



Role of Drum Cutters in Tunnel Construction

Drum cutters are multifaceted tools that find extensive use in engineering and construction industries; they are indispensable for excavation and tunnelling, crushing road pavement, and in mining operations.

Tunnel construction has always been a difficult job; earlier, a combination of drilling and blasting was used to build tunnels, but there are disadvantages in this method, like safety hazard and it also causes a huge amount of fine particulate matter that adds to air pollution. Further, the shape of the blasted tunnel is irregular, which cannot be precisely controlled.

With advent of modern tunnelling technologies, tunnel mechanization has greatly improved. Use of Tunnel Boring Machines (TBM) has completely changed the drilling and blasting method of tunnel excavation.

Rotary Cutter Heads (Drum Cutters) have become quite popular for profiling and widening / deepening the tunnel dia of the tunnel, once the TBM's have done their job. The cutter teeth on the cutter drum collide with the construction surface and cut the soil and rocks like sharp claws, enabling a new and economical construction method

for tunnel excavation. When the interior of the tunnel is sandstone, sedimentary rock, and siltstone, the daily excavation speed of the drum cutter is about 10 meters, and the milling efficiency is very high.

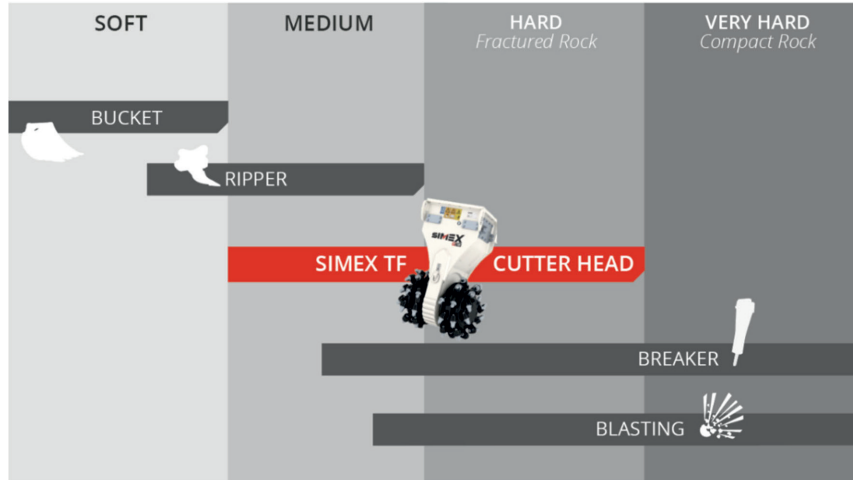
Drum cutters are multifaceted tools that find extensive use in engineering and construction industries. They are indispensable for excavation and tunnelling, crushing road pavement, mining operations in open-pit coal mines, and contouring walls. Additionally, they are utilized across the steel, construction, forestry, and other diversified construction fields due to their adaptability and versatility.

For rocks with medium and low hardness, such as weathered Himalayan rock system, the cutting efficiency of the drum cutter can reach up to 25-40m³/h. This is of course taking into consideration the rock's compressive strength and degree of fragmentation (RQD). In the case of

concrete, the drum cutter can easily mill and excavate (if there are no steel bars present) with an output of up to 40-50m³/h.

Drum cutters are highly effective in mining various types of rocks, including low hardness rock, weathered rock, and layered rocks. Depending on the size and hardness of the rock, the milling volume of the drum cutter can reach up to 80-120 tons per hour.

Drum cutters are broadly categorized into two types: transverse drum cutter and axial drum cutter. They also have two basic structural designs: gearbox transmission and hydraulic motor direct drive. The transverse drum cutter has a horizontal direct output structure, with the motor directly installed in the rotating part. Conversely, the axial drum cutter (also known as vertical drum cutter) has the motor installed in the rear. It is less prone to oil leaks and requires less maintenance than other types of drum cutters.



Simex Cutter Heads for Tunnel Profiling

Among the most versatile attachments in the range, Simex drum cutters can cover a wide area of applications, from trenching in the road sector, concrete pile cropping, vertical profiling of concrete or rock walls, to the heaviest quarrying or tunneling.

Simex cutter heads for profiling guarantee precision finishing in applications such as: resurfacing tunnel roofs, rehabbing deteriorated surfaces, concrete embankments and industrial pavements. Wheels or lateral slides allow milling thickness to remain constant in any condition. Suitable for materials, including cement and rock; milling on horizontal,

vertical or slanted surfaces and for profiling, assuring a constant milling depth.

These cutters are available for excavators from 11 to 40 tons and are specifically designed for profiling on horizontal, vertical or sloped surfaces, keeping a constant milling depth. The thickness of the material removed is controlled by wheels or lateral slides.

1. **Working depth** is set by the lateral wheels, which grant a constant milling thickness. This is very effective when profiling the tunnel vaults during rehabbing works.

2. The **tilting base plate**, equipped with two dampers, grants a perfect milling surface during the work operations.

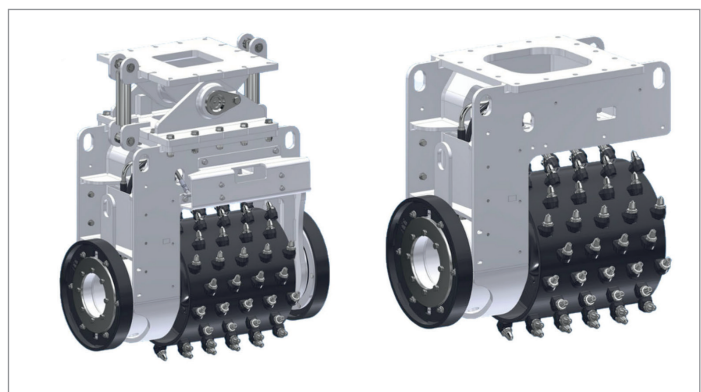
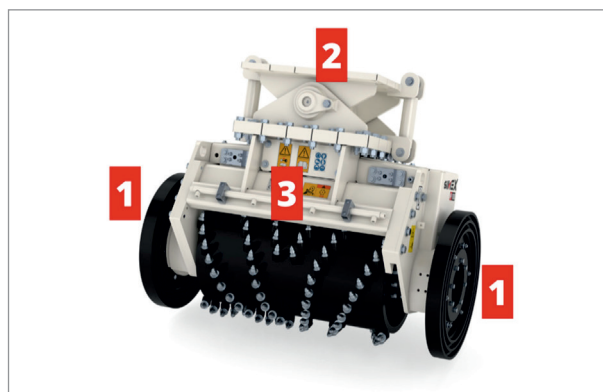
3. **Water spray kit**: for dust abatement during milling operations

The new MP 500 and MP 600 models - designed for 11-25 tons excavators - can be equipped even with one side wheel - ideal for applications where the overall dimensions of the frame must be reduced to a minimum.

The TFC cutter heads with continuous cutting are specifically designed for mounting on mini-excavators and excavators up to 12 tons. Chain drum cutters feature an innovative system without gaps at centre or side footprints and are ideal for finishing flat surfaces and trenches.

Simex TFV vertical cutter heads are ideal for:

- Profiling, excavating irregular shapes
- Trenching smaller widths





- Removing iron and steel residues or mixing soils.
- Often used in cropping pile heads in reinforced concrete in order to strip the rebar.
- They are particularly effective where conventional excavation systems are too weak and percussion ones have little effect.
- Their quiet operation and low vibration emission (<87 dB) allows them to work near sensitive areas (residential zones, hospitals, schools, bridges and infrastructure).
- Especially recommended for finishing operations where high precision, minimum disturbance, and optimum aesthetic results are required.

The advantages of Simex drum cutters compared to conventional methods such as explosives or hydraulic hammers are:

- more accurate profiling
- milled material reusable directly on site
- narrow and deep excavations, precise cuts
- low vibrations and low noise
- minimization of fractures within the rock mass