

Technology Analysis about the Damage due to the Pressure Fluctuation of Waste Gas

Blast furnace gas supply as a result of instability, there is no equipment storage and regulators, resulting in changes in gas pressure of main gas pipe. Fluctuations in gas pressure due to the General Assembly in the following adverse effects

Harm to boiler:

1. The thermal stress would be generated and stress fatigue would occur then the possibility of explosion of pipes for re-heater, super-heater and coal-saver would be increased due to deterioration for heat-transfer of heating surface of boilers caused by the fluctuation of internal temperature of stove.
2. The water level of steam drum would not remain stable, and shock vibration in ascension pipe and boiler drum would occur and even the equipment would be destroyed due to the non-stability of combustion in boiler and then the fluctuation of steam generation;

Harm to steam turbine:

3. The steam superheat will drop or even near to its saturation temperature due to the unstable of combustion, which lead to the lash of water in steam turbine, and even make the rupture of blade.
4. The temperature of main steam will fall down due to the decrease of the coal gas pressure. The great thermal stress and thermal deformation will occur because of the sharp drop of temperature of internal surface of automatic main steam shell, adaption stage, cylinder and other high-temperature components, and even the cracks occur at the metallic component or abrasion between dynamic and static part occur if the situation mentioned goes too far.
5. The load of steam turbine must vary sharply with the fluctuation of steam produced by boiler which is caused by the fluctuation of gas pressure. Then great temperature difference between the surface and center of the steam turbine cylinder and rotor will occur, which lead to the impact thermal stress, and even the cracks at the metallic component or abrasion between dynamic and static part.
6. In the start and stop operation, or during the change of working condition, the rotor, cylinder and other metal components will be effected by alternating thermal stress, resulting in metal fatigue and reducing the life of equipment.

The breakdown accident of the power unit is often caused by the reasons above, which indirectly reduce the electricity generation.

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煤气压力波动造成危害的技术分析

钢铁厂回收废气发电项目，主要是减少高炉煤气对大气的排放量。由于高炉煤气供气不稳定，没有储存和稳压设备，造成煤气母管压力变化较大。因煤气压力波动大会带来以下不利影响：

对锅炉的影响：

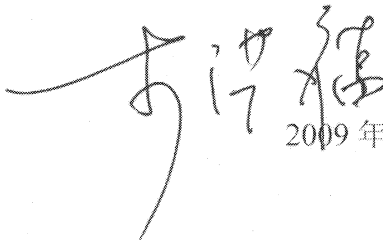
- 1、炉膛内温度波动，使锅炉受热面传热恶化，产生热应力，带来应激疲劳，容易造成锅炉爆管；
- 2、锅炉燃烧不稳，蒸汽产量发生波动，造成汽包水位不稳，在上升管及锅筒内产生冲击震动，损坏设备；

对汽轮机的影响：

- 3、煤气压力降低，使锅炉出口的蒸汽过热度降低，甚至接近或达到饱和温度，使蒸汽带水，造成汽轮机水冲击，使叶片损伤甚至断裂。
- 4、主蒸汽温度快速下降较多时，自动主汽门外壳、调节级、汽缸等部件的内壁温度急剧下降而产生很大的热应力和热变形，严重时可能使金属部件产生裂纹或使机内动静部分造成磨损等事故。
- 5、蒸汽产量的波动，使汽轮机负荷也必须跟着快速变动，就可能使汽缸内外壁转子表面与中心产生很大的温差，从而引起冲击热应力，使金属部件产生裂纹或使机内动静部分造成磨损等故障。

汽机在启停及工况变化时，汽缸转子等金属部件受交变热应力的作用，产生金属疲劳，消耗一部分寿命。

以上几点易造成机组被迫停机，影响运转率，效益受损。

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