTING ASSET ADAPTED

The new reclaiming equipment was integrated through targeted modifications to the existing machine and its interfaces.

FROM MATERIAL BEHAVIOUR TO MACHINE DESIGN

MATERIAL TESTING AND DEM ANALYSIS TRANSLATED THE COHESIVE LIMESTONE BEHAVIOUR INTO THE DESIGN BASIS FOR THE NEW RECLAIMING SYSTEM.

Laboratory testing showed that the limestone became increasingly cohesive with rising moisture. With the supplied samples containing approximately 5.5–7.5% moisture, SCHADE had to quantify the material behaviour and determine the forces required to activate it before dimensioning the new reclaiming system.



Calibration basis for analysing reaction forces in the reclaiming system.

TECHNICAL PROOF POINTS

≈4% MOISTURE	Cohesive behaviour begins around this level in the laboratory test series.
DEM-DERIVED LOADS	Reaction forces acting on the active harrow, Pile Cracker and truss girder.
110 kW / HARROW SIDE	Installed power derived for the mechanical design to reclaim 600 t/h.

01 | MATERIAL BEHAVIOUR QUANTIFIED

Three representative samples were investigated for particle-size distribution, moisture content and flow behaviour.

02 | STOCKPILE CONDITIONS REPRODUCED

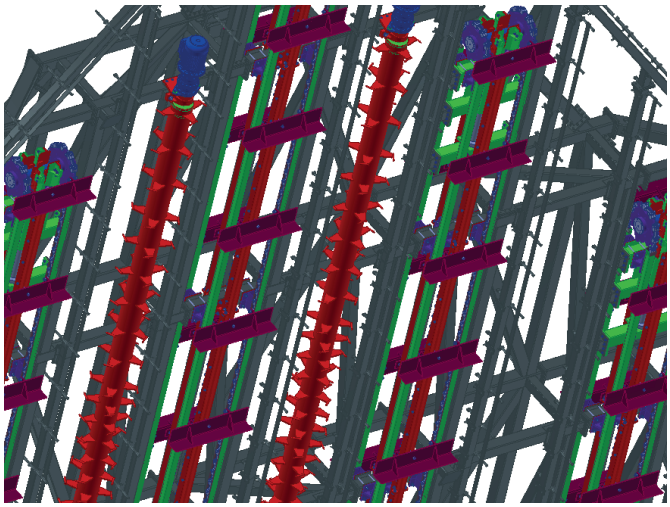
The material model was calibrated to represent the pre-compacted conditions inside the stockpile and the final particle-size distribution.

03 | REACTION FORCES CALCULATED

DEM analysis determined the reaction forces acting on the active harrow, Pile Cracker and truss girder.

04 | MACHINE DESIGN DERIVED

The calculated material loads provided the basis for dimensioning the new reclaiming system.



Active harrow and Pile Cracker configuration derived from the material-specific engineering.

CUSTOMER BENEFIT

Measured material behaviour and calculated reaction forces provided a defined engineering basis for a reclaiming concept designed to achieve 600 t/h across the investigated material conditions.