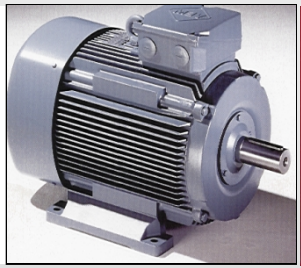
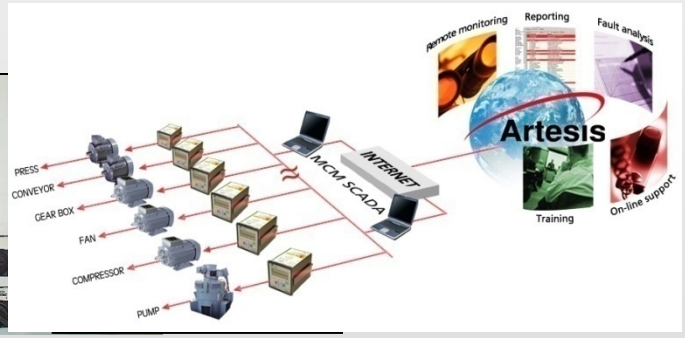
Artesis MCM Case Studies

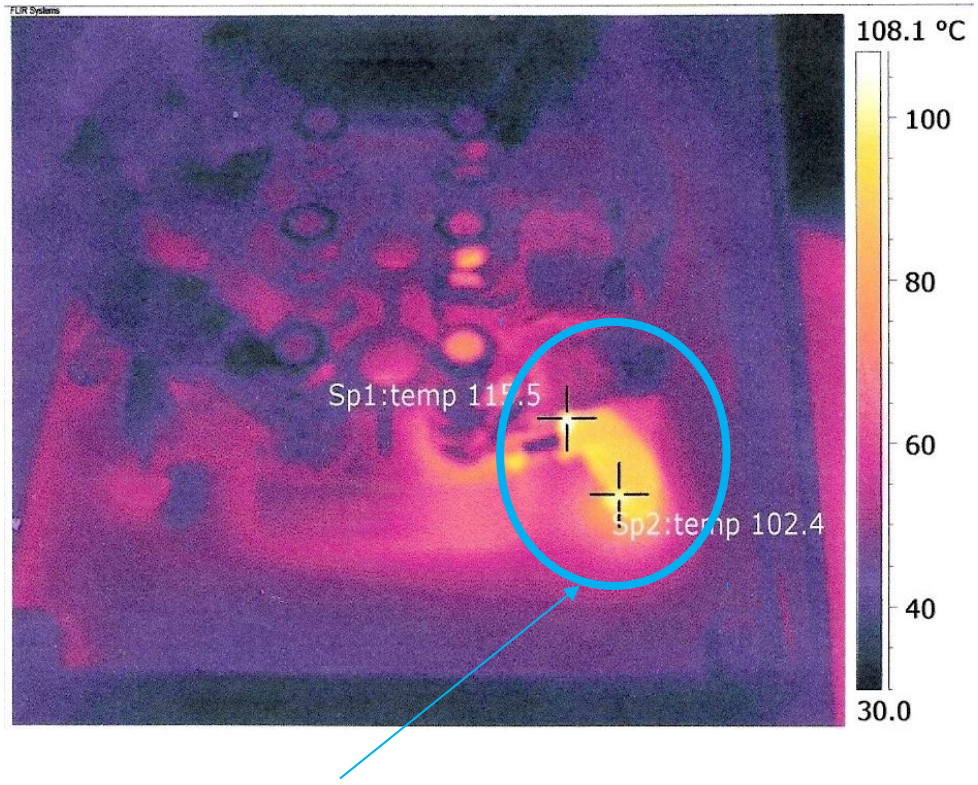



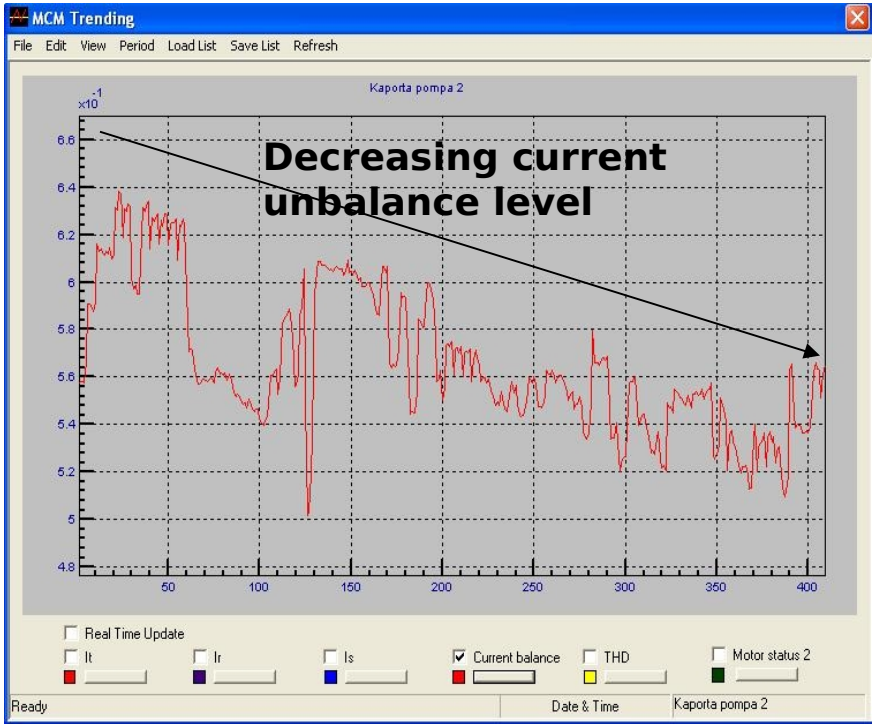



Prof. Dr. Ahmet Duyar

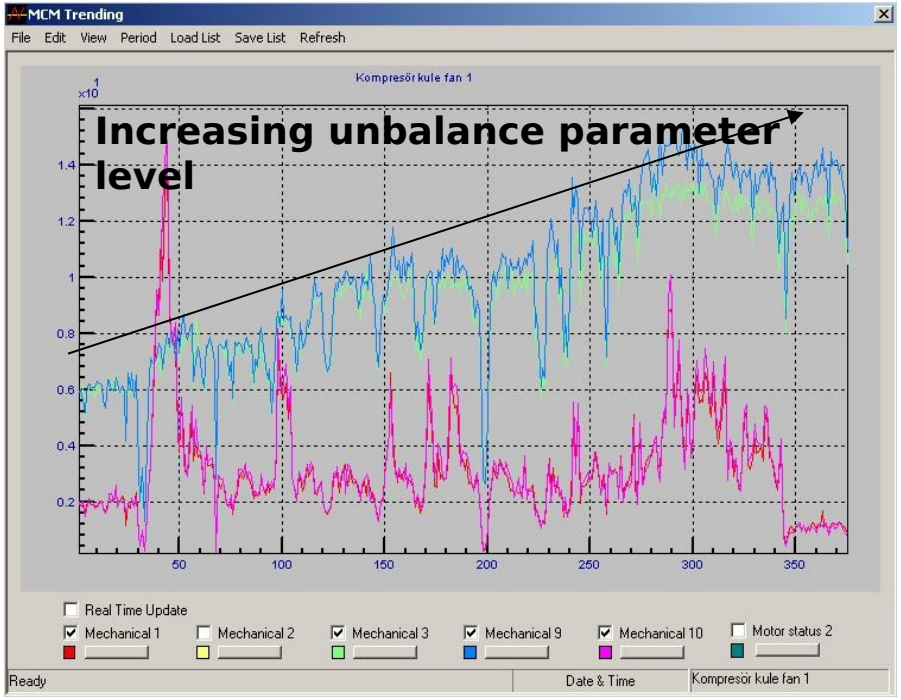
2009

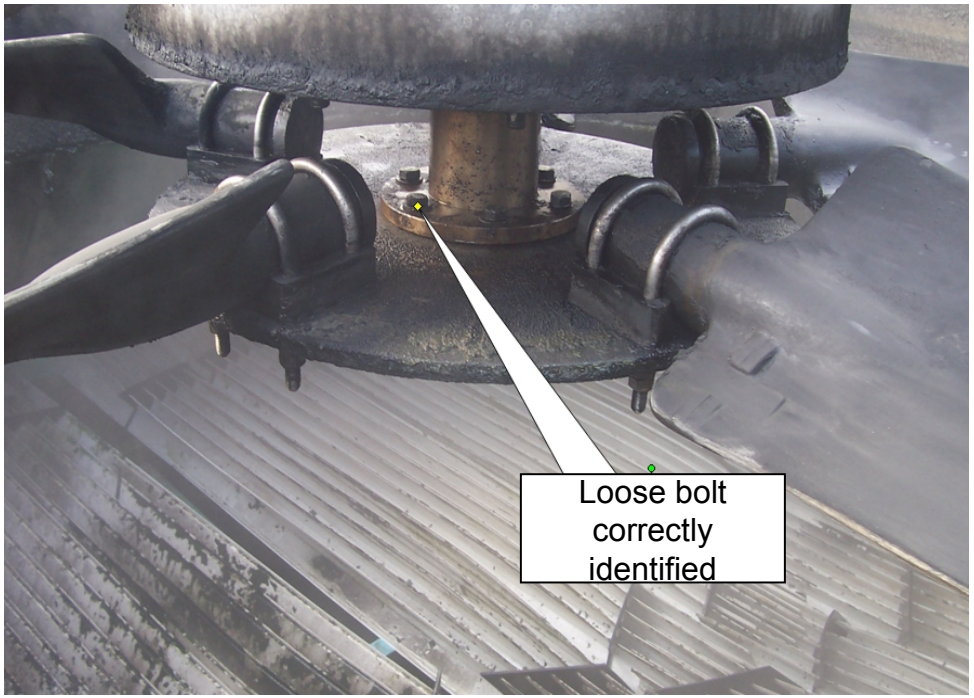
Renault
Isolation Failure



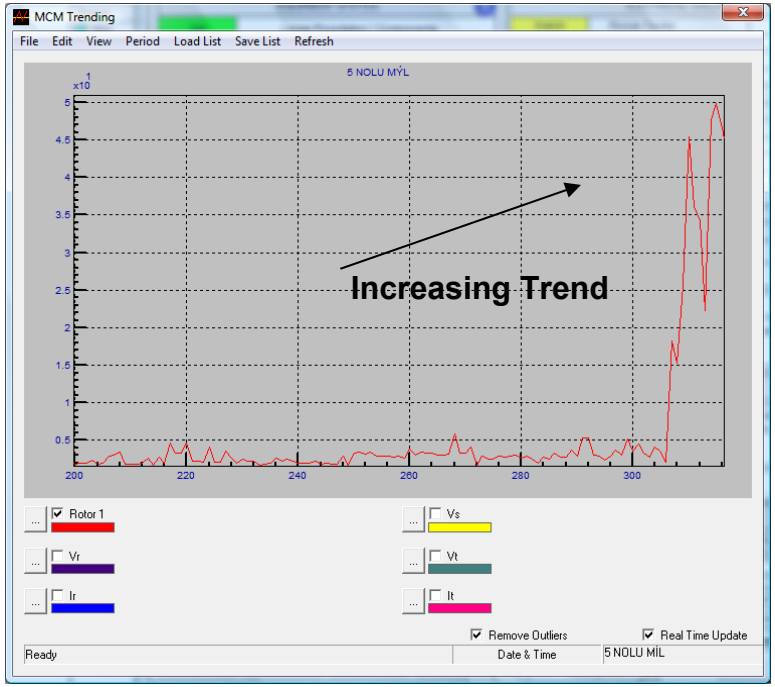


Renault
Fan Unbalance





Goodyear
Rotor Bar Failure



Rotor failure parameter trending for 5th Mill motor

Goodyear Tire and Rubber Company is one of the biggest tire manufacturer in the world. MCM units are used to monitor some of their equipment in Sakarya plant. One of them is 5th Mill Motor. MCM detected some existing failures, transmission and unbalance, after LEARN period. Several months later, MCM gave “Rotor” fault alarm to the user, and TPM chief engineer decided to check the failure with vibration measurement also. Siemens TPM team did some vibration measurement on the motor and they reported that 5th mill motor has one or more broken bars on the rotor. Hence, early predictions given by MCM were also verified using vibration tests.

Goodyear
Rotor Bar Failure

Diagnostic

EQUIPMENT STATUS	
OK	Loose Foundation / Components
OK	Unbalance/Misalignment/Coupling/Bearing
OK	Transmission Element / Driven Equipment
OK	Bearing
Examine	Rotor
OK	Loose Windings / Stator / Short Circuit
OK	Internal Electrical Fault
OK	External Electrical Fault
OK	Other
OK	Line Status
OK	Load Status

ELECTRICAL VALUES		
Watch	Power Factor	0.78
OK	Active Power [kW]	149
OK	Reactive Power [kVar]	118
OK	Vrms [V]	3191
OK	Irms [A]	20
OK	V Imbalance[%]	0.57
Watch	I Imbalance[%]	17
OK	Frequency [Hz]	50
Watch	THD [%]	6.5
OK	3th Harmonic [%]	1.9
OK	5th Harmonic [%]	4.9
OK	7th Harmonic [%]	1.7
OK	9th Harmonic [%]	0.16
OK	11th Harmonic [%]	0.66
OK	13th Harmonic [%]	0.40

EXAMINE 1 — There are developing mechanical and/or electrical fault(s) as shown below. Maintenance should be scheduled within three (3) months.

WATCH ELECTRICAL VALUES — Electrical values are outside of their expected range. They should be noted and watched to identify the cause

WORK REQUESTS

EXAMINE 1: There are developing mechanical and/or electrical fault(s) as shown below. Maintenance should be scheduled within three (3) months.

1.[Existing Fault] Misalignment / unbalance. Check for Misalignment, unbalance, bearing, coupling, and motor shaft.
2.[Existing Fault] Transmission problem. Check for transmission element(s) coupling, driven equipment, belt, pulley, gear box, and fan / pump impeller.

EQUIPMENT INFORMATION	
Equipment Name	5 NOLU MİL
Equipment Type	Other
Nominal Voltage [V]	3300
Nominal Current [A]	74
Rotation Spd. [rpm]	741
MCM Address	2

DATABASE (Last Five Hours)	
Start Date	09/29/2009 07:53:21
End Date	09/29/2009 12:53:21
Number of Data Points	124
DATABASE (Full)	
Database Range	09/28/2009 - 10/19/2009
Number of Data Points	5663 (262/5663)

Plot | Report | Clear Selection | PSD | Load | Advanced | Help | Close

Auto | Step 113 | Goto 5663 | Go

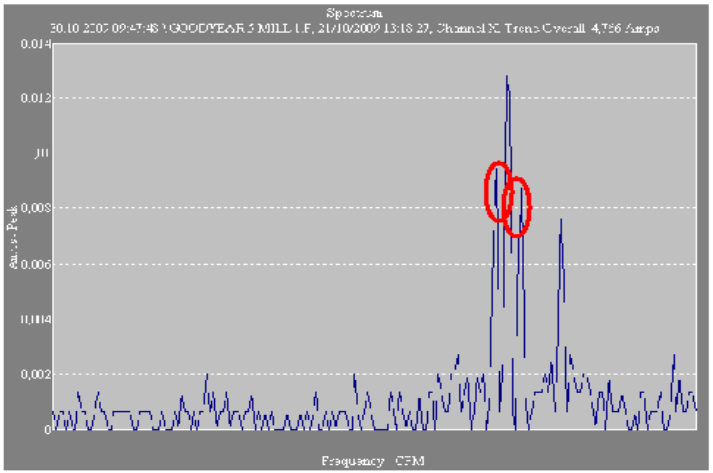
SIEMENS

30.10.2009

TECHNICAL REPORT

Customer : GOODYEAR LASİK FAB. SAN. Ve TİC A.Ş.

Subject : 54 CAL. 1 - 5 Mill Motor



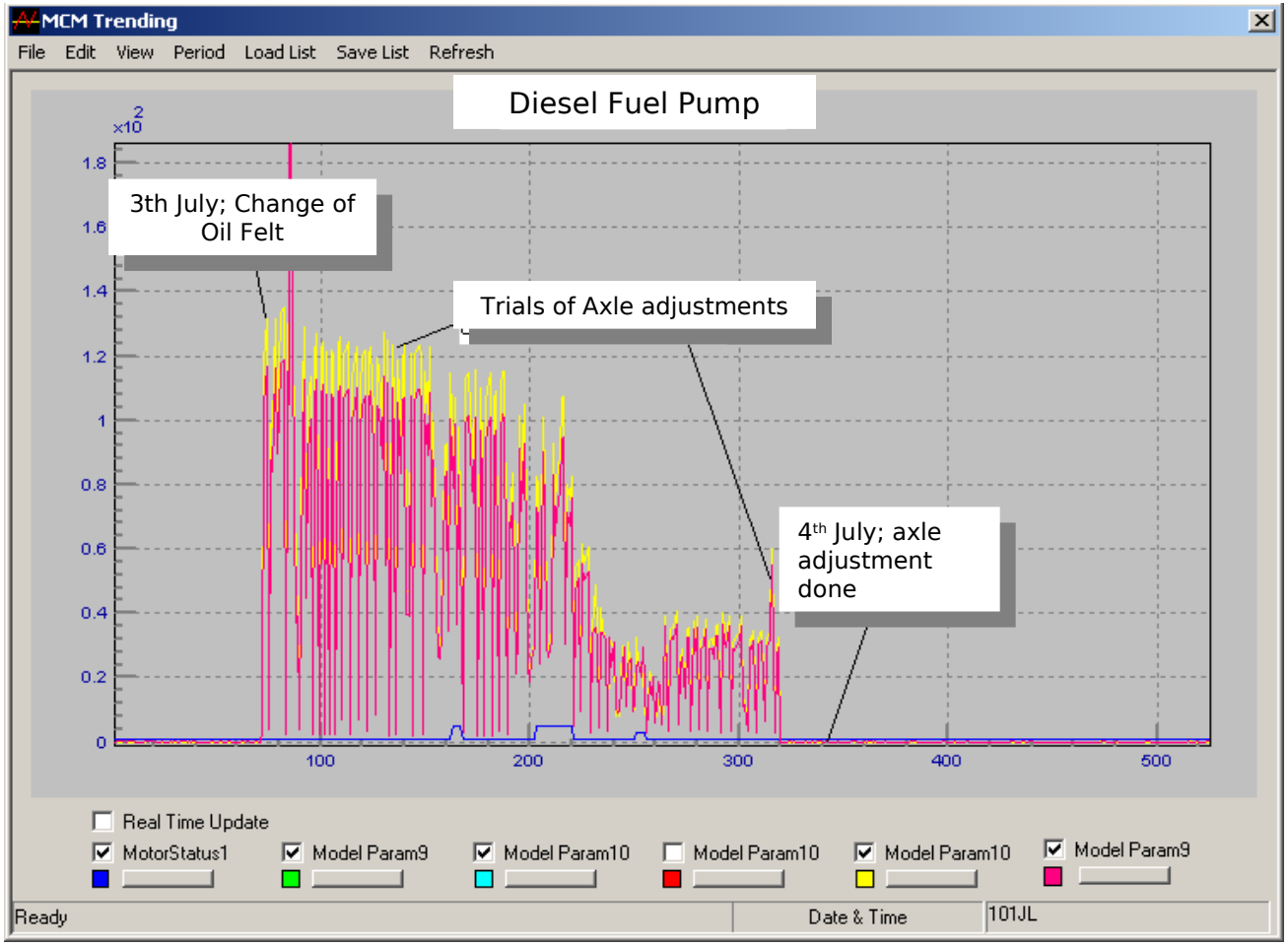
At 21.10.2009 motor dB measurements. You can see peaks at 3.5 pole pass frequance on spectrum. These peaks equal 44.9 dB , this means moderate.
You can see condition assessment table below.

Condition Assessment Table

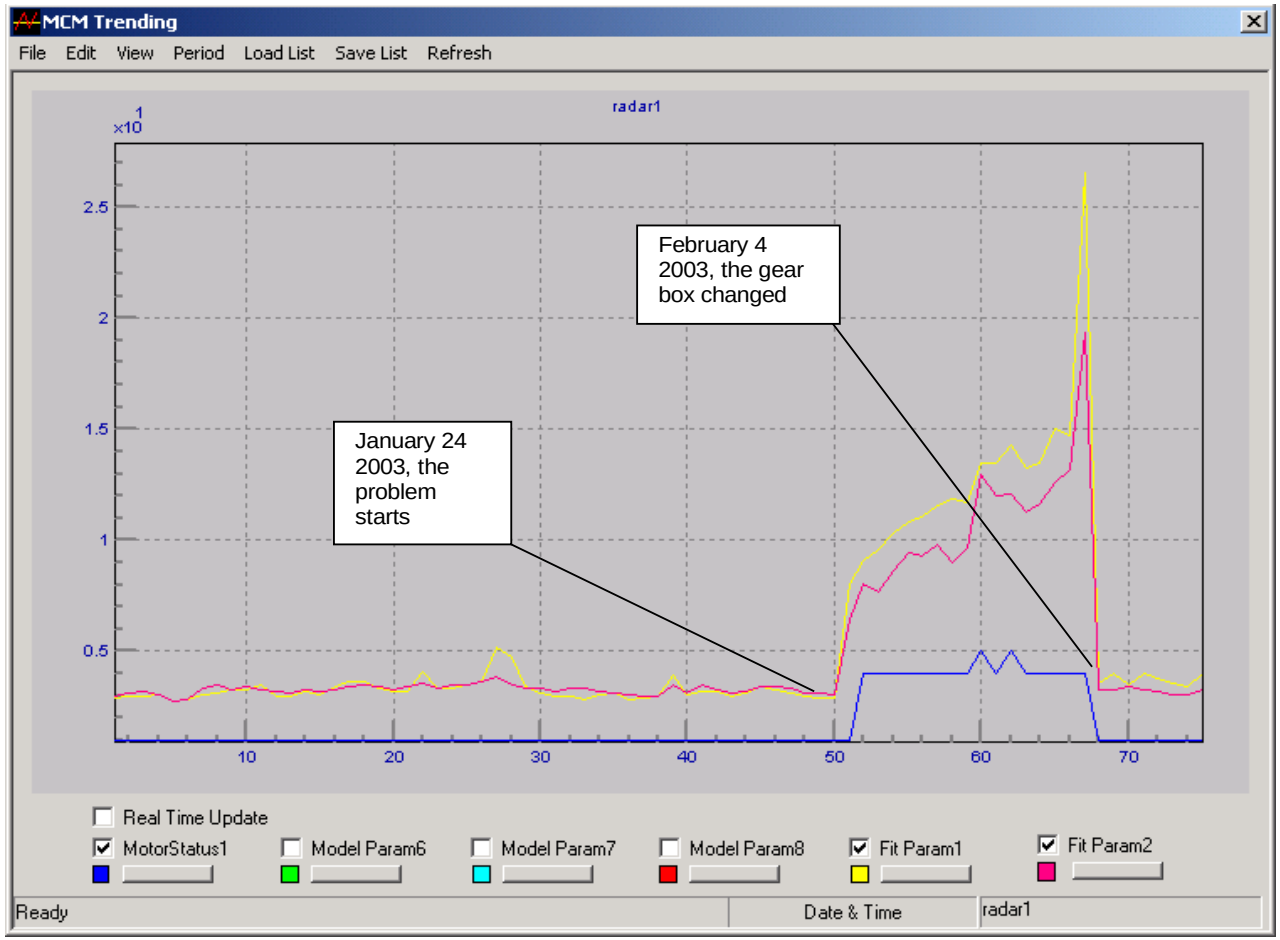
54 - 60 dB = Excellent
48 - 54 dB = Good
42 - 48 dB = Moderate
36 - 42 dB = Rotor bar crack developing or High resistance joints
30 - 36 dB = Multi cracked broken bar sor End – Rings Indicated
< 30 dB = Multi cracked broken bar sor End – Rings very likely Severe problems throughout

ST-I&S-TS-F-034

British Petroleum
Diesel Fuel Pump – Misalignment



NATO
Gear Box Defect in Radar System



Artesis

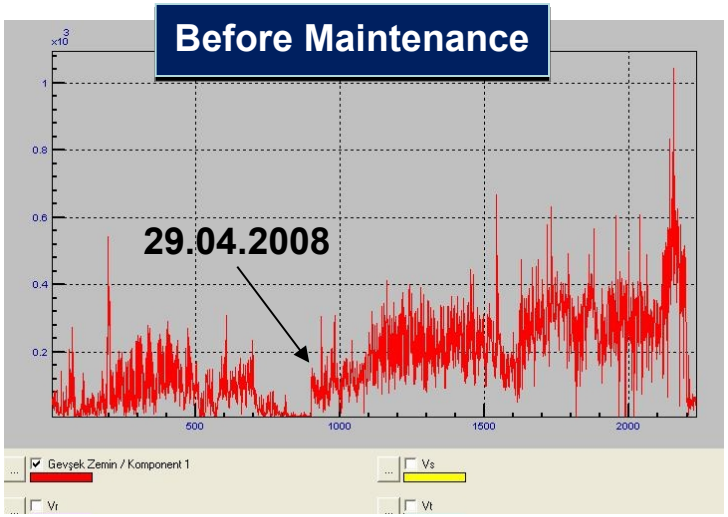
ISKI Water Company
Loose Foundation & Unbalance

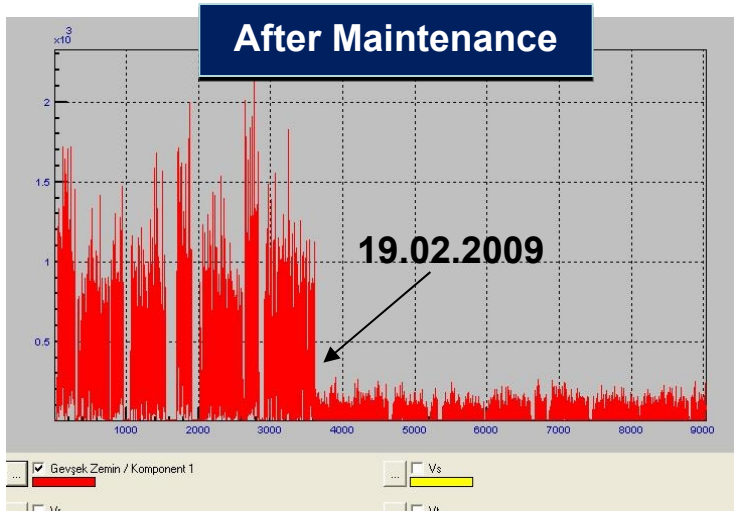
İSTANBUL BÜYÜKŞEHİR BELEDİYESİ
İSKİ
İSTANBUL SU VE KANALİZASYON İDARESİ

ISKI Water Company
Loose Foundation & Unbalance

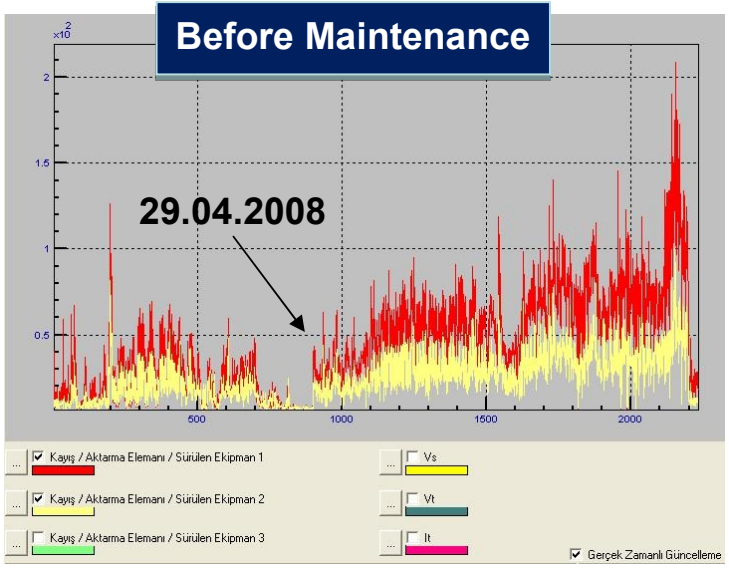
İSTANBUL BÜYÜKŞEHİR BELEDİYESİ
İSKİ
İSTANBUL SU VE KANALİZASYON İDARESİ

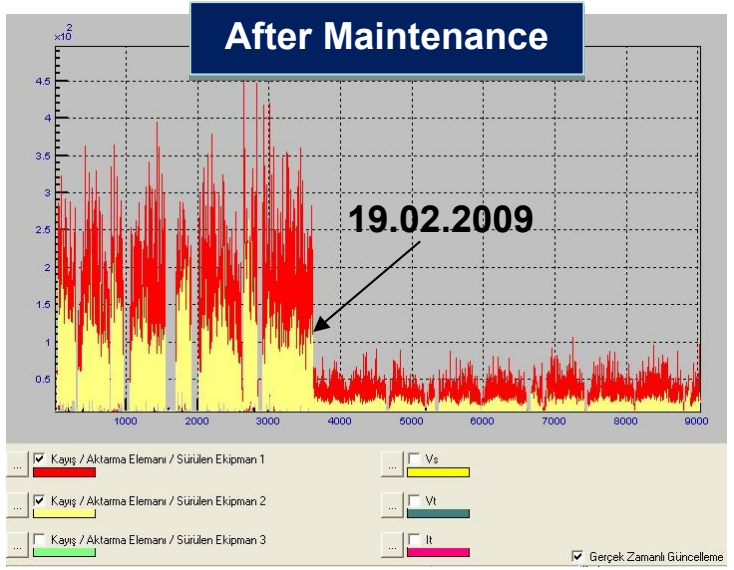
Loose Foundation Problem





Unbalance Problem





Borcelik Steel Factory
Dirty Filter

Borcelik Steel Factory
Dirty Filter

Diagnostic

EQUIPMENT STATUS	
OK	Loose Foundation / Components
OK	Unbalance/Misalignment/Coupling/Bearing
OK	Belt/Blade/Trans. Element/Driven Equipment
OK	Bearing
OK	Rotor
OK	Loose Windings / Stator / Short Circuit
OK	Internal Electrical Fault
OK	External Electrical Fault
OK	Other
OK	Line Status
Watch	Load Status
WATCH LOAD	If the process load has not been altered deliberately, check for leakage, valve & vane adjustment, pressure gauge faults, manometer, dirty filters (fans, compressors). If the process is altered deliberately, MCM/PCM should be updated.

ELECTRICAL VALUES		
OK	Power Factor	0.82
OK	Active Power [kW]	130
OK	Reactive Power [kVar]	92
OK	Vrms [V]	220
OK	Irms [A]	239
OK	V Imbalance[%]	0.47
OK	I Imbalance[%]	0.47
OK	Frequency [Hz]	50
OK	THD [%]	2.4
OK	3th Harmonic [%]	0.27
OK	5th Harmonic [%]	1.6
OK	7th Harmonic [%]	1.3
OK	9th Harmonic [%]	0.12
OK	11th Harmonic [%]	0.44
OK	13th Harmonic [%]	0.35
OK	Electrical values are within expected range	

WORK REQUESTS

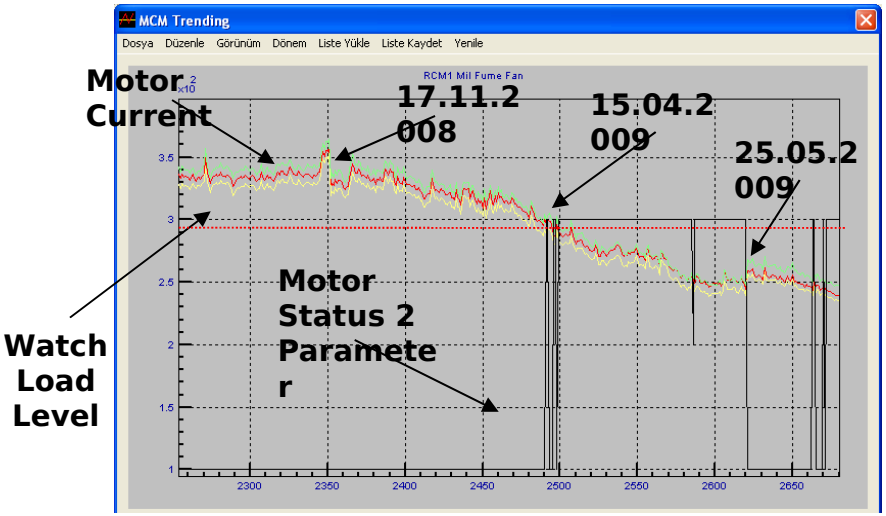
WATCH LOAD: If the process load has not been altered deliberately, check for leakage, valve & vane adjustment, pressure gauge faults, manometer, dirty filters (fans, compressors). If the process is altered deliberately, MCM/PCM should be updated.

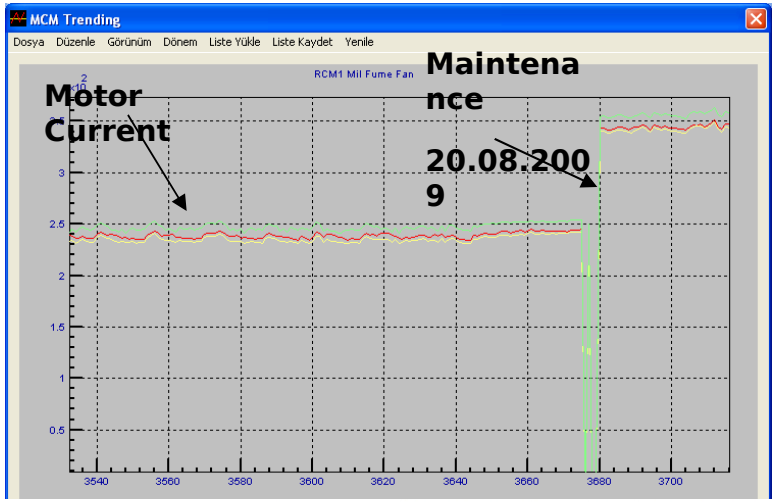
EQUIPMENT INFORMATION	
Equipment Name	RCM1 Mil Fume Fan
Equipment Type	Fan
Nominal Voltage [V]	230
Nominal Current [A]	360
Rotation Spd. [rpm]	990
MCM Address	1

DATABASE (Last Five Hours)	
Start Date	08/05/2009 19:13:09
End Date	08/06/2009 00:13:09
Number of Data Points	34
DATABASE (Full)	
Database Range	08/01/2009 - 08/28/2009
Number of Data Points	3273 (35/3273)

Plot | Report | Clear Selection | PSD | Load | Advanced | Help | Close

Auto | Step 65 | Goto 3273 | Go





Borcelik Steel Factory
Dirty Filter

Borcelik is one of the biggest steel – iron factory in Bursa/Turkey and uses for monitoring their equipment. One of them is Reversing *Cold* Rolling Mill fume fan. This fan has a filter and it discharges dusty air out of the factory. MCM started to warn user by giving “Watch Load” alarm after 15.04.2009. When the current trending examined, it could be seen that motor current is going down since 17.11.2009. This means filter blockage started that date, but it exceeded MCM alarm level on 15.04.2009. Maintenance team of Borcelik tried to clean the filter with pressured air on 25.05.2009, but it did not make the filter completely clean. So MCM started giving “Watch Load” error just after 1 month after maintenance operation. They needed to change the filter on 20.08.2009 and after this MCM stopped giving error and motor current increased to its nominal value.

Cumra Sugar Plant
Cavitation

konya şeker
"Türkiye'nin üreten gücü"

Diagnostic

EQUIPMENT STATUS	
OK	Loose Foundation / Components
OK	Unbalance/Misalignment/Coupling/Bearing
OK	Vane / Trans. Element / Driven Equipment
OK	Bearing
OK	Rotor
OK	Loose Windings / Stator / Short Circuit
OK	Internal Electrical Fault
OK	External Electrical Fault
Examine	Other
OK	Line Status
OK	Load Status

ELECTRICAL VALUES		
OK	Power Factor	0.90
OK	Active Power [kW]	28
OK	Reactive Power [kVar]	13
OK	Vrms [V]	167
OK	Irms [A]	56
OK	V Imbalance[%]	0.87
OK	I Imbalance[%]	0.46
OK	Frequency [Hz]	42
OK	THD [%]	2.9
OK	3th Harmonic [%]	0.49
OK	5th Harmonic [%]	2.4
OK	7th Harmonic [%]	1.1
OK	9th Harmonic [%]	0.11
OK	11th Harmonic [%]	0.28
OK	13th Harmonic [%]	0.11

EXAMINE 1 — There are developing mechanical and/or electrical fault(s) as shown below. Maintenance should be scheduled within three (3) months.

OK — Electrical values are within expected range

WORK REQUESTS

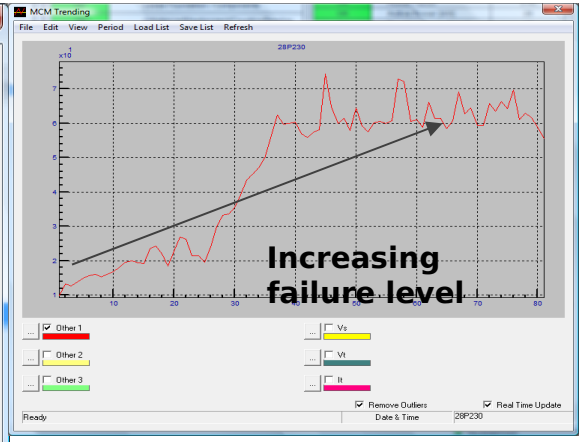
EXAMINE 1: There are developing mechanical and/or electrical fault(s) as shown below. Maintenance should be scheduled within three (3) months.

1.PSD (Power Spectral Density) plot indicates abnormalities. Faults should be identified by checking trends, PSD, and MCMSCADA diagnostic help. Alternately email artesis@artesis.com.

EQUIPMENT INFORMATION	
Equipment Name	28P230
Equipment Type	Pump
Nominal Voltage [V]	230
Nominal Current [A]	83
Rotation Spd. [rpm]	2985
MCM Address	32

DATABASE (Last Five Hours)	
Start Date	10/09/2009 12:40:16
End Date	10/09/2009 17:40:16
Number of Data Points	182
DATABASE (Full)	
Database Range	01/27/2000 - 10/27/2009
Number of Data Points	825 (824/825)

Plot | Report | Clear Selection | PSD | Auto
Load | Advanced | Help | Close
Step 16 Goto 825 Go



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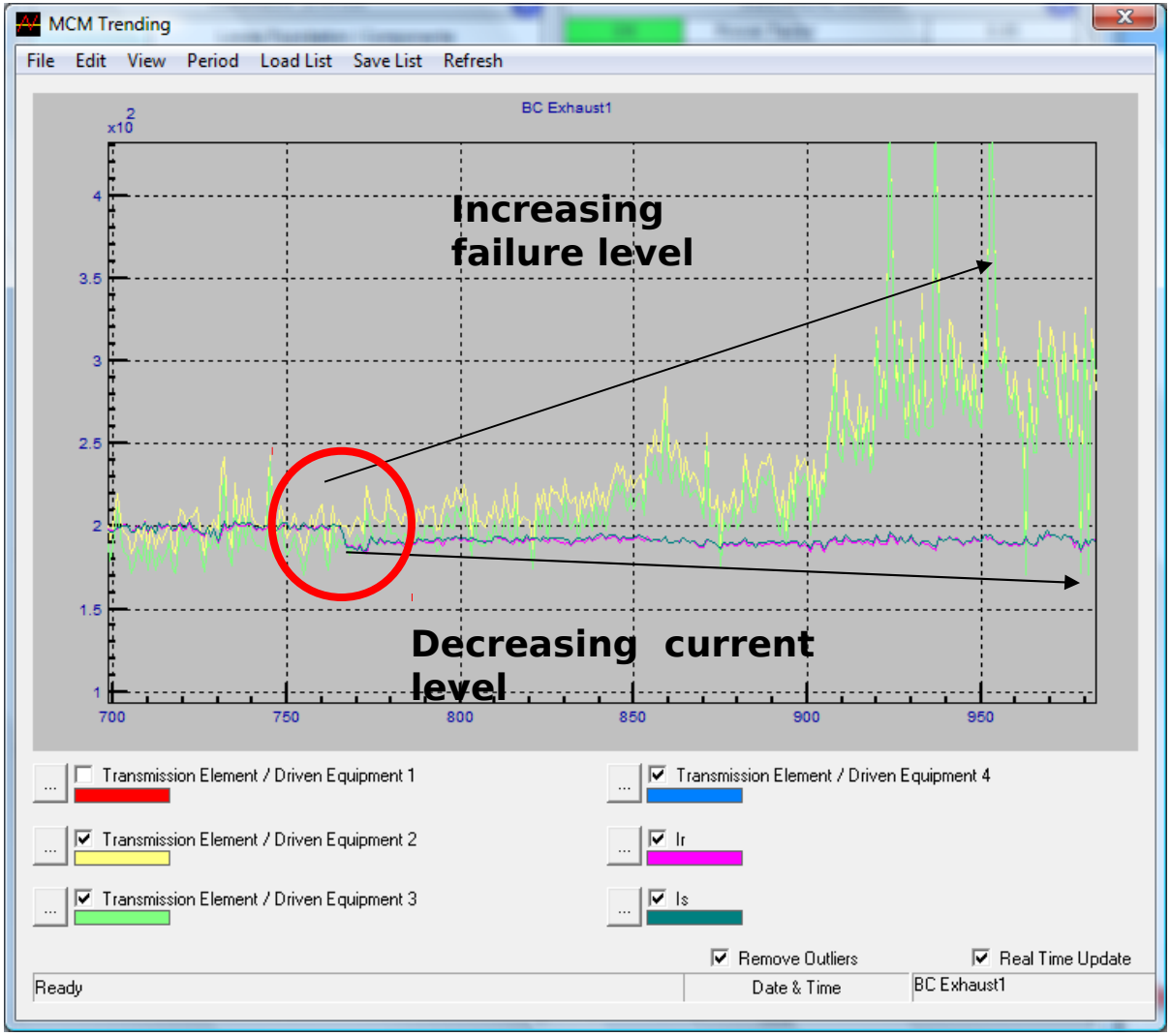
Cumra Sugar Plant
Cavitation

Konya Şeker is the biggest sugar producer in Turkey and it's newest factory is Cumra Sugar mill plant in Konya. They produce almost 50% of Turkey's sugar production. 55 equipment are monitored by MCM. One of them is deep well pump and it supplies fresh water to the process. Just after the LEARN period is over, MCM warned the user about a fault in "other" category. Cumra Sugar maintenance team dismantled the pump and checked for cavitation. The photos on the right shows the damage of cavitation which can be observed as small pits on pump blade.

Karsan Automotive
Belt Looseness

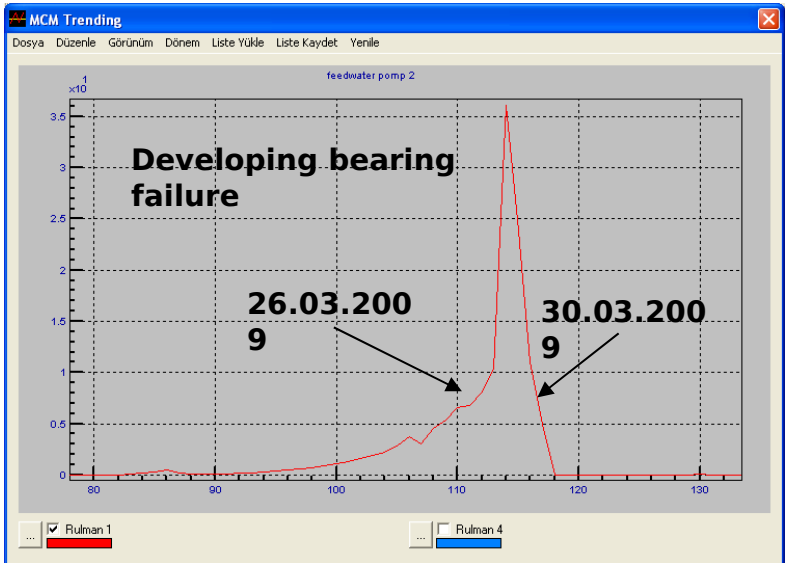


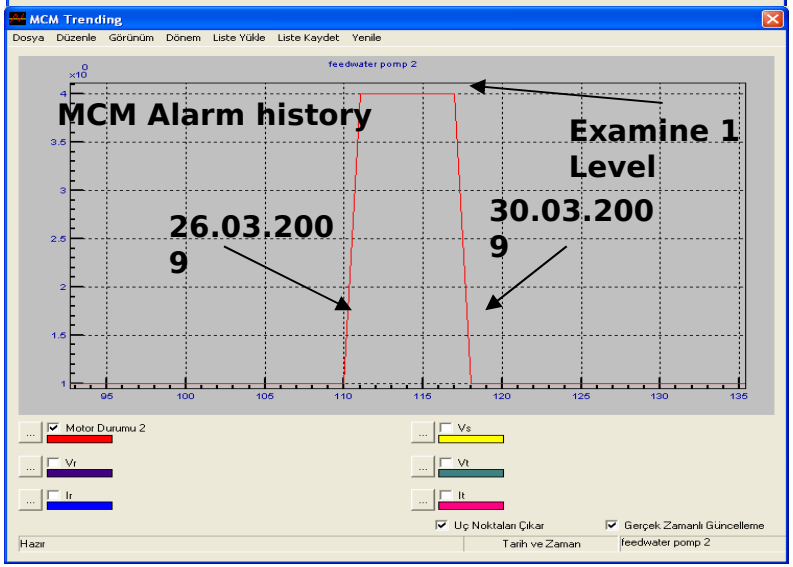
Karsan Automotive
Belt Looseness

Karsan, a leading in Turkish automotive industry. They manufacture some automotive models for Hyundai, Renault and Peugeot. MCM units are used in their paint shop. One of the equipmet MCM monitors is an exhaust fan that discharges air with paint particles. Power is transmitted by a belt to the fan. MCM indicated a transmission fault. The trending data indicates to a loose belt. This means motor slips due to belt looseness and can not transmit all the power to the fan as also indicated by decreas in the three phase currents. The performance degradation due to loose baelt is verified and corrected by Karsan maintenance team.

Nuh Energy
Bearing Failure

nuh
enerji elektrik üretim a.ş.





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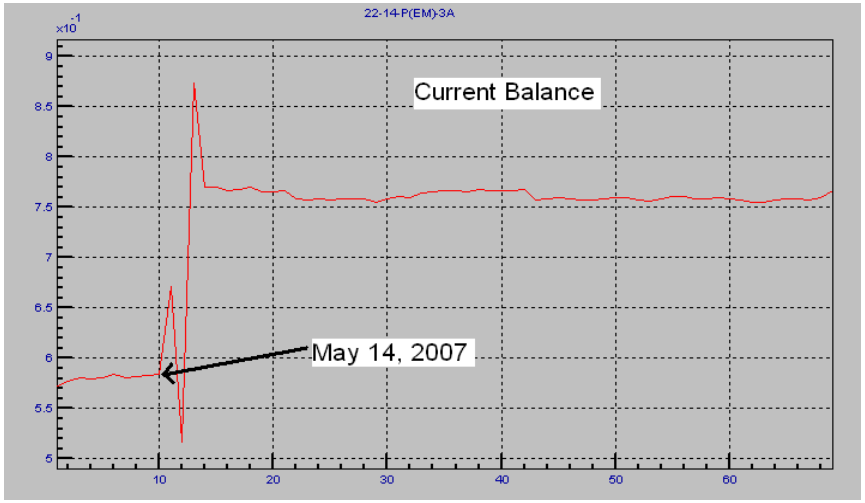
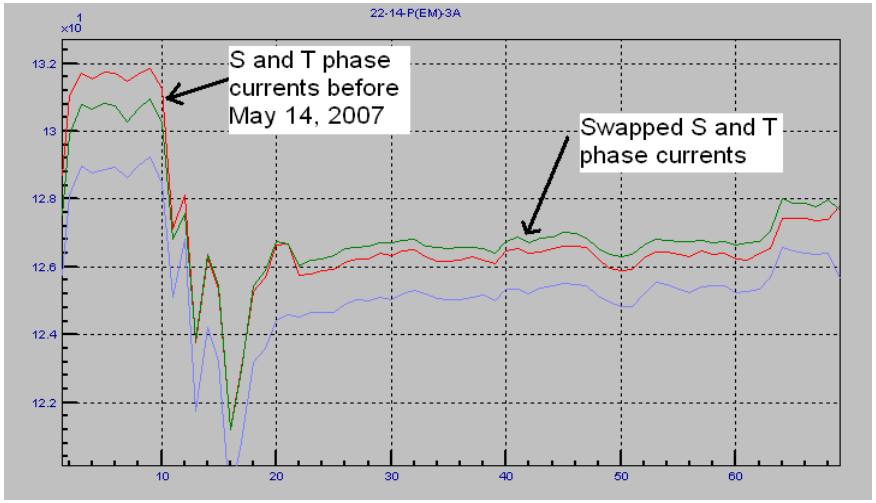
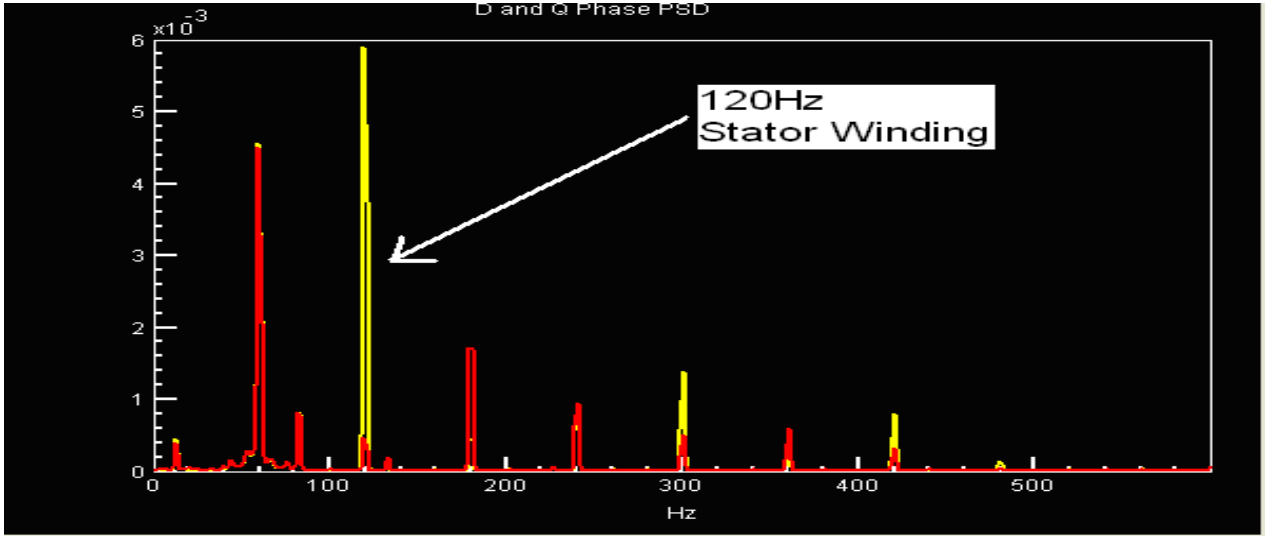
Nuh Energy
Bearing Failure

Nuh energy has 159 MW installed energy generation capacity. Nuh Energy maintenance team has been monitoring one of the feed water pump of the generator by MCM. One month after the installation, MCM indicated a developing “Bearing” fault. Maintenance team verified the bearing fault and replaced the bearing of the motor. After the maintenance action MCM stopped giving alarm verifying the effectiveness of the maintenance action.

Jubail Saline Water Conversion, Saudi Arabia
Stator Failure







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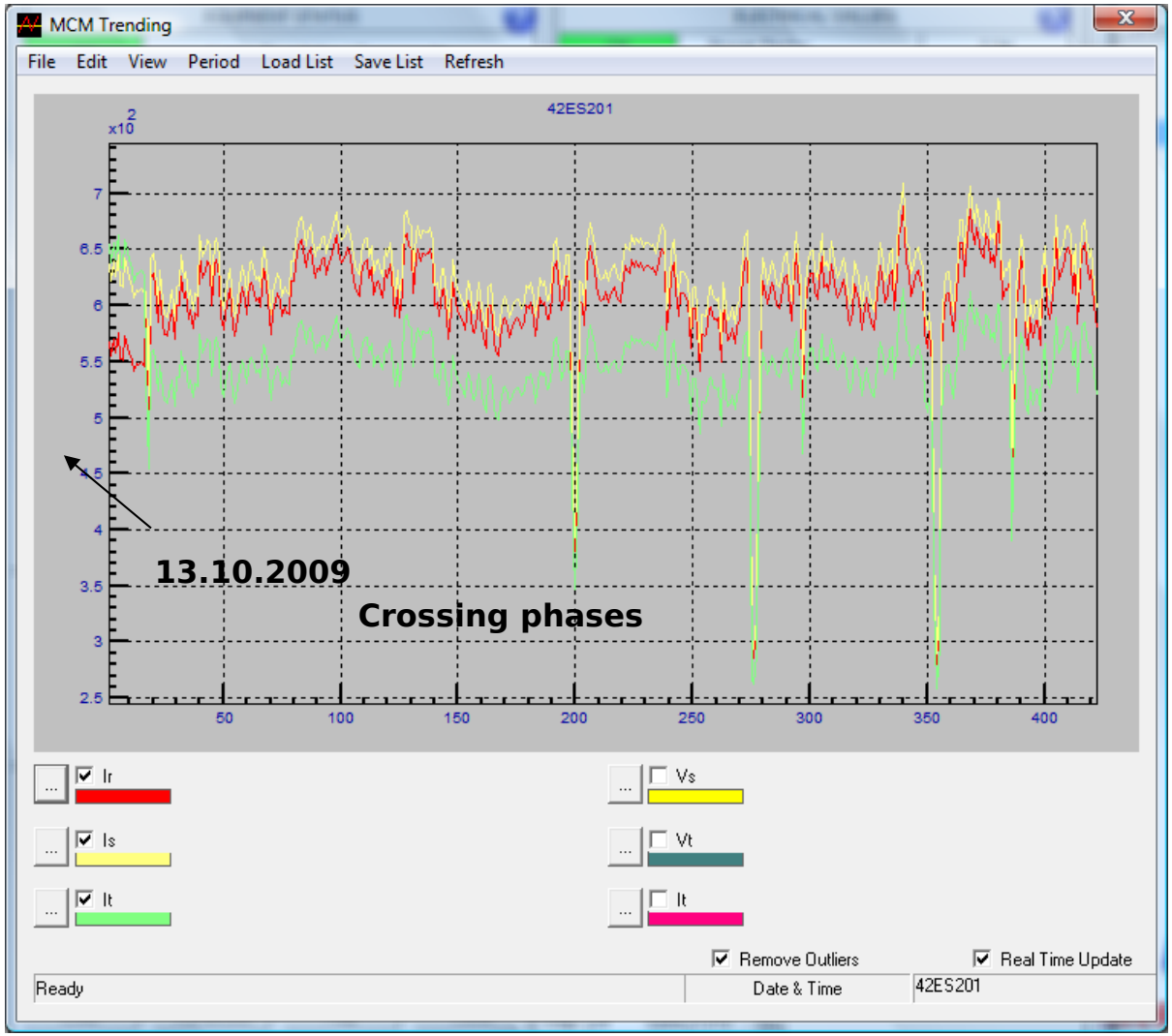
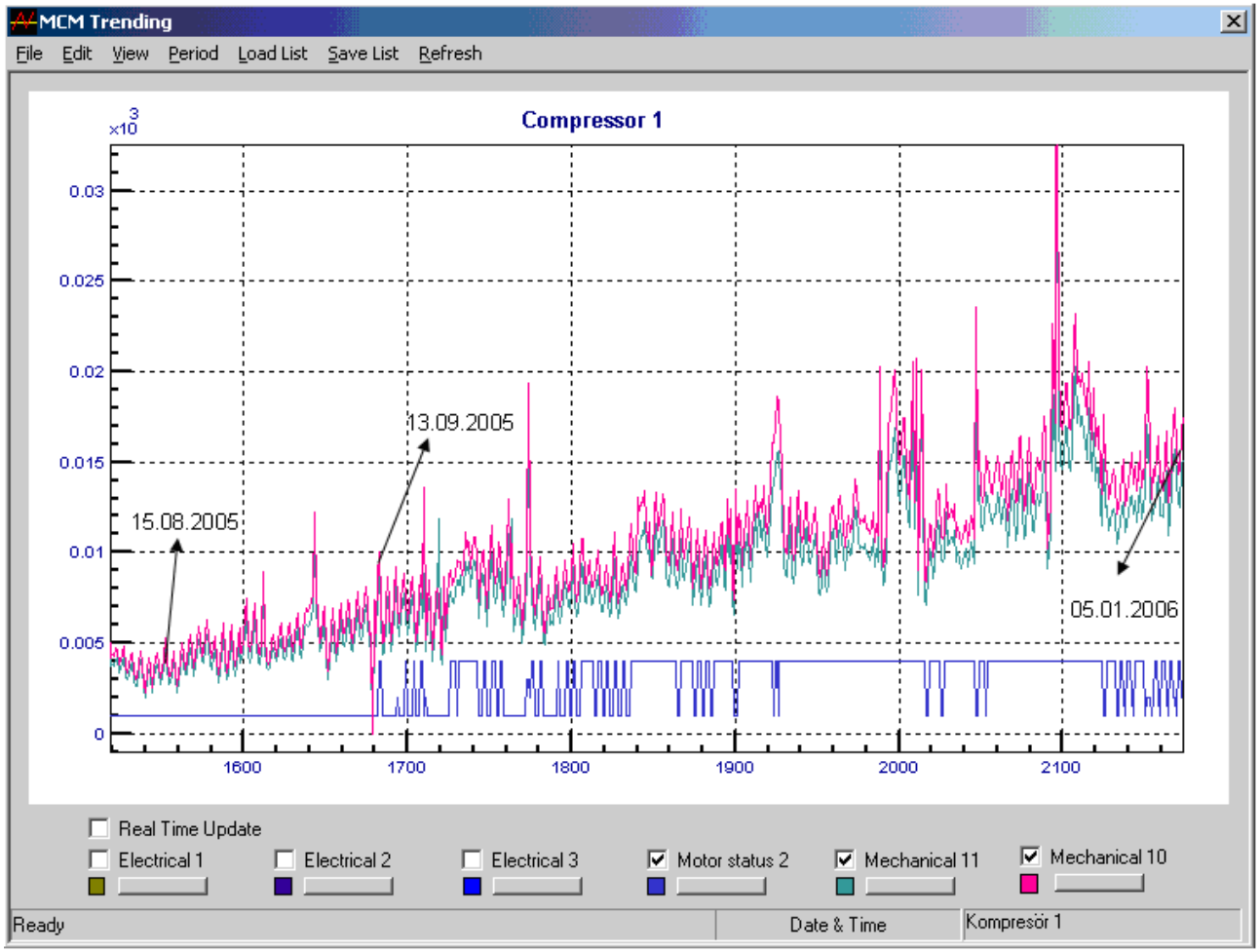
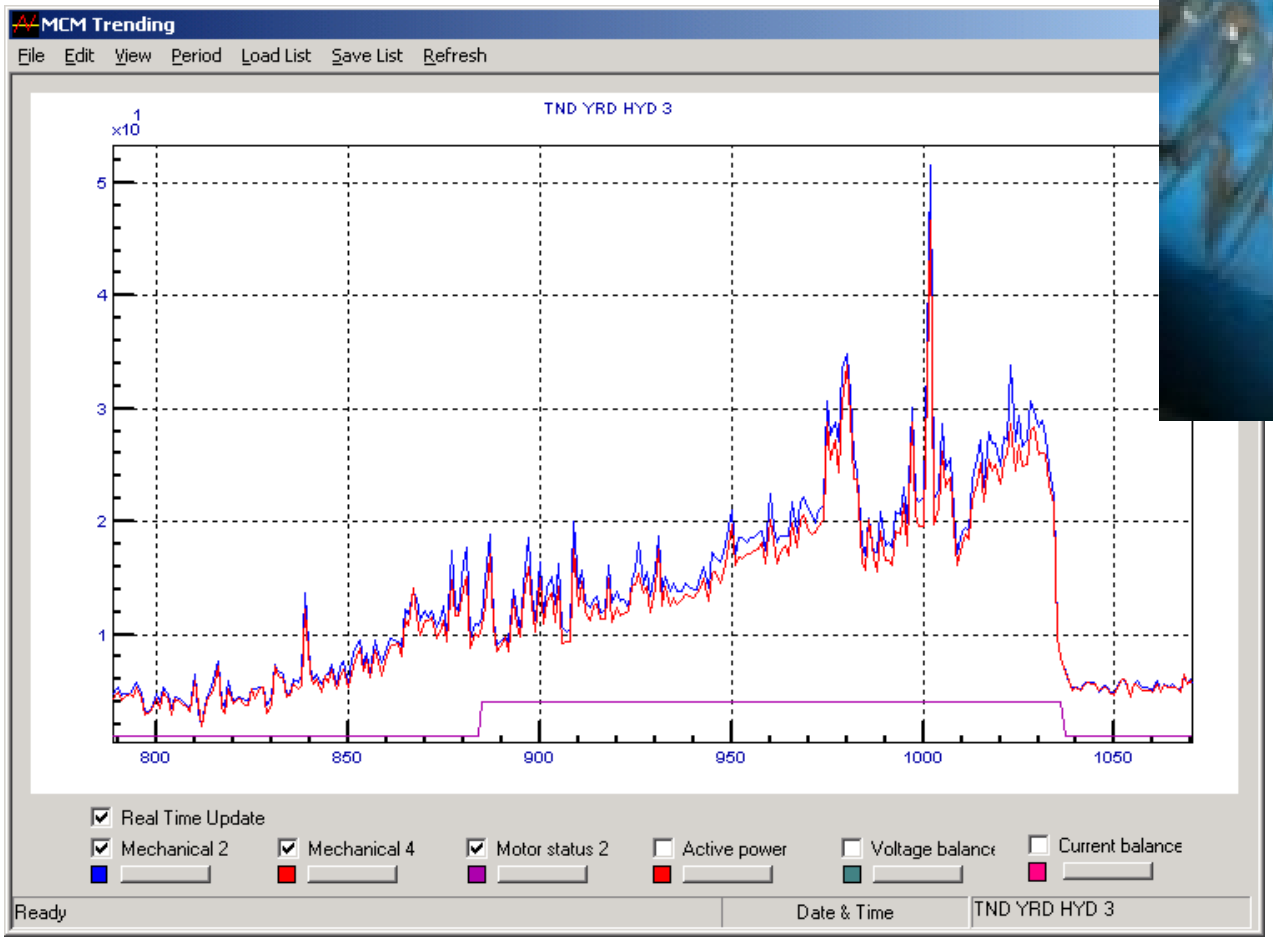
Cumra Sugar Plant
Stator Failure



Mutlu Battery
Compressor Bearing



Erdemir Iron and Steel Plant
Coupling Problem



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Arcelik Home Appliance
Phosphate Pump – Bearing Defect and Bent Shaft