

# What is Mobile?

Brian Flynn, MMD, UK, comments on the use of a new series of mobile crushers.

## Introduction

The dictionary definition of the word mobile is 'movable or easily moved', but what it means to mine operators with respect to crushing systems varies almost as much as the materials that are extracted.

One of the first mobile systems supplied by the MMD Group of Companies was to a lignite operation in northern Spain. The existing mobile crusher employed to handle overburden in the mine was a 1000 tph gyratory unit with a separate truck bridge. These units were moved using a 600 t capacity



Figure 1. Please provide caption.



Figure 2. Please provide caption.

tracked transporter and each took approximately 3 days to relocate to the next level down (approximately 20 m).

## The unit

The MMD unit based on the apron plate feeder incorporating the then revolutionary ground hopper design (Figure 1) and the 1150 centres twin shaft sizer was purchased to handle 2000 tph of overburden, which includes clay, schist, sand and granite. This system allows dump trucks to tip directly over the mine face onto the apron plate feeder, and proved after some minor modifications to be capable of 4000 tph.

Both units were fed by dump trucks with up to 150 t capacity and discharged on to a field conveyor system out of the mine (Figure 2). Due to the success of the MMD unit that was originally positioned at the top of the mine, the operators decided to swap the positions of the two crushers. The MMD unit was relocated so that it would be the primary unit at the bottom of the pit and could be used on all the material including clay, which had to be removed from the mine.

The mine allowed 3 days for the relocation of the unit base on the normal creep speed of the transporter, but due to the low centre of gravity and a total weight of only 350 t it was found that it could travel at the top speed of the transporter. As a result, it was moved 1.5 km to the bottom of the mine in 1 day. After this first move the unit has been regularly moved as the mine level has been lowered.

## Wheeled units

In contrast, the company supplied a series of wheeled units to a lime processing plant based in south Yorkshire to replace feeder breakers that had been operating for 5 yrs. The hard chalk is blasted on a daily basis and loaded into the crushers using Cat 988 sized wheel loaders. MMD first supplied a primary wheeled unit based on a 750 series sizer fitted with four tooth rotors (Figure 3). The method of operation at that time was to work on two levels one in the winter and a lower level in the summer due to the level of the water table at the quarry. To achieve this a series of fixed and quick assembly belt units were used, which were erected in advance of the breaking units so that the change from one location to the next only required the minimum disruption to production. The second wheeled unit, which was based on a chain feeder and a 500 series sizer to produce 150 mm, also fitted with four tooth rotors, was purchased to replace one of the breaker feeders, which had been converted into a feeder by removing the



Figure 3. Please provide caption.



Figure 4. Please provide caption.



Figure 5. Please provide caption.

breaking rotor. This unit also replaced one of the existing secondary crushers located after the main screening unit in the quarry. The primary unit was loaded directly with the front end loaders as shown in Figure 4, and the discharge conveyor feeds the chain feeder of the second unit which takes the surges out of the system. This 500 series sizer is suspended above the field conveyor, which takes the material to the main screening plant in the quarry. The complete system was moved every 3 – 4 months depending on the weather and the production requirements. Later, the operator decided to provide a greater level of security and to allow a new area of

reserves to be opened up without affecting production by buying a repeat of the first complete set up. The latest development has been the purchase of a track mounted system based on the 1000 series sizer fitted with three tooth rotors, which can handle the bigger harder lumps encountered in the bottom level of the quarry. A 625 series secondary fitted with five tooth rotors produces 125 mm. These units were purchased to accommodate a planned increase in production of up to 1000 tph which would require a new field conveyor system. This method of operation has been developed over a number of years and appears to serve the operators very well.

### Fully mobile

Whilst these units could be described as mobile they are linked to a fixed conveyor system. In contrast, a quarry based south of Lincoln, has developed over a number of years a fully mobile processing plant. The material available is Oolitic limestone in a shallow bed that contains a high percentage of fines. A hydraulic backhoe is used to win the material without blasting and reduces the amount of fines produced at the face. Its definition of mobile means the complete plant can be relocated within the quarry in 1 day. There are a number of key features that make this possible. The primary unit is a wheel mounted 750 system fitted with three tooth rotors and powered by a diesel engine, which is not unusual where the mains power supply is limited. This unit is fed directly from the face by a wheel loader at approximately 500 tph. What happens after this unit is what makes this plant so different. Both the secondary and tertiary machines, which are 500 series sizers, are mounted directly on wheel mounted screening units (Figure 5). The secondary system takes the discharge directly from the primary and reduces it to approximately 125 mm which is the top size that is supplied from the quarry. The screen provides three products depending on the meshes which are fitted and largest can be delivered to the tertiary sizer to achieve a 40 mm product that is also split into three products by the screen it is mounted on. These two sizers are powered by a diesel generator whilst the screens and belts are diesel powered producing a completely independent system.

### Multi bench

The most recent mobile unit that was supplied by MMD was to a limestone quarry in Spain, with a deposit in a hillside, which means they have a high multi bench system. Material is pushed from the higher bench levels to the bottom bench. The track mounted three tooth 750 sizer is powered by electricity, but the hydraulic track system is driven by a diesel engine achieving the most economic operating method whilst allowing complete freedom of movement (Figure 6). The unit is directly loaded by front end shovel and discharges on to two fully mobile conveyors capable of handling up to 2000 tph. The plan is to move the sizer unit every 3 or 4 months and purchase extra conveyors when necessary. The material is transported to a primary stockpile, which will make



Figure 6. Please provide caption.



Figure 7. Please provide caption.

the rest of the processing plant independent of the primary operation allowing it to be run according to market demands.

## Conclusion

What of the future? The company has designed and built a fully mobile unit, which has a design capacity of 10 000 tph with an approximate weight of 1500 t. It combines an apron plate feeder, sizer and slewing elevating discharge conveyor mounted on a turn table. The whole unit is mounted on tracks, which allow it to move in conjunction with the large rope shovel feeding the unit (Figure 7). This unit is to replace a bucket wheel excavator and will discharge on to an existing belt conveyor system.

Maybe now, an alternative definition of 'mobile' should be 'not fixed'.

**Enquiry no:**