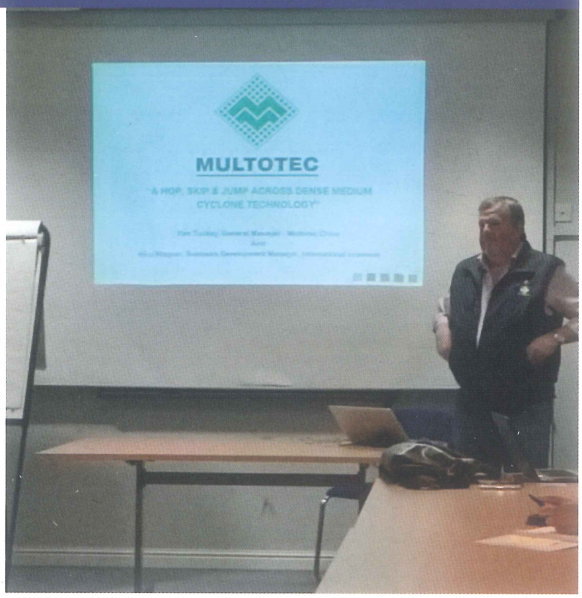
Northern Group Technical Meeting — Dense Medium Cyclone Technology



On a slightly nostalgic evening in November, Northern Group held probably the last MES meeting to take place at the Stables complex of Doncaster College before it unfortunately closes after Christmas.

Once again the College provided a most agreeable buffet to start the evening off before 24 members, guests and speakers adjourned to the meeting room. The presentation was intriguingly entitled "A Hop, Skip and Jump through Dense Medium Cyclone Technology" which had been arranged through our friends at TEMA.

Mr Nico Wagner, Business Development Manager, International Business from Multotec in South Africa, joined the advertised speaker Mr Ken Tuckey. They proceeded to deliver a very interesting and informative presentation. Ken began with a quick background on Multotec, which had grown from Steinhaus in Germany, and have been involved in Coal & Mineral Processing for many years.

South Africa now has the second largest economy in Africa - only Nigeria with its oil revenues is larger - and is number three in the world in iron ore production. It still mines and processes a large tonnage of coal and its gold mines are now working at depths in excess 4000 metres. So there remains plenty of scope for Multotec!

Ken began his 'hop, skip & jump' with early dense medium (DM) cyclones that could only be made up to a maximum size of 710mm. This was because cast iron was the material of choice for manufacture and this was the biggest mould available for this shape and construction. This limited the maximum size of feed to around 40mm and capacity to around 100tph.

As people experimented with lining the cyclones, the maximum size began to increase. Soon the 1m DM cyclone became commonplace and now Multotec are installing 1.450m cyclones with top size of feed up to 100mm and feed capacities of up to 700 tph.

One major development that has been made possible with these larger cyclones has been much smaller plants overall as large DM systems have been superseded and a typical plant in South Africa these days will be: -

+50mm	large diameter cyclone
50 x 2mm	small diameter cyclone
-2mm	cyclone classifier and spirals or froth flotation cells

Other equipment, particularly pumps and screens, have also had to evolve to service the larger DM cyclones. Pumps are now unrecognisable from when this author started in Oakdale and Penallta CPPs and screens at 4.6m width. I am pleased I am not responsible for maintaining them!

Ken used the Grootegeluk coal complex, which now has eight plants, which reflects the changes in plant design over the years. Its latest plant has 8 x 1.450m cyclones at its washing heart!

Ken then handed over to Nico who was going to deal with other minerals. He began with diamonds where the desired product was now provided by the cyclone spigot product. Diamond plants have reverted to cast iron cyclones as their life cycles fit in better with that of the overall plant.

On most other minerals it has now become almost standard practice to use large dense medium separators to "in effect de-shale" the run of mine and reduce the load on the subsequent cyclones and fines treatment plants, thereby improving separation and recovery of the desired product. On platinum plants around 25% of the unwanted mineral is removed at this stage, which also reduces costs down the line as wear on crushing and grinding plants is reduced.

Nico finally described some of the challenges being faced by Multotec in providing the correct equipment to the minerals industry. Emeralds involve primary separation at 2.65 SG and secondary at 2.95 SG and nickel has had to deal with problems with spigot capacity and high density differentials leading to accelerated wear. However the main challenge to the industry currently is from 'optical sorting' which is probably the subject for another paper in the not too distant future!

After an interesting, but necessarily short, Question & Answer session, Northern Group vice chairman Andrew Howells gave a well deserved Vote of Thanks to both speakers. He also thanked TEMA Isenmann's Phil and John Cranston for arranging the speakers for an excellent evening.