

A customised Bonfiglioli mining solution for flotation cells

As an example of its customised drive solutions offering to the mining industry, Bonfiglioli has recently developed and installed a purpose-built impeller drive for the flotation cells of a local mine's processing circuit.

Bonfiglioli is very active in the global mining industry and, as a result of various product developments, has built a solid reputation over time in this sector. The specialist drive systems company offers a wide range of solutions from its range of planetary, right angle bevel-helical and parallel shaft helical series gearboxes for mining applications.

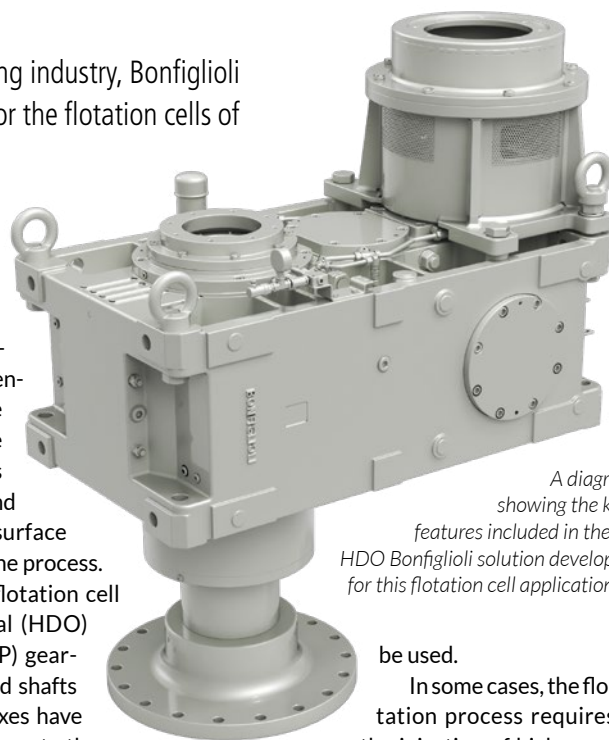
Mining, by its very nature, is a tough environment and mines are often situated in extremely remote locations, which demands that very reliable equipment that is up to the task at hand, is offered. For this reason, Bonfiglioli's commercial and technical departments work very closely with OEM partners to identify their needs for a particular application. In addition to the conditions of the location where the equipment is to be operated, an in depth study of the machine application is a prerequisite.

A recent project involving flotation cells is a typical application where a partnership with a multinational mining OEM resulted in the development of a drive system solution that optimises the performance of the client's minerals recovery operation.

Flotation cells consist mainly of a large tank

where an impeller keeps a water and material slurry in suspension at high speed. The use of specific chemical reagents and the possible addition of air into the mixture enhances the separation of the ore from the liquid slurry. The ore creates foam that floats to the surface of the tank and is then extracted from the surface and sent to the next step of the process. The agitating impeller of a flotation cell requires either bevel helical (HDO) or parallel shaft helical (HDP) gearboxes with vertical low-speed shafts to drive them. These gearboxes have the impeller mounted directly onto the output shaft.

The resulting loads generated by the impeller are generally at a position some way below the shoulder of the output shaft, which results in high stresses being applied to the shaft. The output shaft must therefore be reinforced with an extended bearing span and larger bearings to withstand the high generated loads. An increased shaft diameter may also



A diagram showing the key features included in the HDO Bonfiglioli solution developed for this flotation cell application.

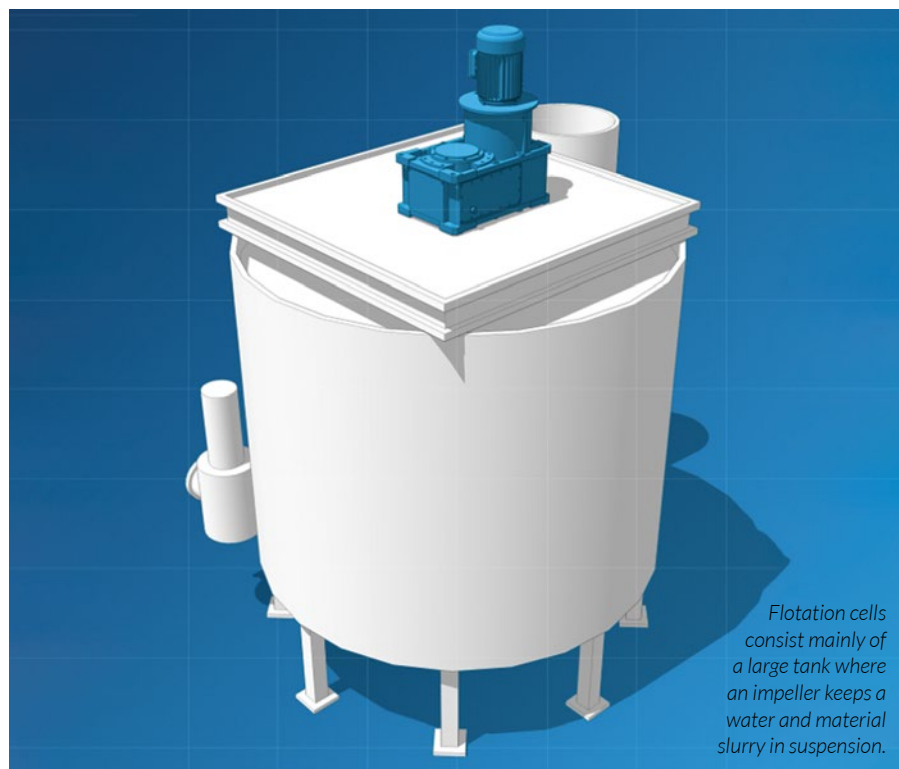
be used.

In some cases, the flotation process requires the injection of high-pressure air to maximise the separation of the product material from the water. In this case, the gearbox must be equipped with a special pass-through hole in the output shaft to allow for an air pipe connection at the top of the gearbox.

For the Bonfiglioli solution developed for this application, a compact piping system was incorporated into the gearbox housing at strategic points to ensure perfect lubrication of all bearings and gears, which are lubricated with oil that is free of impurities thanks to a filtering system installed in the circuit and monitored by pressure and temperature sensors. All of this is managed by a mechanical pump driven by the gearbox itself, which ensures greater reliability than an electrically driven lubrication pump.

There is often also a requirement that the flotation process be free from contamination. This can be guaranteed if the gearbox is assembled with a drywell configuration. The final bearing on the output shaft, which is reinforced to withstand the high radial and axial loads of the moving impeller, is closed off from the main gear unit in a grease filled chamber. This in turn prevents oil leaks and thus makes the gearbox drip-proof.

As well as flotation cell solutions for the mining sector, Bonfiglioli can also develop customised solutions for dewatering – using belt filters or spiral classifiers; and thickener solutions. This on top of its wide range of materials handling and mobile mining equipment offerings. ▢



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