IMPROVING TECHNOLOGY FOR CMM EXTRACTION

Clemens Backhaus
Contents

• Application
  Function of CMM extraction

• Water Ring Pumps - the traditional solution

• Roots (Rotary Piston) Compressors – the improved solution

• Advantages with new solution

• References
  Operating data and some details of a few installations

• Conclusions
Function of CMM extraction

CMM extraction in **ACTIVE** coal mines

- **Central Degassing**: 25% - 65%
- **Ventilation air**: < 1%
- **0% – 4%**
- **25 % - 90%**
Function of CMM extraction

CMM extraction from **ABANDONED** coal mines

Compressor station

active or abandoned coal mine
Function of CMM extraction

CMM extraction

Compressor station

Cogeneration plant

Transformer

Active or abandoned mine does not matter for CMM utilization
Function of CMM extraction

The capacity of the degassing system is mostly limited by the design of the gas pipes!
Water Ring Pumps (WRP)

WRP compress the gas by a liquid ring

+ Even explosive mixtures can not ignite
+ Relatively resistant to dust
+ Low gas temperature

- High drive power
- Capacity loss caused by incorrect water level
- Water cooling and water conditioning required
- Problems with calcifications
- Risks in cold environment
- Only limited change of the delivery volume possible
Roots Compressors (Rotary Piston Compressors)

Roots work as geometric compressor

+ Low power requirement
+ Compact size, simplifying the application of modular units
+ No additional equipment for cooling
+ No risk of frost or calcifications
+ Large flexibility of the delivery volume possible

- Explosive mixtures can potentially ignite – Flame arrestors are needed for safety
- Filter for dust are desirable
Advantages for Roots Compressors (vs WRPs)

By October 2014, 19 CMM Root Compressor Stations have been installed in Kazakhstan, Russia and Ukraine, about 50 Roots compressor system in Germany

ADVANTAGES:
• Compact size, promoting modular design
• No water needed
• Easy to automate
• Unmanned operation
• Very high availability
• Low power consumption
• Less operating costs
• Lower overall price

<table>
<thead>
<tr>
<th>Comparison of driving power</th>
<th>Liquid Ring Vacuum pump Nash 2BE1 303-0</th>
<th>Roots Rotary blower RKR BS90</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suction capacity m³/min</td>
<td>47</td>
<td>47</td>
</tr>
<tr>
<td>Under pressure inlet mbar</td>
<td>250</td>
<td>250</td>
</tr>
<tr>
<td>Rotation speed U/min</td>
<td>590</td>
<td>1250</td>
</tr>
<tr>
<td>Shaft power kW</td>
<td>59</td>
<td>27</td>
</tr>
</tbody>
</table>
Extraction Station MDRS-180 in Kazakhstan

MDRS-180 Compressor Station; 5 Years Degasification Runtime

Average of 5 years operation of Compressor Station: 7,300 h per year

Every compressor 1 to 4: about 24,000 to 27,000 h running time
Reference - 2

Extraction Station
Conclusions

1. Shifting CMM extraction technology from Water Ring Pumps to Root Compressors can:
   a) Reduce foot print, increasing flexibility by modular design
   b) Increase availability
   c) Very good controllability
   d) Avoid water consumption
   e) Important reduce of power consumption
   f) Improve profitability

2. There are about 70 installations in operation since 2000

3. This is an example of how a sensible shift in technology can improve the overall efficiency, flexibility and profitability of an application.
Thank you for your attention

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