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KTC installs a versatile concrete pipe plant with cutting edge technology

At the North East of South America you will find the republic of Surinam, a very beautiful country of which approximately 95 % is still rainforest. The climate of the rainforest is warm, humid, and wet. When it rains it really rains, people in the western world have no idea how much water comes down. Being close the equator the climate is typical for the rainforest, so in the rain season large amounts of water comes down in short time. This volume of water requires good sewage and drainage system. The government of Surinam takes its obligation very seriously and has introduced an enormous program to upgrade the infrastructure with an improved sewer system which can cope.

Ferry Jakobs, Hess Group, Germany

The Kuldipsingh Group is one of the leading building materials producers in Surinam. In the last decade this group has positioned itself well, with new production facilities Kuldipsingh can supply almost anything which can be made out of concrete. The increased demand for drainage and sewer pipes offered The Kuldipsingh Group member KTC (Kuldipsingh Total Concrete) the opportunity to invest in a new versatile concrete pipe making plant.

Kuldipsingh was already making concrete pipes with an old manufacturing plant. This was not very efficient and the product quality left much to be desired. The concrete pipes made on that plant could fulfil neither the technical requirements nor the market demands. Kuldipsingh were faced with a growing market and fierce competition. This meant a choice had to be made; either to invest in new concrete pipe plant and aim for a leading position in the market or continue with the existing plant and slowly loose the market. The decision was made to invest and the Hess Group was invited to offer solutions. The Hess Group is the proud supplier of the concrete building block and concrete paving plant which was successfully installed and commissioned at KTC in 2010. Hess was delighted to be invited to work on the pipe project.

The first step was to investigate what products were required. A new investment offered also a new opportunity to set new standards. Only a few years earlier the government hat set new standards which were being reviewed. So, in close conjunction with government officials, recent problems on sections of the national drainage and sewer system were investigated. Even at this preliminary stage the Hess Group was asked to participate in discussions and use its world wide experience of different kinds of drainage sewer systems.
Originally concrete pipes, without gaskets, with a flat base & with a length of 1,25 meter were manufactured in Surinam. The concrete pipes joints were sealed mortar. The relatively high percentage of leakage forced a move to 2 meter circular pipes with rolling-O-ring rubber gaskets. The idea behind this was that longer pipes (so less joints per kilometre of pipe line) would lead to less leakage and longer pipes would increase the speed of laying of the pipes. Surprisingly the biggest problem over recent years had been leakage, especially at the joints. Another problem was breakage of the pipes.

Preparing of foundation

Installation of the plant

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Oscillating spigot former

Concrete pipes curing

Traditionally drainage and sewer pipes are supported by wooden frames. The 1,25 meter pipe had a stable, flat base and the weight of the pipe was carried over the full width of the base on the wooden frame. No one had anticipated that the wooden frames were not able to resist the concentrated load from the circular concrete pipes and they collapsed leading to breakage of the pipe, or a misaligned joint which could not prevent leakage.

At the time KTC started the discussions with the government the evaluation of the projects in which circular 2 meter pipes were used had almost concluded. The conclusion was that pre-bedded concrete pipes with a flat base, were necessary for a stable drainage and sewer system and that integrated gaskets to prevent sliding of the rolling ring gaskets were necessary. 2.0 meter pipes would be used to provide a shorter installation time. The government accordingly set the new standard based on 2,0 meter long pre-bed concrete pipes with a flat base and an integrated gasket joint.

The second step was determine what kind of production process was required, the level of flexibility and the necessary capacity. The Schlosser-Pfeiffer Variant, a multi-functional, versatile, concrete pipe making machine which has the ability to make circular pipe and rectangular box culverts, street gullies and similar products was immediately selected. Depending on the model the Variant can make an inside diameter of up to 4.000 mm. The output requirements lead to a twin version of the Variant each with a maximum diameter of 2.500 mm. The objective now was to design a pipe plant that was self-supporting, including a dedicated batching and mixing plant. The batching plant is a Hess group standard, as supplied by Schlosser-Pfeiffer for many years. It comprises a travelling weighing batcher for accurate dosing of the aggregates and a skip-hoist to bring the batch of aggregates to the mixer, in this case a model SP-SM 1500-2. This mixer can make up to 1 cubic meter of concrete per batch. One of main characteristics of this mixer is that every star has its own, frequency driven, drive motor. The main gearbox for all the stars is separately driven by either one or two main drives depending on the mixer size. The total of motors can go up to 6, depending on the output, but all motors are relatively small; 11 kW for a star and 22 kW for the main gearbox. The advantage for the operator is that he can tweak his mixer for the perfect mix design, and re-starting the mixer under full load is absolutely no problem.

From the mixer the fresh concrete is brought by belt conveyor to the Variant, a semi-automatic pipe making machine. Every single step in the production process has to be started by the operator, the single process steps can be done either by hand or through automatic steps. The automatic steps, e.g. filling of the mould are related to the mould and 'programmed' through a teach-in mode. In the teach-in mode the exact actions of the operator are recorded and are repeated by the controls.

The process of making a pipe starts with placing the outer mould over a base pallet,

either with or without a reinforcement cage. The integrated gasket is already positioned onto the base pallet. After connecting the outer mould with the base pallet a bridge crane lifts and moves the assembly to the Variant and lowers them over inner mould on to the production table.

The feeding system with the main feeder belt and the rotary feeding conveyor is swivelled into position over the mould, and is slotted in position. The mould is gradually filled by a rotating feeding conveyor, providing a uniformly filled and well compacted product. The filling height is controlled by laser, ensuring that the final product height is consistent. During the filling the product is already compacted through a central vibrator, which is hydraulically clamped to the inner mould. After the filling process the spigot is formed. The feeding unit is swivelled away, to the second production station, and the pressing unit, with a pressing ring and spigot former, is placed over the mould. With the central vibrator running the spigot former is slowly pressed in the top of the mould. With pulsating pressure and oscillation the spigot is formed. This creates a smooth surface of the spigot. The spigot former is removed from the product and the pressing unit is swivelled back into its home position.

At this stage the pipe is ready for de-moulding. First the base plate, the outer mould and the product is withdrawn from the inner mould. This done by a bridge crane which slowly lifts the mould with product until they are completely free from the Variant. If the products are very large and heavy the Variant system offers a de-moulding aid; in the form of a frame placed on 4 hydraulic cylinders. On the frame are fingers which will help the mould de-moulding over the initial centimetres until the friction between the product and the inner mould is broken. The product is then brought to a place where it will be cured and the outer mould is released from the base plate. Then, the outer mould is withdrawn slowly from the freshly made concrete pipe by moving it upwards. When the product is completely free a supporting ring is placed on top of the spigot, keeping it in perfect shape. The empty outer mould is taken to the next base pallet, with integrated gasket, either with or without reinforcement cage, and the cycle repeats itself, so next products can be made.

Production

Stockyard

New concrete pipe making plant

This production capacity of this system process suited the KTC's requirements. The whole project was brought to paper and discussed. The building and bridge cranes were designed in conjunction with the Columbian company Centro Aceros. At this stage KTC' was able to place an order with Hess.

At stage 3 the equipment was built in Germany and on site all the preparations were made for a new building. Everything had to be ready at the same time. On the day the first containers from Hess arrived on site the site was ready to receive them. The installation engineers also arrived on site and an enthusiastic, dedicated group started to erect the plant. It was the, soon to be, operators of the pipe plant who did the erection of the plant under guidance, and responsibility, of Schlosser-Pfeiffer engineers. As before, the corporation of all the Kuldipsingh Group daughter companies was fantastic and with their excellent corporation a modern concrete pipe making plant was built.

Concrete pipes on the truck to a customer

The fourth stage was the completion of a versatile concrete pipe plant. This was the commissioning and de-bottlenecking of the process, and soon after this the first pipes were made. KTC staff was able to operate the plant themselves in a very short time, making the different diameters required and carry out necessary maintenance. The completion of the plant came conveniently just at the time when the Surinam government started some large projects with several kilometres of DN 1.000 mm concrete pipes. KTC was just in time to get those orders, a good start for a brand new plant. KTC has now the possibility to produce concrete pipes up to a diameter of 2.500 mm; a diameter not being used in Surinam so far and therefore is well prepared for future developments.

This new concrete pipe making plant fits in the ambition of The Kuldipsingh Group, to be the best. Mr. Switrang Kuldipsingh, President of the Kuldipsingh Group, is setting continuously new goals and always motivates his suppliers to come up with good solutions to give him the best. The high quality standards of quality set by The Kuldipsingh Group has now been achieved in the pipe making plant. "It was a small step for The Kuldipsingh Group, but a big step for Surinam!"

FURTHER INFORMATION

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