

The new Kubria® cone crusher from thyssenkrupp

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Introduction

The Kubria® cone crusher from thyssenkrupp (see Fig. 1) has proved effective for many years under the toughest application conditions in the field for hard-rock crushing. It is used mainly in the aggregates industry for the secondary and tertiary crushing of granite, basalt, gneiss and other hard rock, as well as in the mining and cement industries.

The Kubria® product line was recently updated to include the latest technical developments, and standardised to assure uniform manufacturing standards maintained at thyssenkrupp locations around the world. The result is that the crusher can now be offered very competitively and with significantly lower delivery times.



Fig. 1: Kubria® cone crusher

Design and function

The Kubria® crusher design has a hydraulically supported main shaft and fixed upper crusher chamber. Crushing takes place between the concaves in the crushing chamber and the mantle lined crushing cone (see Fig. 2), which is rotated by an eccentric drive in the lower section.

This design allows the gap between the concaves and the crushing cone to be continuously decreased or increased all around the periphery. As the crushing chamber narrows, crushing of the material is achieved by means of increasing pressure on the rock. The geometry of the crushing chamber and the eccentric stroke can be individually adapted to specific crushing requirements as determined by the material characteristics. This is particularly important when the raw material properties or the product requirements change during the service life of the crusher.

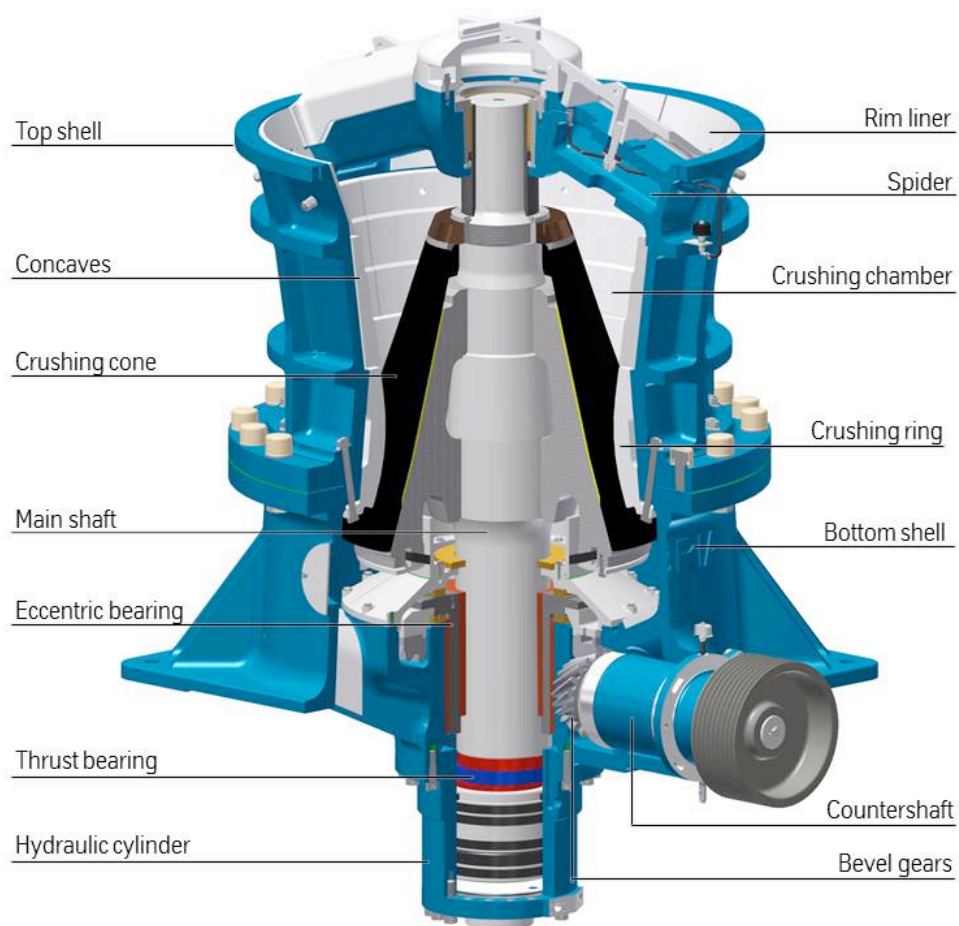


Fig. 2: Main components of the Kubria® cone crusher

The maximum possible feed size for the crusher is determined by the opening width at the top of the crushing chamber. The finished product lump size is determined by the closed-side setting (CSS) in the discharge zone.

The wear material components in the crusher are made of wear-resistant austenitic manganese steel that can be replaced easily. The crushing cone consists of a mantle fit on the cone body that is in turn firmly connected to the main shaft. The crushing ring is fastened in the top shell of the crusher. "G" models for coarse crushing are additionally equipped with annular arranged concaves. The top shell and bottom shell are both made of cast steel. The 'spider' in the upper area of the top shell is used to support the upper shaft bearing. This spider is also made of cast steel and has spider arm liners. As all wear parts and heavy internal removable components parts are accessible from above, the crusher is very easy to maintain.

A thrust bearing is used to support the main shaft on a hydraulic cylinder. This cylinder is used to control the crusher setting by raising and lowering the shaft. If tramp material is experienced in the crushing chamber, the shaft is lowered automatically, allowing the tramp material to largely pass through the crushing chamber without resulting in damage to the crusher. For run of mine materials that are very hard and tough to crush, the main shaft is equipped with a hydrostatic thrust bearing assembly for operating at high crushing pressures.

The drive and the hydraulic cylinder are housed in the bottom shell of the crusher. The Kubria® bevel gear teeth are cut with a cyclo-paloid process that was specially developed for this crusher. It provides for smooth, low-wear operation, which also allows higher drive powers to be transmitted. The result is that Kubria® cone crushers can be

equipped with bigger motors. In addition, these crushers are characterised by a long service life and easy accessibility for maintenance work.

The crusher is equipped with a circulating lubrication system to supply oil to the eccentric bush bearing assembly, the axial bearing assembly and the bevel gears, and is also equipped with an automatic grease lubrication unit for the spider bearing.

Today's quarry operations increasingly require automation of plant systems . This also applies to the crushing circuit. The Kubria® crusher is typically delivered with the proven Kubriamatic control system, which can be integrated into the control system and the dynamic process display of the overall plant.

With the Kubriamatic control system, the crusher settings can be changed during operation. It is also used to enter and monitor the crusher-specific operating data such as closed-side setting, operating power and pressures, as well as temperatures and the oil flow conditions. Further, important operating data such as operating hours and load and no-load hours, as well as the number of pressure and power peaks, can be called up. The crushing setting is regulated automatically according to adjustable power and pressure limits. Automatic setting adjustment is carried out to keep the product quality of the crusher constant as the crusher concaves and mantle liners wear.

Design and application

For the aggregates industry, Kubria® crusher sizes 90, 110 and 130 are commonly used. The number denotes the lower cone diameter. "G" models for coarse crushing and "F/M" models for fine and medium crushing applications are available for each size (see Fig. 3). The coarse "G" model crushers are equipped with a steeper cone, while crushers for fine and medium (F/M) crushing have a more flat cone. The steep cone angle results in achieving higher throughput rates. The use of the flatter cone angles in the F/M crushers means a particularly high-quality product can be achieved. The design of the bottom shells for either the "G" or "F/M" models is identical.

The coarse crushers are used mainly in the second crushing stage. They can process feed sizes of up to 450 mm. The fine and medium crushers are used for secondary and tertiary crushing. Here, feed sizes of up to 230 mm can be handled.

All versions of the Kubria® cone crushers are characterised by the fact that the material has a relatively long retention time in the crushing chamber, with a correspondingly high number of crushing steps. As a result, a product of high cubicity is produced, which is important for meeting product standards required for concrete aggregate and other products. The Kubria® product name is based on the high cubicity product it produces.

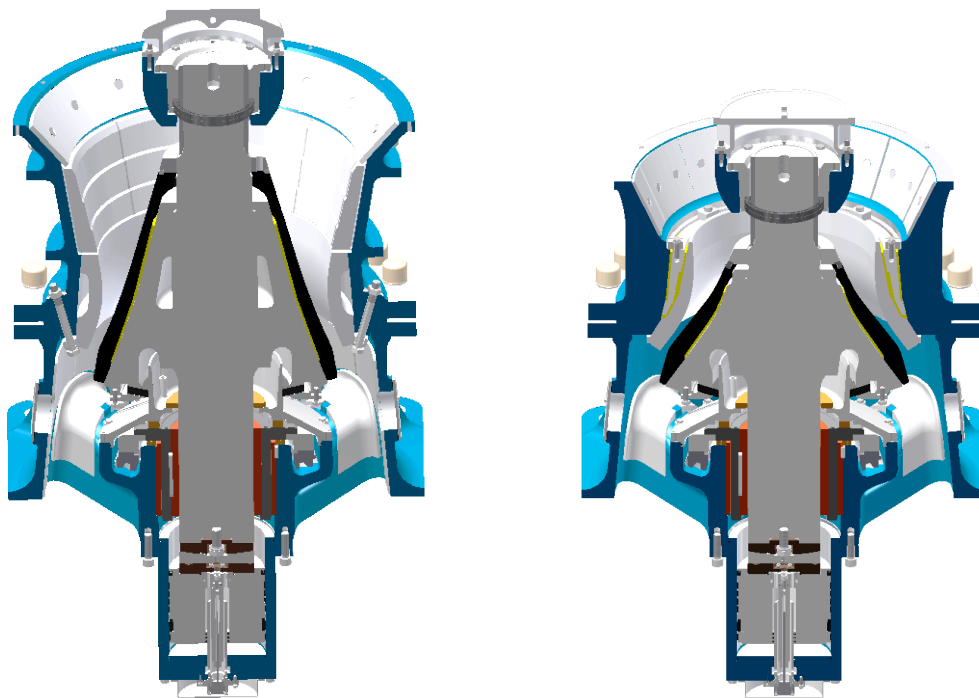


Fig.: 3
Kubria® G type

Kubria® F/M type

Application example

One example of the use of Kubria® cone crushers is in a three-stage crushing plant for the production of crushed stone. The flowsheet for this plant, which has a total capacity of 250 tph, can be seen in Fig. 4. Depending on the requirements of the producer, the plant can be designed as a stationary plant, a semi-mobile crushing plant, or a wheel-mounted portable plant in which the crushers and the associated screens are combined into modules.

The 0–600 mm size run of mine material is discharged from a bin by means of a grizzly feeder where the initial primary screening takes place. Furthermore, a fine-screening stage is used to remove natural contaminants such as soil and dust, which are not wanted in the end product.

In the first crushing stage, the material is crushed to 200 mm by an EB 11-08 jaw crusher. From there, it is conveyed to a secondary "G 90" cone crusher where it is crushed to a size of 50 mm in closed circuit with a screen. The product from the secondary crusher will already meet product standards, so the 25–50 mm fraction can be screened out and sent to product stockpiles for use as railway ballast, drainage systems or other products.

In the tertiary crushing stage, a Kubria® F/M 90 is used in a closed circuit to produce the required end product. The product is then split into the various product size ranges by a circular vibrating screen with 4 decks. By adjusting the close-side settings of the secondary and the tertiary crushers, it is possible to produce a final product containing a particularly high portion of the desired fraction. Fig. 5 shows some typical product curves for a fine and medium crusher, with different crusher settings.

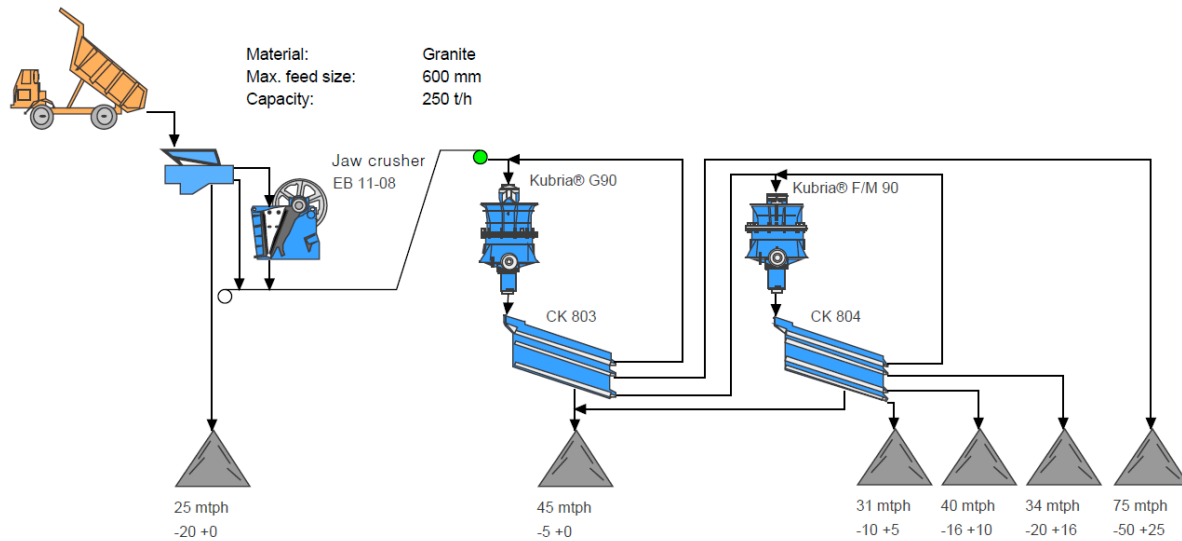


Fig. 4: Flowsheet for a three-stage crushing plant for the crushing of granite

Thanks to the optimised crushing chamber geometry, the product of the tertiary crusher contains a high portion of the required fraction, which means that only approximately 5% of the feed volume has to be recirculated. This results in lower wear of the crusher manganese and therefore higher availability for the crusher and reduced operating expenses.

Overall, the use of Kubria® cone crushers allows the implementation of a plant concept that is characterised by efficiency, flexibility and a product that meets the highest quality requirements. With the use of modern control systems, a high degree of automation and user-friendliness can additionally be achieved.

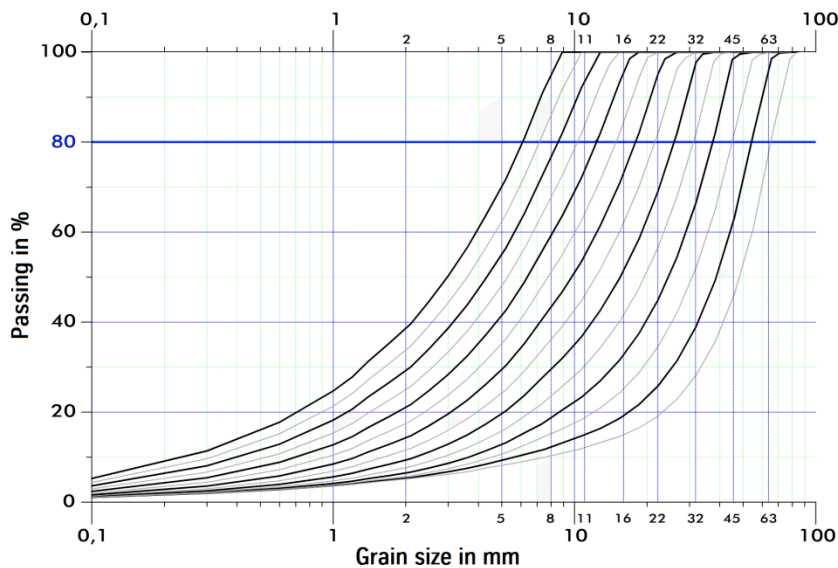


Fig. 5: Typical product gradation curves of Kubria® cone crushers based on crusher setting

A plant based on flowsheet shown in Fig. 4 was delivered to Cameroon earlier this year as a wheel-mounted portable plant system. All components were designed and manufactured by thyssenkrupp. The mobile modules, feed bins, surge bins and belt conveyors used were taken from the standard range of processing machines. Assembly and commissioning were also carried out by thyssenkrupp, which provided a turnkey plant that was handed over to the customer.

Summary

The new Kubria® series of cone crushers from thyssenkrupp offers extremely competitive machines for coarse, medium and fine crushing to the aggregate industry. In operation for decades, these machines have proved effective under the toughest conditions for crushing granite, basalt, gneiss and other hard rocks, as well as in the ore processing industry. Incorporating the latest technology, these machines provide:

- High-cubicity finished product
- Low wear and low operating expenses
- Rapid crushing setting adjustment
- Variable crushing chamber configurations for adaptation to product requirements
- Ease of maintenance, with low maintenance downtimes
- High level of operating reliability and process control with the Kubriamatic control system
- Solutions for mobile, semi-mobile or stationary plant requirements.