

## Multi-Fit Pipe Lifting Attachment



New Acland Coal Pty Ltd

### Problem:

The main driving factors that led to the development of our Multi-Fit Pipe Lifting Attachment were the difficulties encountered by Maintenance Personnel in the safe & efficient removal of slurry pump discharge pipes within the CHPP at New Acland Coal. The majority of slurry pumps are located on the ground floor and are often located under the plants. This restricted and confined work environment presented challenges to Maintenance Personnel to safely and efficiently remove the discharge pipes for maintenance and inspection purposes. Traditionally this work would involve a considerable amount of complex rigging and manual handling which exposed personnel to the potential risk of personal injury and surrounding equipment to the possibility of damage. This work also contributed greatly to the amount of time required to perform the job.

### Solution:

The design and manufacture of a custom built and load rated Multi-Fit Pipe Lifting Attachment that fits a cross section of larger sized pipe spools typically found on slurry pump discharges. The device is easily fitted to a standard Franna Crane boom and can safely be operated by anyone with basic rigging skills. Once attached the Multi-Fit Pipe Lifting Attachment allows for Maintenance Personnel to be well away from the immediate work area while a pipe is being removed or installed.



Fig.1 New Acland Coal's Multi-Fit Pipe Lifting Attachment shown in the process of being attached to the discharge spool from a Metso MM-400 Pump.

Rob O'Brien, a CHPP Operator employed at New Acland Coal, on his own initiative took on the task of developing a better way to perform the pump maintenance on site. Rob was able to draw on his years of experience as a Maintenance Contractor at various mine sites to develop an initial prototype lifting device that would be suitable to trial in order to prove up the concept. Once Rob had manufactured the prototype in the onsite CHPP Workshop it was ready to be trialled.

Prior to using the prototype pipe lifter on a maintenance day it was subjected to an extensive series of un-official test lifts in order to prove that the device was capable of lifting approximately 500kg. This is roughly two and a half times the weight of the heaviest discharge pipe that it might be called upon to lift on a maintenance day. The prototype was then further trialled on a maintenance day in order to prove that the device could be successfully used within the Washplant environment. After the prototype device had been trialled and proved to be effective further minor improvements were formulated via discussions with involved NAC Employees and Contractors for inclusion in the final design.



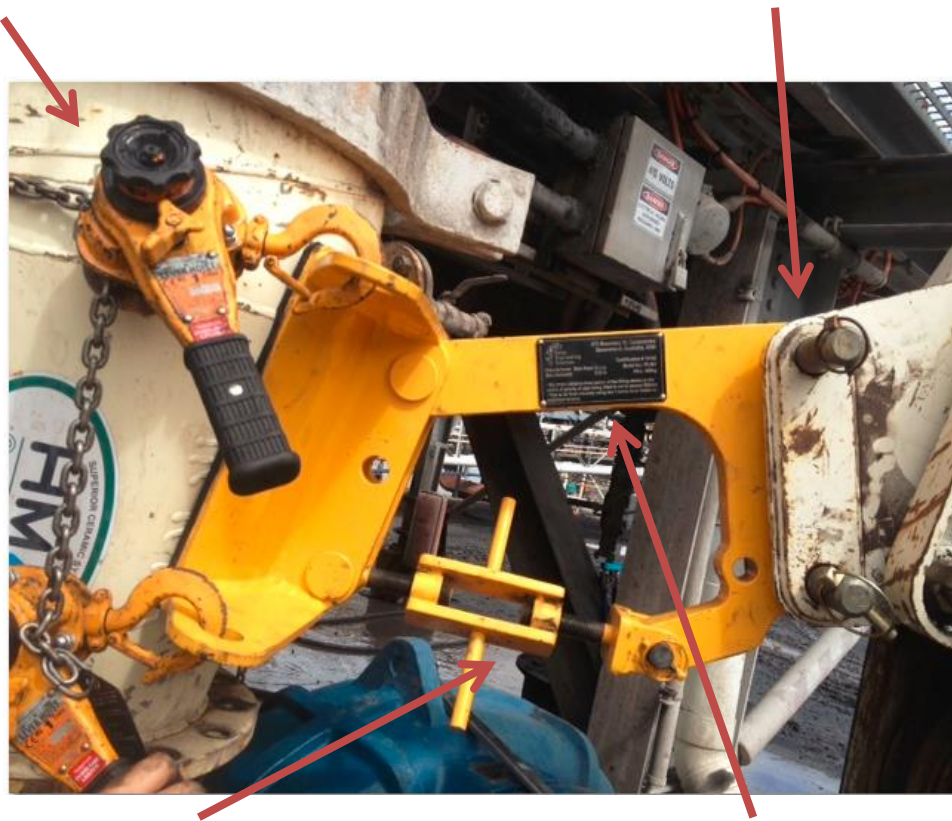
Fig.2 New Acland Coal's Multi-Fit Pipe Lifting Attachment shown in the process of lifting out the discharge spool from a Metso MM-400 Pump. Note there are no Maintenance Personnel located within the potential drop zone.

At this stage a local engineering firm, Ireland Engineering, were tasked to draw up plans and supply components for the new improved version that Rob O'Brien would then fabricate onsite. This new model incorporated a more compact turn-buckle arrangement for the angle adjustment of the attachment which was identified as an improvement during the trial period. Once completed the Multi-Fit Pipe Lifting Attachment was ready for load certification.

A Consulting Engineer was engaged to attend to site to test and certify the Safe Working Load of the attachment. A pipe assembly of a known weight of 800kg was lifted with the Multi-Fit Pipe Lifting Attachment under the supervision of the Engineer and was submitted to various tests as deemed necessary in order to provide it with a Certification of a S.W.L of 400kg.

1000Kg Attachment Lever Blocks

Rhino Hook Attachment Point



Turnbuckle for Angle Adjustment

Certification Plate

Fig.3 New Acland Coal's Multi-Fit Pipe Lifting Attachment with the main features identified.



Since the successful certification of the Multi-Fit Pipe Lifting Attachment approximately 12 months ago there have been very few occasions where it has not been used on a maintenance day to assist with the safe and efficient removal and replacement of pump pipework. One of the best features of the device is its simplicity in that anyone with basic rigging or fitting skills can safely and easily utilise it for its intended purpose.

In regards to applying the Hierarchy of Controls it was deemed to be impossible to either Eliminate or Substitute the practice of removing pump discharge spools as the very nature of pump inspections and associated maintenance necessitates these actions. Over time we have replaced many mild steel pipes with Basalt Lined Pipes in order to reduce the frequency of pipe change outs however eventually the pipe spools will have to be replaced with new items. With this in mind we have settled for an Engineering control to effectively minimise the risk and control the associated hazards that are presented when changing out pipes.



Fig.4 New Acland Coal's Multi-Fit Pipe Lifting Attachment shown in the process of installing the discharge spool from a Metso MM-400 Pump after the pump has been inspected & adjusted.

## **Benefits/ Effects:**

The major benefit gained from using the Multi-Fit Pipe Lifting Attachment is that workers initially only have to attach the bracket to the pipe and are then able to stay well out of the drop zone while the pipe is removed by the crane. This is much safer than the past method of two Personnel using endless chains etc to remove the pipe from its original position and then lowering it to the ground, while being exposed to the risk that the pipe may slip or fall at any time. Furthermore, the work space was always a restricted area that introduced another level of risk to the job.

Additionally we have been able to achieve a significant increase in productivity in regards to the time taken to conduct routine pump maintenance and pump change outs at the CHPP after we began to use the Multi-Fit Pipe Lifting Attachment. Previously we generally scheduled 2 to 3 Pump Inspections on a 12Hr Down Day. With the use of the new device we can now budget on completing at least 4 Pump Inspections with the reduction in time achieved by not having to manually remove and lower the discharge pipes. We have also found that the use of the new attachment on an large pump change out saves us around 2 hours on what was previously a 10 hour job. This is a significant amount of time which will quickly pay back the initial cost of developing and manufacturing the device.

The Multi-Fit Pipe Lifting Attachment in its current form really only has a use within the CHPP on our site at the present time. Some thought has been given to making some changes to the current design with the intention of possibly using in the Mobile Workshop environment for the removal of large hydraulic rams on the likes of Hitachi Excavators etc. However we have not followed up on this idea any further at this stage.

## **Transferability:**

We believe that the Multi-Fit Pipe Lifting Attachment could be of great benefit to a large number of companies across the resources industry, both in Australia and internationally, wherever large pumps and associated pipes are in use. Some examples would include Oil Refineries, Processing Plants and Dredging Operations. Other examples outside of the resource industry would include Power Stations and Sugar Refineries.

## **Innovation:**

Prior to designing and manufacturing the Multi-Fit Pipe Lifting Attachment, none of our CHPP Personnel had seen or used a similar device either here or elsewhere. Similarly after speaking with Sealing Devices Queensland who specialize in pump repairs and modifications across a large number of mine sites, we found that they had not encountered a device like this anywhere else either. After using the device a few times, Sealing Devices Queensland Personnel stated that it was one of the best time saving and safest devices they had seen for removing and installing pump pipe work.

### **Approximate Costing:**

Design, Manufacture & Testing Of Prototype Device

NAC Labour: 20Hrs x \$80.00 = \$1600.00

Material: \$100.00 (Various offcuts & scrap found on the mine site)

SubTotal Cost: \$1700.00

Design, Manufacture, Testing & Certification of the final model - Multi-Fit Pipe Lifting Attachment.

NAC Labour: 10Hrs x \$80.00

Material & Machining: \$500.00

Design, Testing & Certification of the Device: \$1175.00

SubTotal Cost: \$2475.00

**Total cost of the project comes to \$4175.00**



Fig.5 New Acland Coal's Multi-Fit Pipe Lifting Attachment shown in the process of removing a discharge spool from a XG-350 Metso Pump.