# A Safer Procedure for Tramp Removal Inside a Primary Crusher – Novel Hydraulic Thermal Lance.

*L. Ono[1], E. Nunes[2], H. Lemos[3], R. Costa[4] and H. Delboni Jr.[4]*

1. Application Engineer – Crushing Systems, Metso:Outotec, Sorocaba-SP, Brazil 18087-101 Email: lucas.ono@mogrouppartners.com
2. Application Manager – Crushing Systems, Metso:Outotec, Sorocaba-SP, Brazil 18087-101 Email: edis.nunes@mogroup.com
3. Manager – Service Technical Support, Metso:Outotec, Sorocaba-SP, Brazil 18087-101 Email: hugo.lemos@mogroup.com
4. Engineer – Service Product Support, Metso:Outotec, Sorocaba-SP, Brazil 18087-101 Email: rogerio.costa@mogroup.com
5. Professor – Department of Mining and Petroleum Engineering, University of São Paulo, São Paulo-SP, Brazil 05508-030 Email: hdelboni@usp.br

Keywords: HSE, Crusher, Mining, Rock Breaker, Oxy Flame, Thermal Lance

## ABSTRACT (300 WORDS)

The primary crusher is responsible for receiving the Run of Mine (ROM) and break the coarse material to an appropriate size for conveying and further processing at the plant. The material from ROM is often contaminated with metal pieces such as an excavator tooth that goes undetected until it reaches the crushing chamber. Since compressive crushers are not suited to break solid metal pieces, this creates an obstruction which eventually can stall the machine with the chamber full or partially filled with material.

Depending on how this tramp is positioned or trapped, there are different ways to remove it - such as using a rock breaker to push it to the side and/or pulling it up with a crane - but, frequently, the only way to remove it is by cutting the metal scrap, which is usually done by a technician wielding a thermal lance within reachable range. This procedure of cutting the metal pieces with manual tools – often times with inexperienced personnel - may expose the workforce to safety hazards, such as material sliding or metal projectiles that are created from the suddenly released energy from the compressed metal that was cut. In worst cases, serious injuries or fatalities have been reported.

The remotely controlled thermal lance was developed to provide safer work environment by removing the operators from the risk zone during the procedures. A hydraulic arm was designed with quick coupling system to allow rapid change between: (a) the hydraulic clamp module that is used to lift and remove the rocks that sits above the obstruction and (b) the ***Oxy Flame*** module used to cut the metal piece. The system can be operated from a safe place using images acquired from a thermal camera installed on the hydraulic arm.