

# MACHINE MINING PRODUCTION

## **The Continuous Mining Machine.**

In January 2002 Salt Union Ltd purchased a Continuous Mining Machine (JCM) to replace the traditional method of salt extraction via drilling and blasting. This was to be the most significant change to production methods ever seen at Winsford Rock Salt Mine.

Many mining machines were considered during the selection process, which eventually led to the purchase of a JOY 12HM36, with 'JOY' being the name of the manufacturer.

This was followed by a second JCM in 2011 and a third JCM was added in 2014.

## **How the JCM works.**

The JCM system is a single drumhead miner weighing in at 130 tonnes, with a total installed power of 1,005 Kilowatts (1,345 horsepower). The tungsten steel cutting picks fitted to its drum are short and sharp and these claw away the rock salt as the machine head moves up and down.

The rock that is cut by the JCM is loaded directly onto the Bridge Belt Conveyor. The Bridge Belt Conveyor acts as an 'arm' attached to the back of the machine, enabling the rock salt to travel directly out of the back of the JCM and onto the conveyor system, without the need for shuttle cars or loading shovels. It is fixed to the walking tail end, which allows it to move back and forth.

## **How the JCM advances deeper into the tunnel.**

To enable the JCM to advance into the tunnel, an operator uses manual controls located on a platform at the back of the walking tail end. The base is lifted up on rails both sides and pushes forward on cylinders which enable it to 'walk'. Fixed conveyor structure is added in the gap created by the walking tail end.

## **Cutting Pattern.**

To continue with the 'room and pillar' method of mining, a work pattern has been developed to minimise unnecessary set-up/movement of the JCM. The JCM's maximum cutting height is 4.6m (14ft) but at Winsford the average requirement for room height is 8 to 9 metres.

In order to achieve the correct roof height the JCM must cut the rock in two stages, the first of which involves removing the rock that is positioned in the upper 4.6 metres. The JCM cuts into the rock salt on a gradual gradient, creating a ramp that enables it to begin cutting the upper section. The machine then remains at this height until it has removed the entire tunnel (1km or 3/4 mile).

Pillars are created by cutting cross cuts at right angles to the main roadway. Due to the machine reach the pillar forming sequence only becomes complete once the cross cuts are joined up, following the removal of the parallel tunnel.

After the tunnel has been cut the JCM is driven out and the conveyor system dismantled. Stage two involves the removal of the lower section of rock and, to achieve this, the JCM and associated systems are set up again at the start of the tunnel. Cutting begins with the removal of the ramp followed by the rest of the tunnel.

To see the Continuous Mining Machine in operation please refer back to the home page of the website and select video clips.

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## **Crushing and Screening.**

Once the rock salt has left the working face it is carried on the conveyor system to the underground crushing and screening plant. To avoid any waste metal entering the crushing plant, the rock salt is conveyed under metal detectors and magnets at three different points. A series of crushers and screens then reduce the size of the salt and separate it into 0-6mm and 0-10mm product.

The crushing plant and all the conveyors are automated and controlled from No 5 Shaft surface, where a controller monitors underground activity via television screens and passes any requests via radio.

## **Product Elevation.**

The finished product leaves the crushing and screening plant via a conveyor leading to No 5 Shaft, from where it is elevated to the surface in 9-tonne bottom dump skips. Once the skip reaches No5 Shaft surface it discharges onto a conveyor which takes the salt to surface. En route, it is sprayed with a small dosage of a basic anti-caking agent, a treatment that enables rock salt to flow freely out of the gritter despite being stockpiled.

## **Surface despatch and stockpiling.**

Surface stock levels are put in place ready for the start of the winter, enabling Compass Minerals to despatch product to customers with immediate effect during heavy winter demand. Additional salt is always readily available from both underground stocks and as a result of ongoing production. Compass Minerals business is wholly dependent on the severity of the winter and we must always be prepared to provide salt to our customers at a moment's notice!

The rock salt is despatched to customers within the UK mainly via 28-tonne tipper trucks, although a small percentage is also transported by rail. Due to surges in demand we operate a computer-based stock management system, into which customers input their usage and rock salt is sent out accordingly. The stock management system, combined with encouragement to restock during the summer months, ensures that Compass Minerals is always able to meet demand.

For further information about Compass Minerals business operations please refer to the main Compass Minerals site: [www.compassmineralsuk.com](http://www.compassmineralsuk.com)