

OPERATING INSTRUCTIONS

Semi Mobile Crushing Station

Manual 4 Design and Function

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1 DESIGN AND FUNCTION

1.1 General Description

Semi-mobile crushing equipment is used for transporting coal, mixed with xylitol, from a nearby open cast mining to an open air coal storage (not in scope of supply) inside a power plant.

The entire equipment consists of two main components:

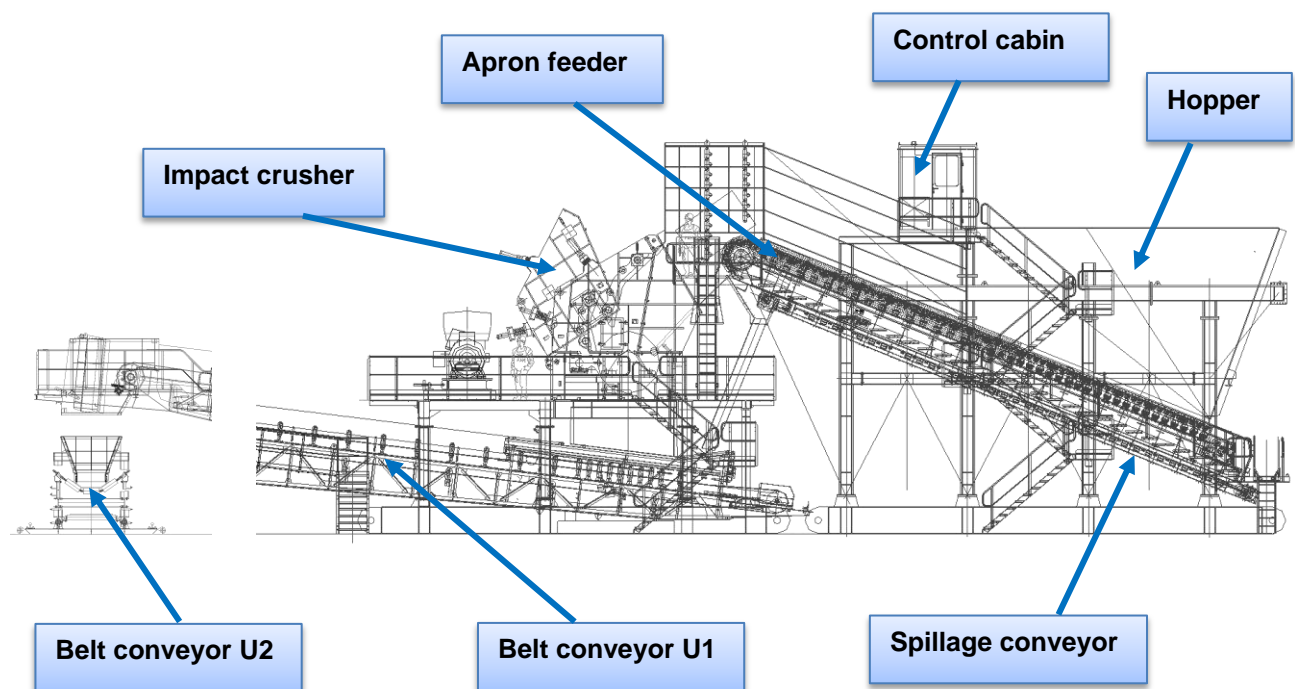
- Crusher station for twin truck feeding,
- Belt conveyor system with 1 line for feeding the power plant open air stockpiles.

The crusher station is designed to feed an apron feeder by trucks from 2 sides. During unloading, trucks dump the coal-xylitol-mix through a hopper to the loading surface of the apron feeder. It starts and carries the material along a slope to its top point and discharges the load into a chute with a running impact crusher below.

Big lumps of coal and long pieces of xylitol are cracked inside the crusher immediately and the outgoing material falls through a chute to the loading table of the first belt conveyor with flowing sequence.

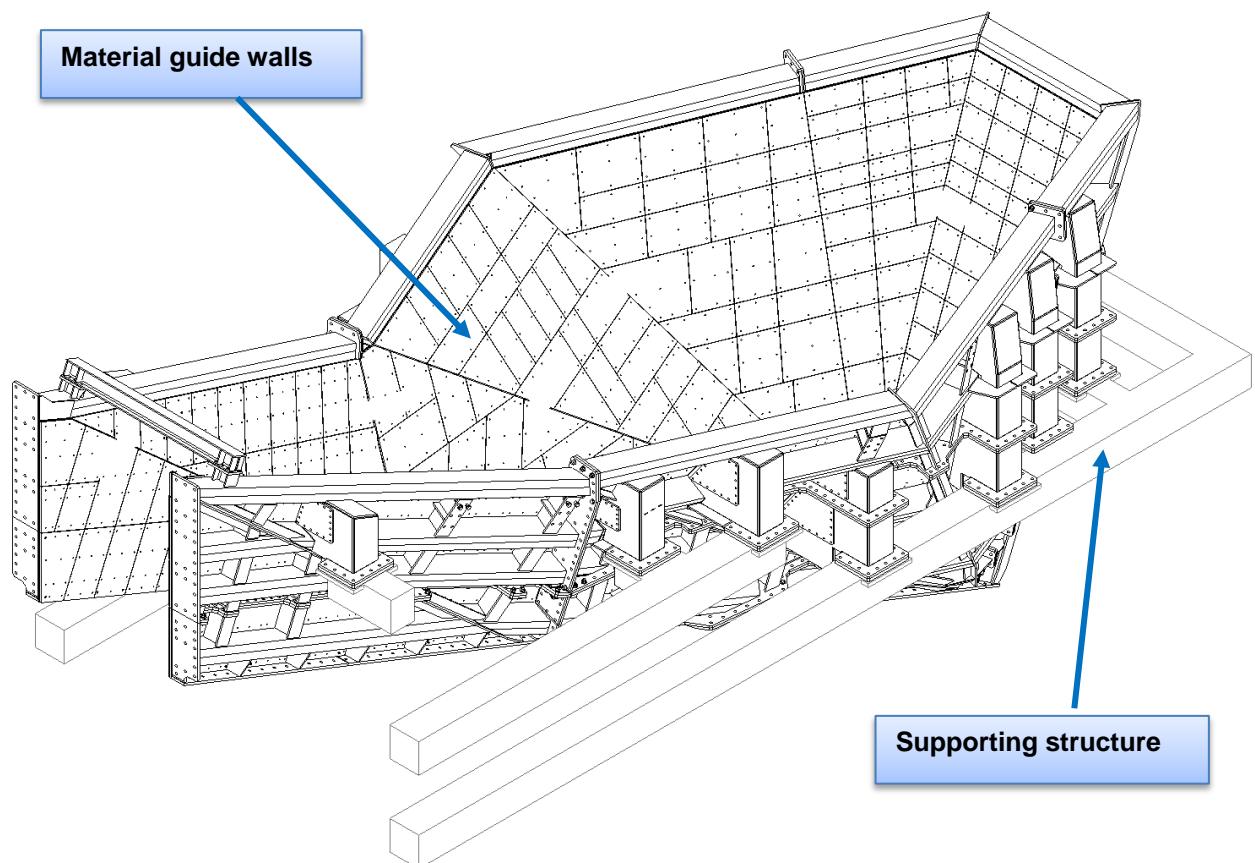
The conveyor system consists of a continuous belt conveyor line involving conveyors U-1 to U-5 with a common length of 2937m.

In the immediate vicinity of the crusher station, there is an operator cabin installed to control the handling process of the crushing station and the belt conveyor system. This cabin is designed for a continuous presence of an operator.



1.2 Feeder Hopper

The feeder hopper accepts material discharged by dump trucks from the loading ramps, which are designed in a way allowing the trucks to approach the hopper backwards from two sides. The hopper is made as a solid robust construction. Its material guide walls are lined with RCH1000 plates. The base frame and supporting structure of sectional steel components are designed to accommodate the feeder hopper and its outlet walls.



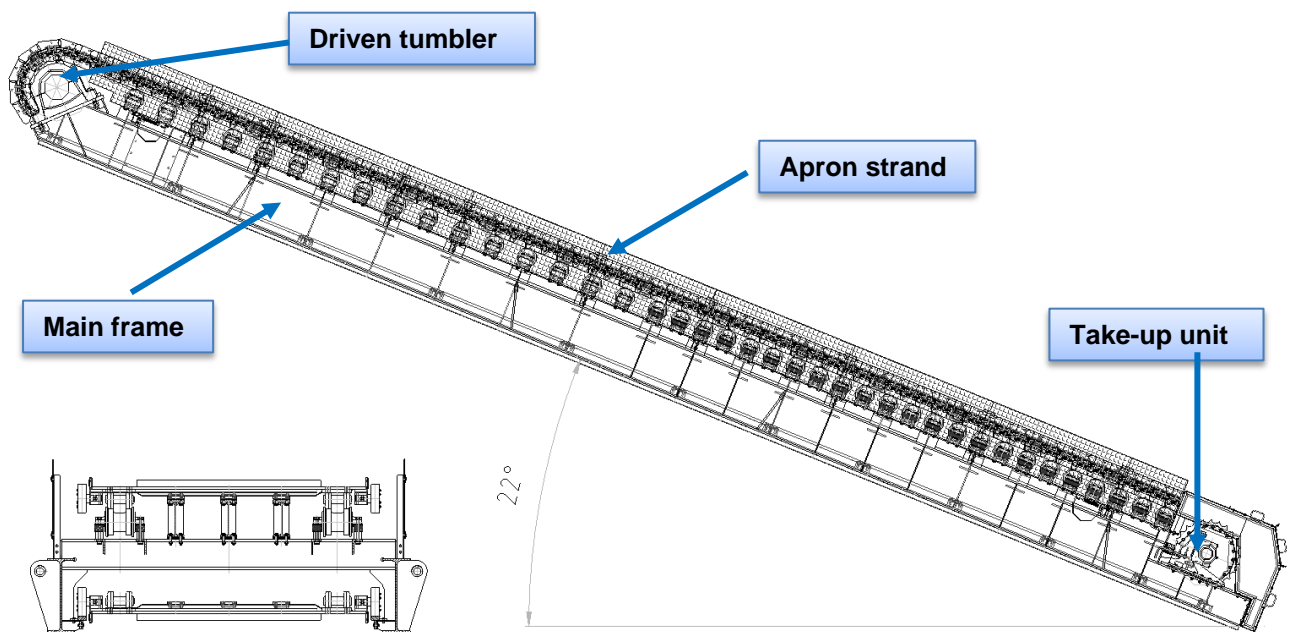
1.3 Apron Feeder AF 2200 x 15

1.3.1 General Notes

The apron feeder is a flat steel plate conveyor. It is the first drive in the conveying sequence and has a capacity of three truck loads (two truck unloading ramps allow double unloading). During unloading operation, the coal falls from the dump truck into a hopper at which base the apron feeder is situated. The material is transported along a slope to the top point of the apron feeder where it is discharged into a further chute, which guides the coal directly into the crusher. Capacitive material detectors on the ground and on top report to the control system if the chute is filled or free for a new truck unloading operation.

The apron feeder consists basically of following main components:

- main frame,
- apron strand,
- driven tumbler,
- drive unit,
- take-up unit,
- set of rollers,
- set of impact rails.



1.3.2 Main Frame

All components of the apron feeder are mounted on the main frame which is designed as a welded structure built up by two longitudinal girders and numerous cross beams.

1.3.3 Apron Strand

The apron strand consists of individual aprons. The pulling unit is formed by means of two track chains which are arranged in the double-link style.

The individual aprons are fastened on the chain links. The gap between adjacent aprons is closed with a seal so that material cannot penetrate between the aprons even when moving around the sprocket wheels.

The aprons are fabricated in welded design.

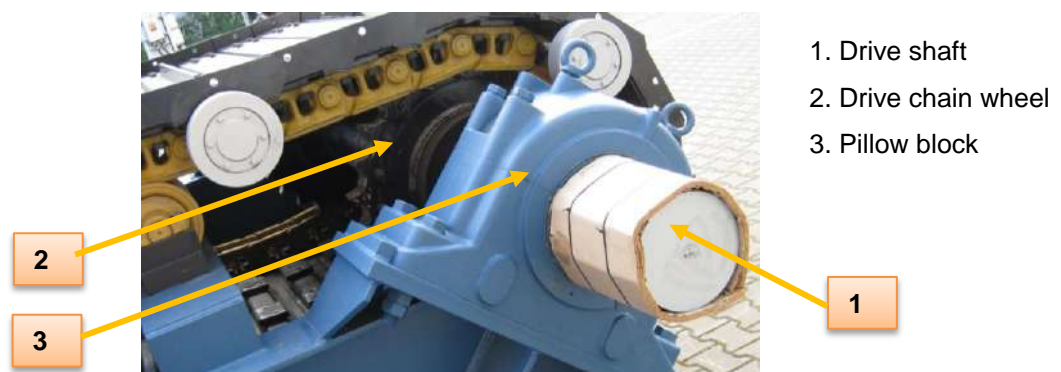
The complete apron strand is guided in the upper run by means of rigidly fixed and maintenance-free track rollers. Below the apron strand, there are arranged impact rails which absorb the loading impact resulting from feeding operation.

The return rollers are installed on both sides under the aprons. These rollers run on rails fitted to the carrying frame in the return strand. The chain is guided over a drive sprocket and a return sprocket.



1.3.4 Driven Tumbler

The driven tumbler is formed by a drive shaft with drive chain wheels and pillow blocks containing spherical roller bearings. The drive chain wheels with replaceable gear segments are fixed to the drive shaft by means of taper keys.



1.3.5 Drive Unit

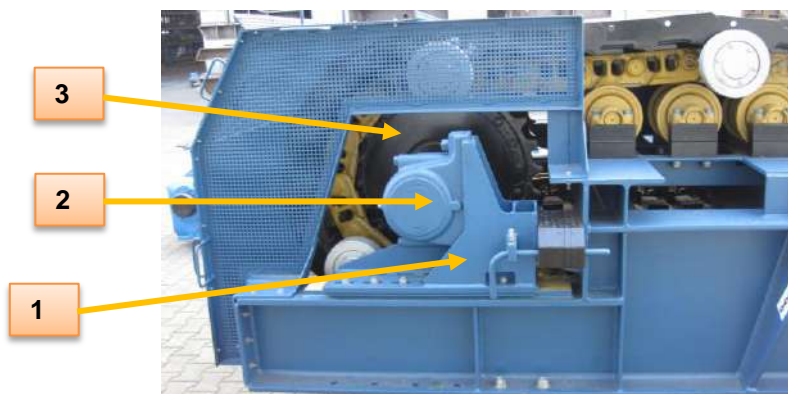
The apron feeder is driven by a planetary-gear motor. The connection between the gearbox and the drive shaft is established by a shrink disc. The entire drive unit is linked with the carrying frame of the apron feeder via a torque arm.

1.3.6 Take-up Unit

The take-up unit consists of a moveable tensioning frame with the two pillow blocks, bolted to the frame. Both chain wheels with replaceable gear segments are bolted to the tensioning shaft.

The tension of the apron chains can be adjusted in stages of 1 mm each by means of the take-up chain wheels.

The tension adjustment is effected by hydraulic cylinders.



1. Tensioning frame
2. Pillow block
3. Chain wheel

1.4 Spillage Conveyor KGF 2490 x 15,1

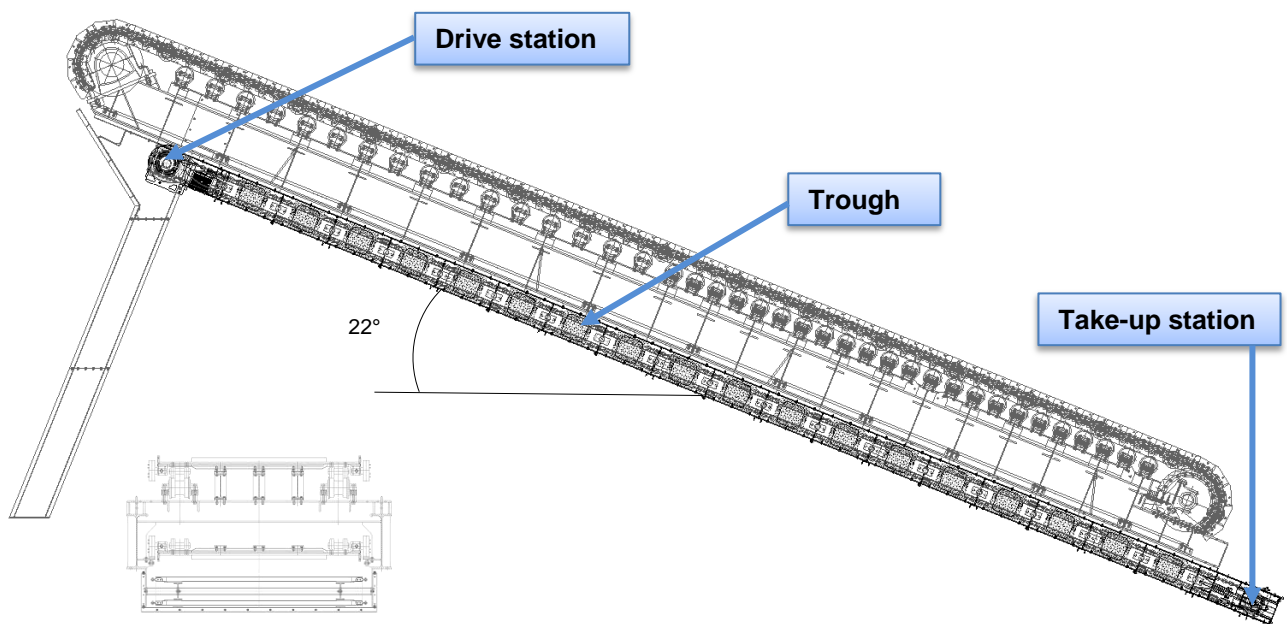
1.4.1 General Notes

The spillage conveyor is located below the apron feeder. It is aimed to remove any coal pieces falling from the lower run of the apron feeder. The material falls through between the upper run scrapers of the spillage conveyor and is further transported by its lower run scrapers to a spillage chute.

The spillage chute guides the coal powder beside the crusher directly to the upper surface of the belt conveyor U-1.

The spillage conveyor consists basically of following main components:

- trough,
- drive station,
- take-up station.



1.4.2 Trough

The trough is a sheet steel structure. It is equipped with scraper guides and wear rails used for scrapers to slide.

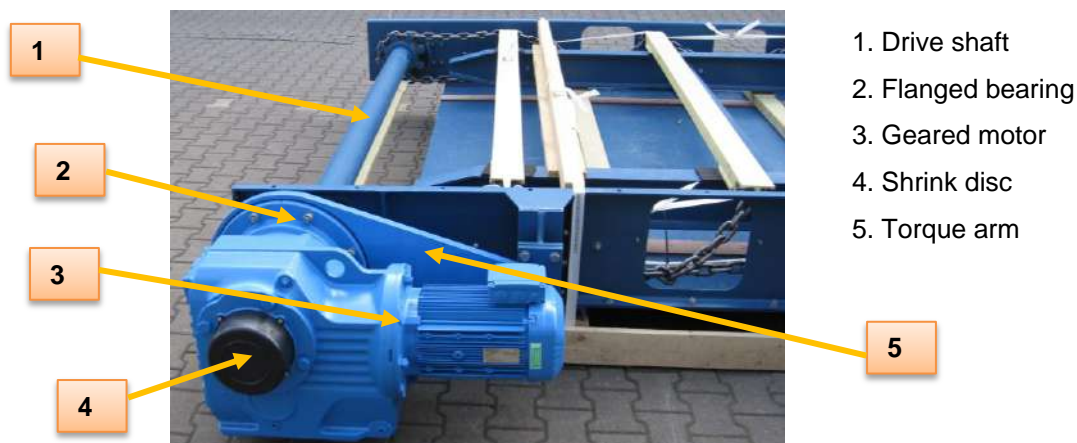
The scrapers spaced at intervals of 1000 mm are mounted on the round steel chains. They guide spillage material falling into the trough back into the flow of the conveyed material.



1.4.3 Drive Station

The drive station consists of a drive shaft which passes through the trough and is supported laterally by flanged bearings. Two chain sprockets are fixed on the shaft by means of gib keys.

The driving unit consisting of a bevel geared motor is mounted onto the drive shaft. The geared motor is connected with the drive shaft in the force-closed manner by means of a shrink disc. The torque arm of the geared motor is fastened on the base frame.



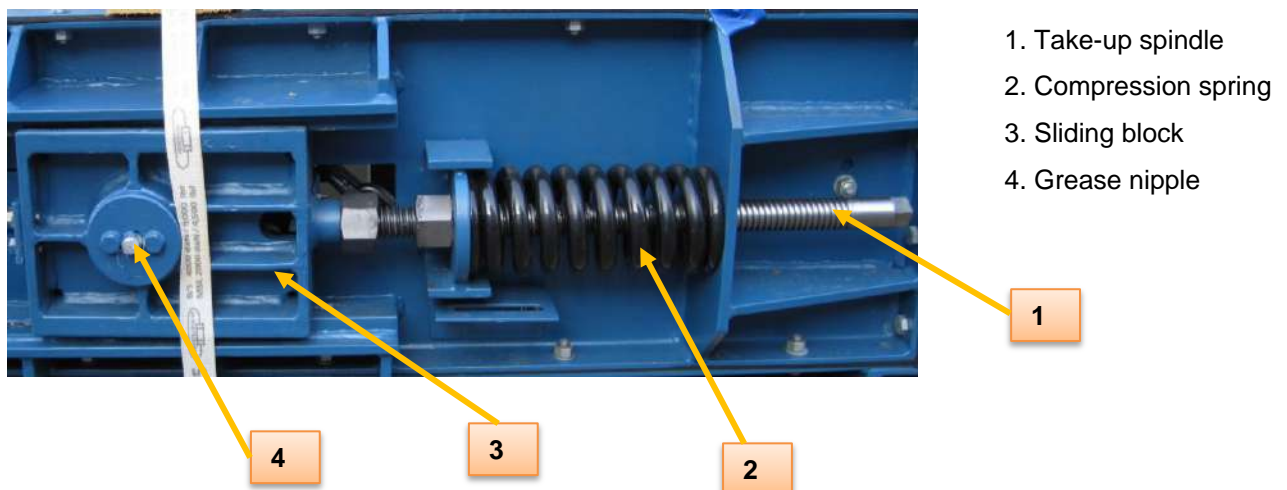
1.4.4 Take-up Station

The take-up station is designed as a spindle tensioning station. The necessary pre-tensioning of the chain strands is reached by turning the take-up spindles (on both sides).

By turning the take-up spindles, the springs get tensioned (compressed) and the position of the sliding block changes.

The springs are necessary to compensate the polygon effect of the chain sprockets and impacts. The sliding blocks accommodate the take-up shaft which holds chain sprockets supported by bearings.

On the end faces of the tensioning shaft, there are provided grease nipples which supply the chain sprockets with lubricant.



1.5 Impact Crusher PB 1822 PP

1.5.1 General Notes

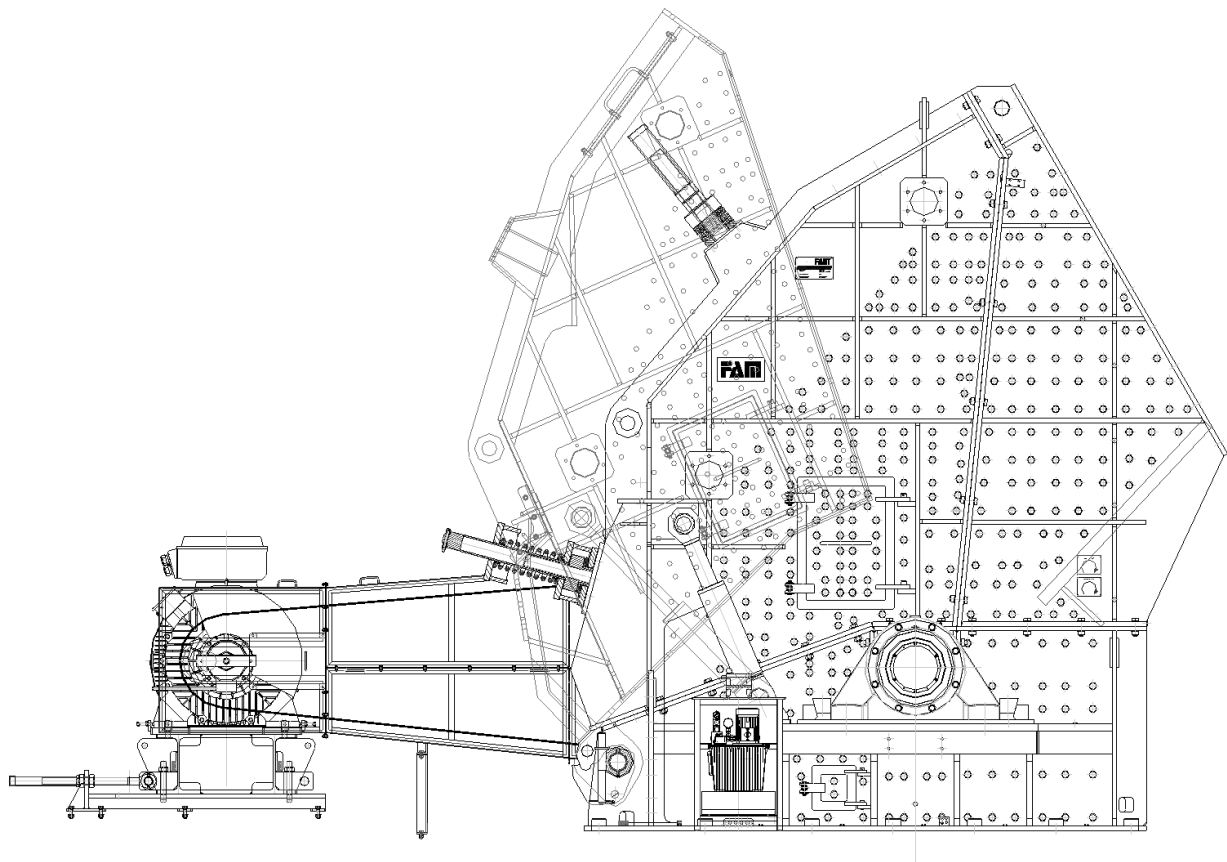
The impact crusher beats the big lumps and xylitol pieces into small parts, which have the size of bulk material. Rotating at high speed (ca. 39 m/sec), the rotor placed in a housing lined with wear plates grasps the feed material with great force and throws it against impact rockers. The impact rockers with oscillating suspension are installed in the housing.

The feed material is crushed between blow bars and impact rockers to the desired grain size. The impact rockers are arranged in a way so that the product is thrown back into the crushing radius.

The output grain size can be determined and easily controlled from outside by adjusting the impact rockers, t.i., by altering the gap between the rotor and the impact rocker.

Besides, the contact pressure can be changed by respective tensioning of the helical compression springs.

The crushed material falls without time delay through the third chute onto the belt conveyor U-1 installed below the chute.



1.5.2 Drive Unit

The impact crusher is driven by a narrow V-belt drive consisting of 18 V-belts 8V/25N with a pitch length of 12700 mm. Tensioning and releasing of the tension is effected by three external take-up spindles.

Drive unit and crusher have a fixed coupling via belt-drive. The motor and countershaft are connected via an elastic coupling. For that matter, the motor is energized via a frequency converter. Due to its volume, the running crusher has a high inertia torque and much kinetic energy. The FC allows a better and longer controlled start-up and shut-down after using. The start-up takes approx. 2 min. and the shut-down lasts about 5 min.

To detect any slipping between the drive unit and the crusher there are speed sensors installed on both sides. Both values will be compared to detect slipping before a different speed causes friction and heat to the V-belts, which connect both sides - the motor and the machine.



1.5.3 Hydraulic System

The impact crusher is furnished with two hydraulic cylinders for the housing opening device. The cylinders of the machine are supplied by one hydraulic unit with which they are connected via pipe and hose lines.

The cylinder pair is provided with a 4/3 directional valve on the hydraulic unit to actuate opening and closing operation of the crusher housing.

Each cylinder is equipped with a load-holding valve to keep the cylinder in position and protect it against overloads

