**1, In my past years of career, I served one technical company which is professional in machinery detection, diagnosis, and maintenance service. The company is one of subsidiaries [səbˈsɪdiəri] of China Baowu Steel Group Corporation, which is the biggest Iron and Steel manufacturing enterprise in China.**

**China Baowu sets up the control mode of “1 head office and multiple bases” , and there are hundards of thousands machines and equipments distributed in different factories and different production lines.**

Nowdays, equipments maintenance are rquired to attend predictive maintenance, that is use vibration Analysis technique

identify possible impending problems like looseness, unbalance, misalignment, lubrication issues and more

and Continuous monitoring technologies,

to reduce maintance costs and equipment downtime by detecting equipment faults such as imbalance, misalignment, Mechanical looseness ,rolling element bearing faults and resonance conditions.

**2，As we know, Anytime a machinery is running, it is making vibrations. Vibration is a physical phenomeno of rotating machineries and moving structures.** *It can be induced by various sources, including rotating shafts, meshing gear-teeth, rolling bearing elements, fluid flows, structural resonance and angular rotations.*

**The studies of sound and vibration are closely related. Sound, or pressure waves, are generated by vibrating structures (e.g. vocal cords); these pressure waves can also induce the vibration of other structures.** *In the past, because of lack of vibration analysis tools, many maintance staff use Listening Stick to listen to pumps, compressors, motors and other rotating equipments. The normal running sound of the equipment is smooth, even and without harsh noise(such as the rubbing sound of metal). The maintance staff listen and compare the equipments frequently, so they can correctly judge the operation of the equipment with experience. I think it is one of the early use of acoustic technologies*

**Same as sound, A complex machine with many components will generate a mixture of vibrations, which is a combination of vibrations from each rotating components。**

3，**Vibration analysis is a process for measuring the vibration levels and frequencies of machinery and then using that information to analyze how healthy the machines and their components are.**

It can determine what's wrong with a equipment, identify possible impending problems like looseness, unbalance, misalignment, and then catch issues before they cause significant downtime (proactive). predictive maintenance,

4、The company has built a remote intelligent maintenance platform. All equipment data will be uploaded to the cloud.

Different machinery has different structure and specification, different faults has different characteristic, especially in frequency spectrum. So hundreds of analysis models and algorithms are implanted in the platform.

While the collecting data is uploaded to cloud platform, It will call corresponding models and algorithms for analysis. Once the platform detects the abnormal, it will trigger alarm progress, atuomatically produce alarm message, diagnosis report, processing guidance, and then push these information to to the equipment manager and maintenance staff through email and APP.

5, We developed 2 series of vibration collectors: handheld series and online series. Vibration sensors attached to the machine generates a voltage signal that corresponds to the amount and the frequency of vibration the machine is producing. The collectors acquire vibration signals according to pre-determined parameters *such as sampling frequency, vibration level, recording length, recording intervals and frequency bandwidths*.

* Be composed of a collector and a group of sensors; Be equipped with a keyboard and screen; Can browse and view value and alarm record;
* Be equipped with DAC conversion module providing 4 ~ 20mA standard signals connecting with the PLC system through the RS-485 bus
* Be implanted in Alarm judgment algorithm. Collecting, calculating, judging, and transmitting at the same time
* Store alarm value locally and upload alarm data and waveform actively while alarming is triggered. Control the relay action to protect equipment