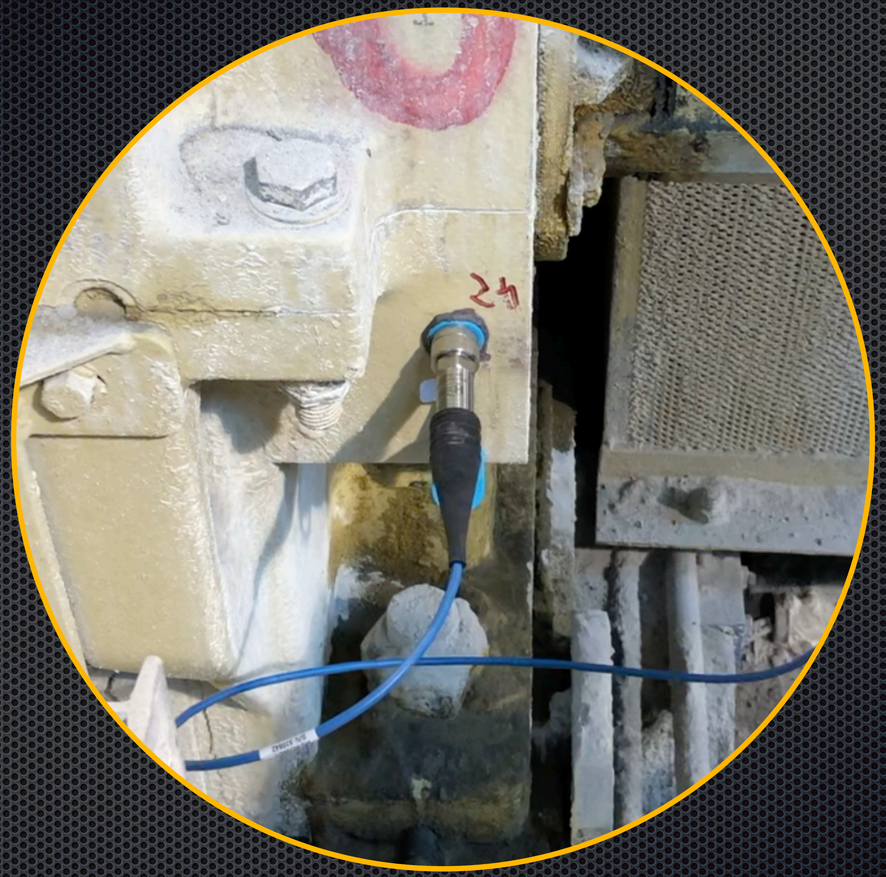
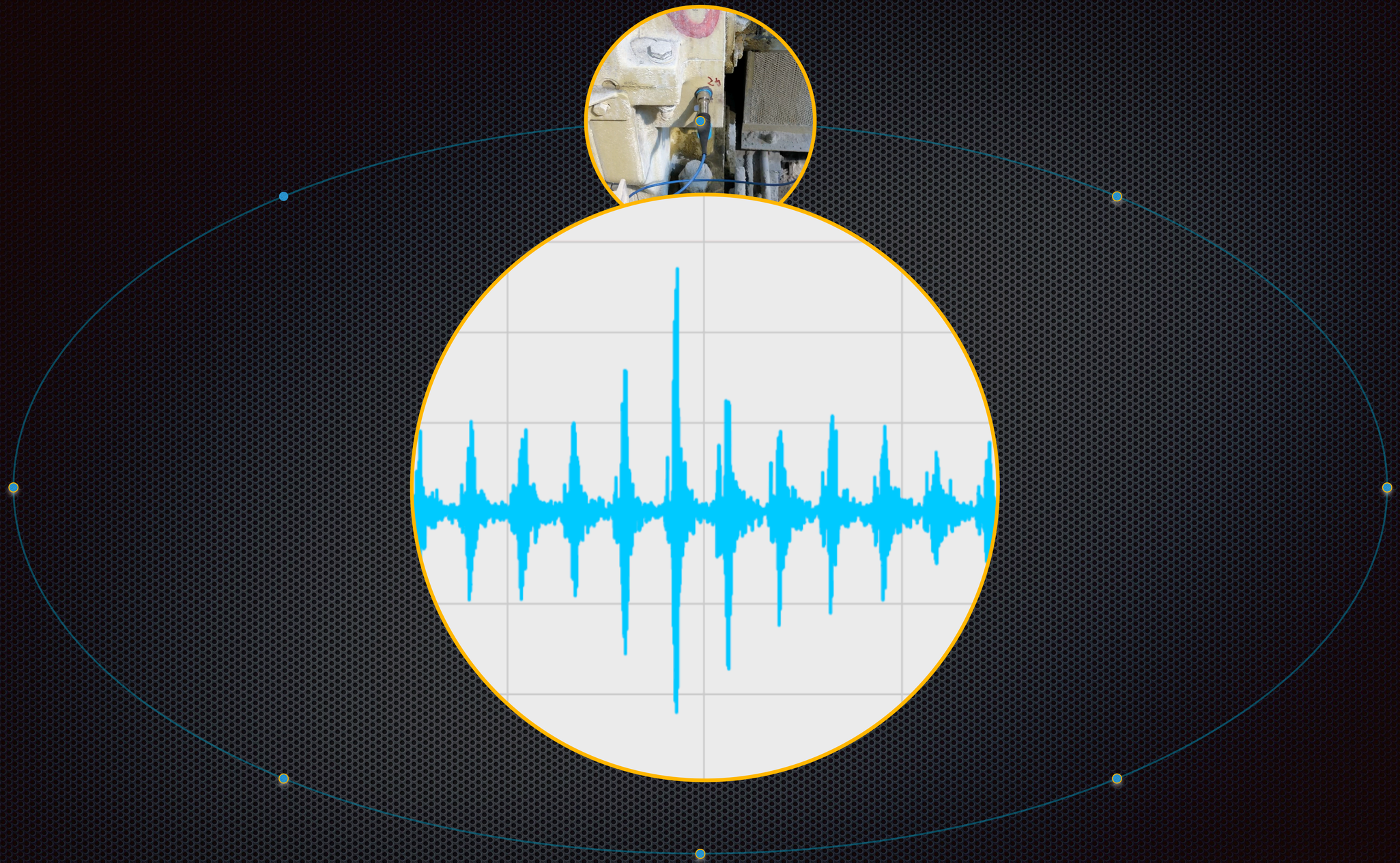
CBM Journey

From SIGNAL to INFORMATION

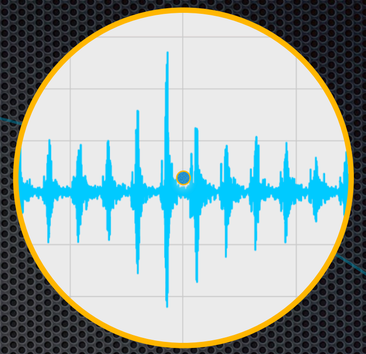
Explaining the Process of **Transforming** the **Machine Voice** to **Information** for the use of Maintenance and Production teams.



The CBM Journey starts from the **CM Point** on the machine



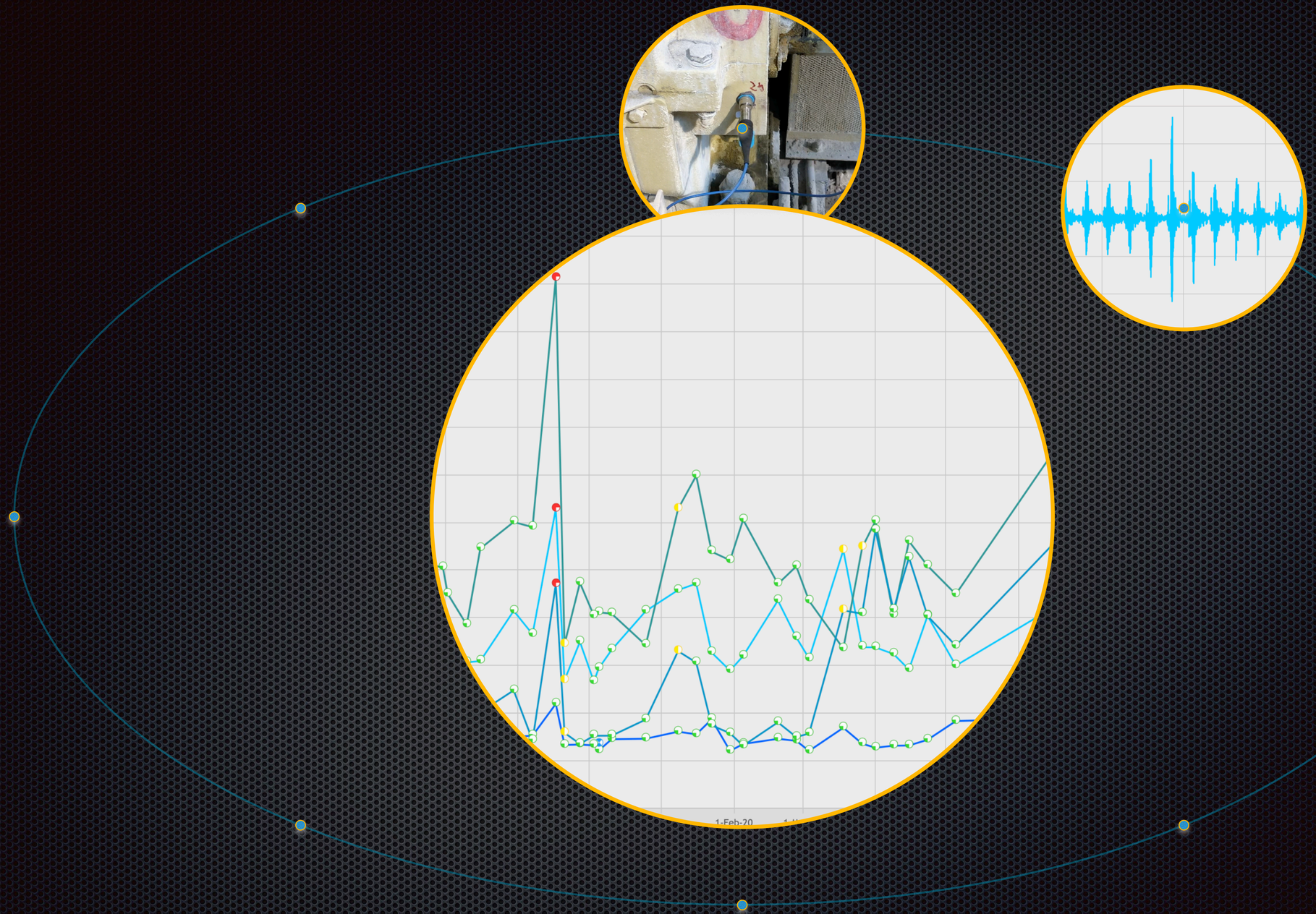
The **Accelerometer** sends time **Signal** to logger



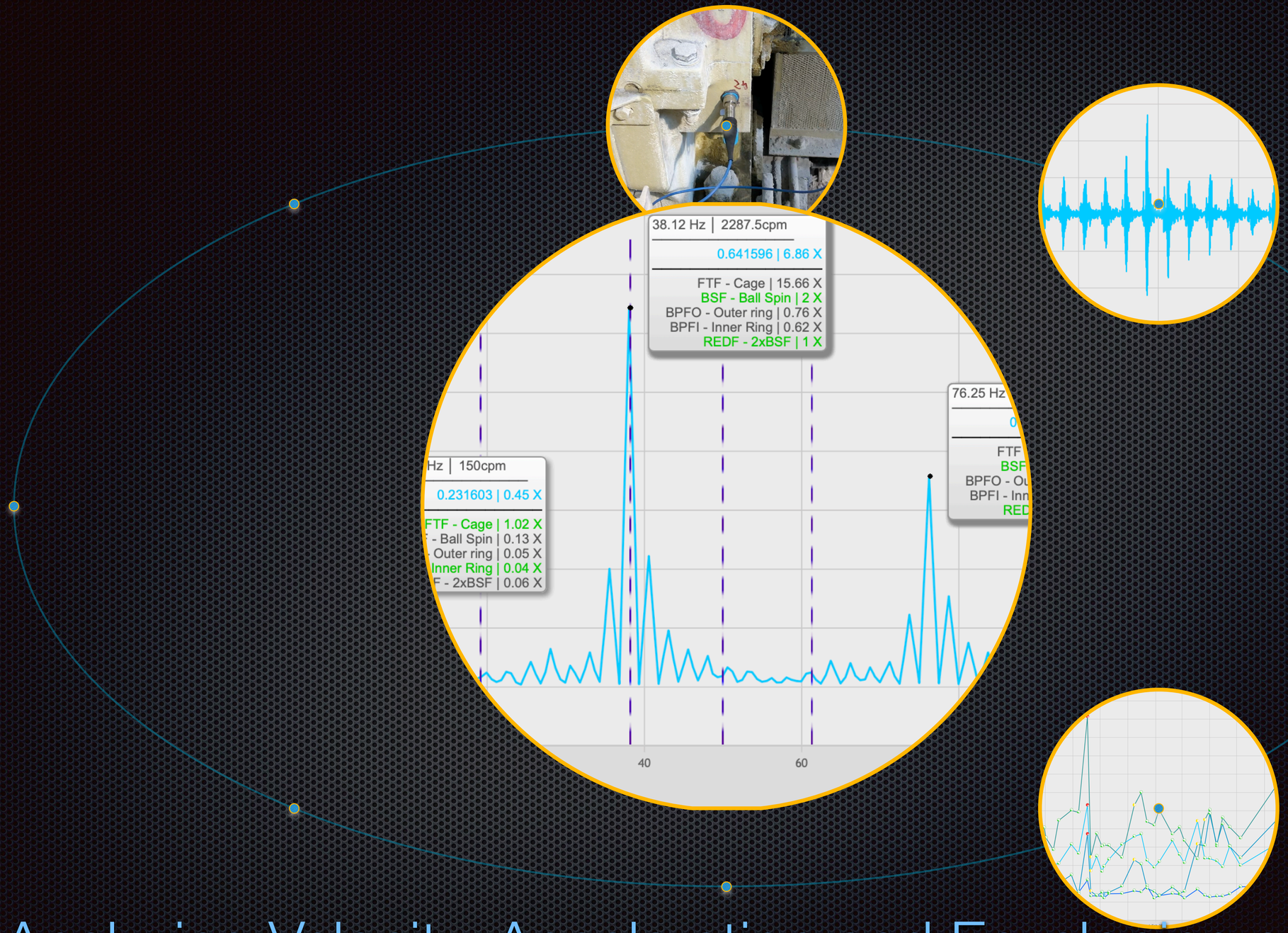
```
        offset from the start of the
    -- fractional overlap (between 0 an

    urns:
        (maxfreq, nlines, offset, overlap) -- tuple of sugge
        parameters for Fourier transforms."""
    if maxfreq > self.twf.freq/2.0:
        newmaxfreq = self.twf.freq/2.0
        logging.warning('Requested maximum frequency {0} too high, s
                        'to {1} (half the sampling frequency).'.forma
        maxfreq = newmaxfreq
    length = int((nlines)*self.twf.freq/maxfreq)
    if length > self.twf.samples:
        length = self.twf.samples
        newnlines = int(length*maxfreq/self.twf.freq)
        logging.warning('Requested number of lines {0} too large, setting
                        'to {1} (maximum possible).'.format(nlines, newnli
        nlines = newnlines
    if offset < 0 or offset+length > self.twf.samples:
        logging.warning('Requested offset {0} too large, setting to {1} '
                        '(maximum possible).'.format(offset, self.twf.samp
        offset = self.twf.samples - length
    if overlap is not None:
        # FFT averaging functions handle gracefully noverlap=0
        if overlap < 0.0 or overlap >= 1.0:
            logging.warning('Requested overlap {0} should be between 0 a
                            ' 1, setting to 0 (no averaging).'.format(ov
            overlap = 0.0
        elif 2*length-int(overlap*length) > self.twf.samples:
            noverlap = 2*length - self.twf.samples
            if noverlap >= self.twf.samples:
                newoverlap = 0.0
                logging.warning('Requested overlap {0} too small
                                '0 (no averaging).'.format(ove
            else:
                newoverlap = 1.0*noverlap/length
                assert(2*length-int(newoverlap*length)
                logging.warning('Requested overla
                                '{1}.'.form
```

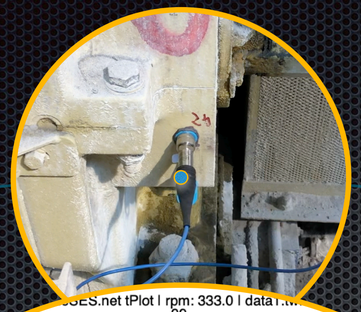
The **CM platform** processes the **Signal**

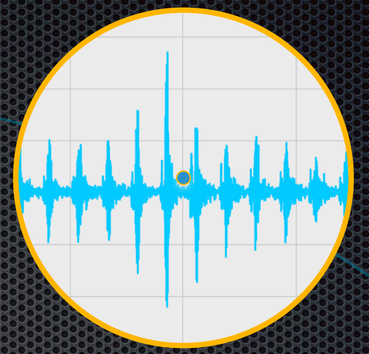


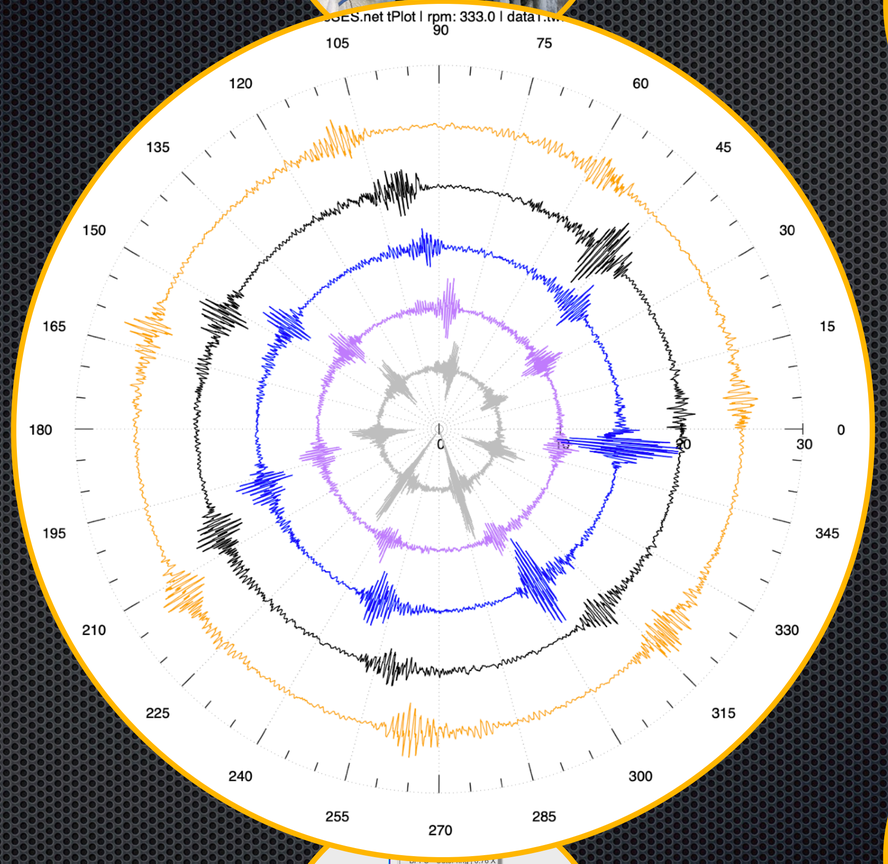
CM Specialist reviews **Trends** of the computed **Parameters**

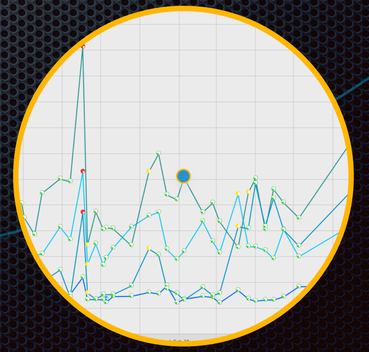


Analyzing Velocity, Acceleration and Enveloping spectra

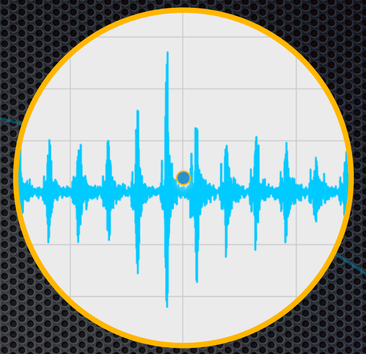




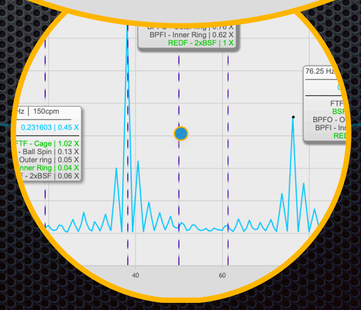


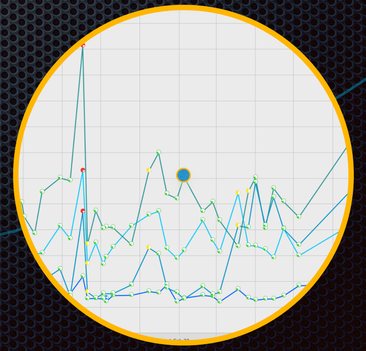


Using advance tools

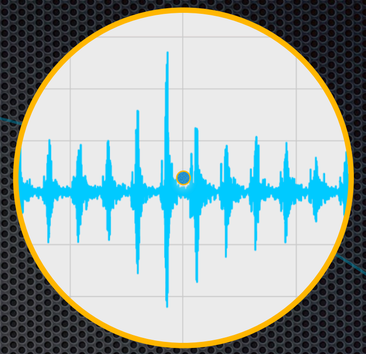


	Fault Notes	Re
ed	Raised Velocity trend. Be	Plan for
Med	Raised 2X and 5X.	Visual Ins
Med	Raised Velocity trend.	Plan for repla
Med	Raised Velocity overall va	Overhaul mac
Low	Raised 1X.	
Low	One point is not collected	
Low	Raising Velocity trend.	
Low	Only two points are collec	Collect
	Raised 3X in Velocity.	Vi

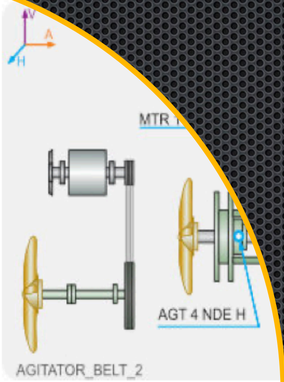




Document the discovered faults, and give recommendations

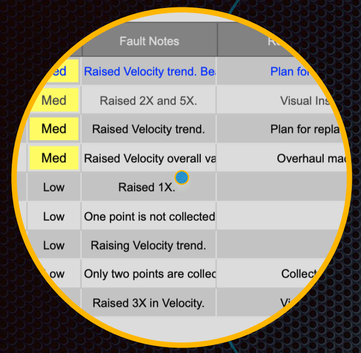


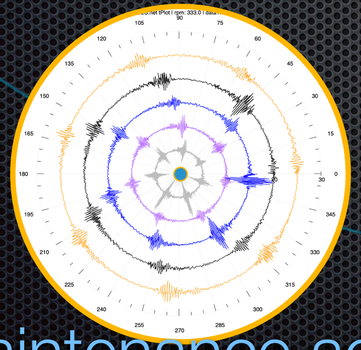
	Analysed by
ATTENTION	CBM Dreamer

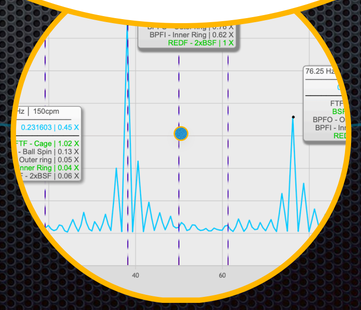


	CM Status	CMMS ID
R	ATTENTION	3000206331
MISSION -	ACCEPTABLE	3000567644
TOR	ATTENTION	3000206332

ent	Component	Fault	Sev	Recommended Act
R	EL MOTOR	UNKNOWN - no changes - Raised Velocity trend. Bearing defect frequencies in sE spectrum.	Med	Plan for replacem Планирайте дей ремонт на ЕД.
	AGT 4 NDE BRG 1	Broken component - Raised 2X and 5X.	Med	Visual Har

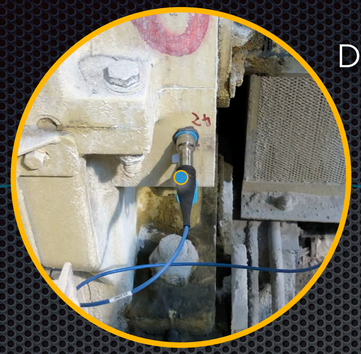




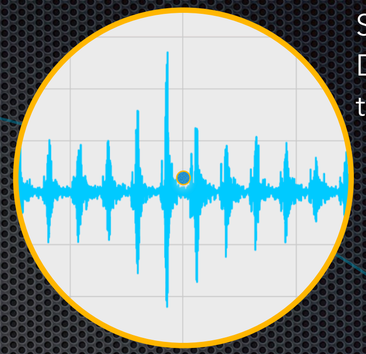


Planing the maintenance activities, based on the recommendations

Data collection



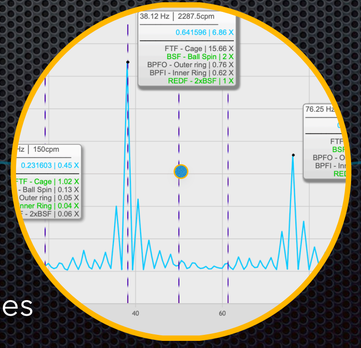
Signal Digitization and transfer



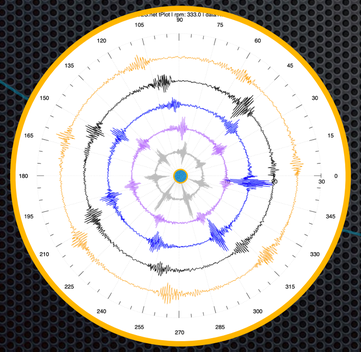
Signal processing

Trends analyses

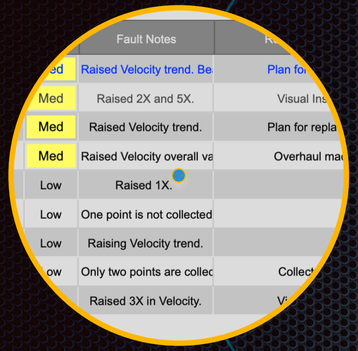
Spectra analyses



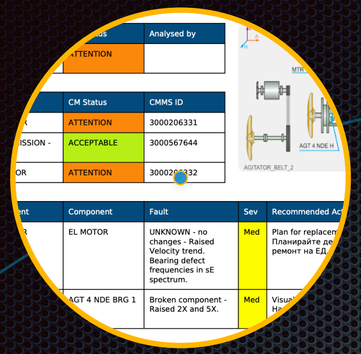
Using customized advance tools



Documenting faults and recommendations



Using recommendations to Act on Time



Site Maintenance: Act based on DATA

Site Organization: It has to be Easy.

Technology: Simplicity & Cost

Understand the data

Trained & Certified

Know how machines work

CM Data Analytics Team

THOUGHTS

- The CBM Journey starts with data collection.
- The technology should simplify instead of complicating the process. The technology only transforms the signal to data.
- The data analysis is a complicated process, and it is the core of transformation from data to information.
- If the Maintenance team is not going to use the CBM Information, don’t waste your money for CM technology.