CASE STUDY

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Replacing a preventive maintenance practice with predictive technology

GREENFIELD GLOBAL

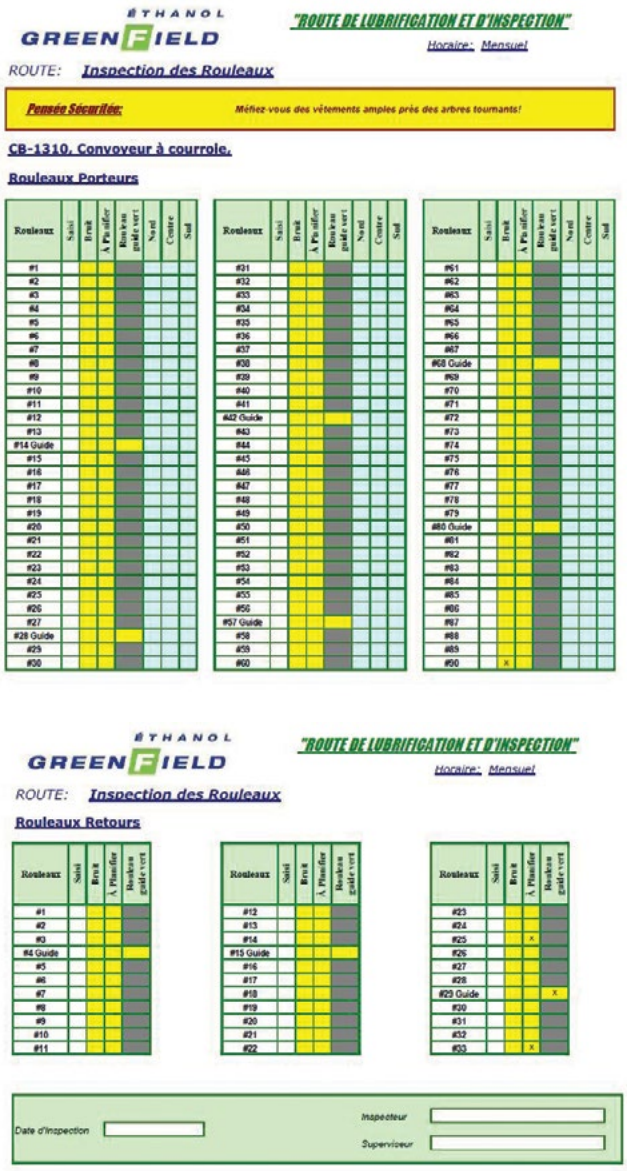
We have a 350-foot-long belt conveyor in our facility that contains 270 small bearing rolls, 33 return rollers in addition to the drive rollers and others.

Given the difficult and dangerous access to these rollers, they have been excluded from our vibration routes in the past.

To alleviate this situation, a preventive maintenance route was established.

Replacing a preventive maintenance practice with predictive technology

A person with a list of rolls, went on site to do a visual and auditory inspection, to determine which rolls to replace. This technique was long and dangerous since it was necessary to open each running conveyor cover to perform this PM. This practice was very subjective, and the results varied greatly from technician to technician.



ÉTHANOL GREEN FIELD

"ROUTE DE LUBRIFICATION ET D'INSPECTION"

Horaire: Mensuel

ROUTE: Inspection des Rouleaux

Pensée Sécuritée: Méfiez-vous des vêtements amples près des arbres tournants!

CB-1310, Convoyeur à courroie,

Rouleaux Porteurs

Rouleaux	Saisi	Bruit	À Planifier	Roulem. graisser vert	Nord	Centre	Sud
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#6							
#7							
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#9							
#10							
#11							
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#13							
#14 Guide							
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#28 Guide							
#29							
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Rouleaux	Saisi	Bruit	À Planifier	Roulem. graisser vert	Nord	Centre	Sud
#31							
#32							
#33							
#34							
#35							
#36							
#37							
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Rouleaux	Saisi	Bruit	À Planifier	Roulem. graisser vert	Nord	Centre	Sud
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#62							
#63							
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#66							
#67							
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#90		x					

ÉTHANOL GREEN FIELD

"ROUTE DE LUBRIFICATION ET D'INSPECTION"

Horaire: Mensuel

ROUTE: Inspection des Rouleaux

Rouleaux Retours

Rouleaux	Saisi	Bruit	À Planifier	Roulem. graisser vert
#1				
#2				
#3				
#4 Guide				
#5				
#6				
#7				
#8				
#9				
#10				
#11				
#12				
#13				
#14				
#15 Guide				
#16				
#17				
#18				
#19				
#20				
#21				
#22				
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#25			x	
#26				
#27				
#28				
#29 Guide				x
#30				
#31				
#32				
#33			x	

Date d'inspection

Inspecteur

Superviseur

Two years ago, we upgraded our existing SDT170 ultrasound instrument with a new SDT270 which included trending and analysis software. In the past, we used ultrasound only for air leak detection and for lubrication routes. Now, with the help of the Ultranalysis Suite Software, our use of ultrasound is getting closer to our vibration techniques.

We began by measuring several pieces of equipment with our ultrasound unit to familiarize ourselves with the equipment and software. We quickly realized that the software was limited compared to a vibration analysis software. However, it remains as an excellent working tool.

Since our vibration program is important in the plant, I wanted to integrate ultrasound into our existing predictive maintenance practices. That's when we came up with the idea of using it on our CB-1310 conveyor. At first, in 2016, we built a route only at the level of the return rollers. A reading on the roll frame gave us good signal quality for the application.

At this time, the previously established preventive maintenance route was still performed. We used these latest inspections to establish a basic level of alarm in dBuV. By comparing the two routes for a few months, we arrived at similar results. Subsequently, we refined our alarms to make sure we could see the problems in advance. Following the satisfactory results obtained, we applied the same method on the carrier rollers without even opening the covers.

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After a dozen collections, we can say today that the results are very promising.

After a dozen collections, we can say today that the results are very promising. One year ago, since implementing this new ultrasonic strategy, we no longer need to do the preventive maintenance route.

Since I am a vibration analysis technician, I use ultrasound by applying the same techniques I use in vibration. In both cases, I analyze the time waveform and / or spectral (FFT) except that I am measuring ultrasound instead of displacement (vibrations).

Here are some examples of defects found on our rolls. Unfortunately, for our carrier rollers, I check three rolls at a single reading point and I can not say precisely which one is in fault. These rolls are manufactured with two bearings 6304-2RS / C3 and it is the outer ring of the bearing that rotates at a speed of 238 rpm.

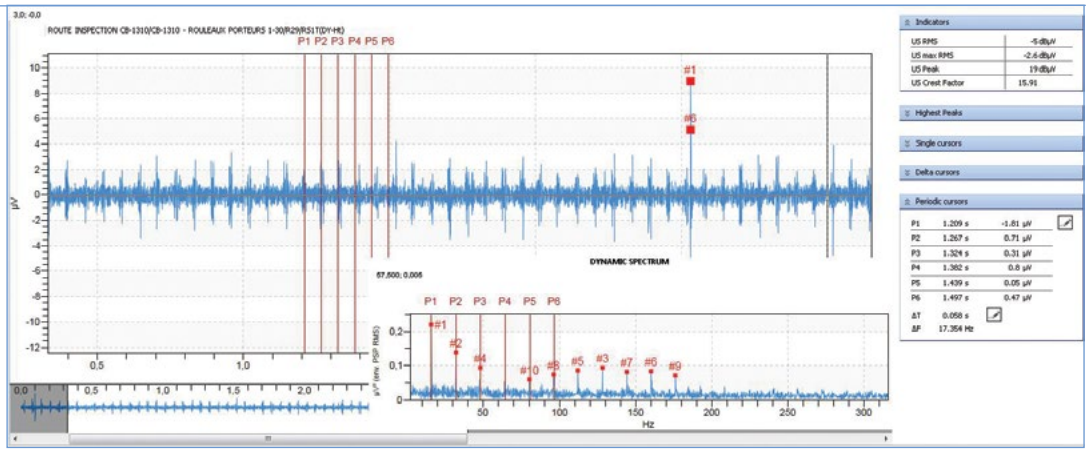
These are the default frequencies for a SKF 6304 bearing:

f_e Rotational frequency of the outer ring	3.97 Hz
f_c Rotational frequency of the rolling element and cage assembly	2.51 Hz
f_r Rotational frequency of a rolling element about its own axis	6.97 Hz
f_{ip} Over-rolling frequency of one point on the inner ring	17.6 Hz
f_{ep} Over-rolling frequency of one point on the outer ring	10.2 Hz
f_{rp} Over-rolling frequency of one point on a rolling element	13.9 Hz

Replacing a preventive maintenance practice with predictive technology

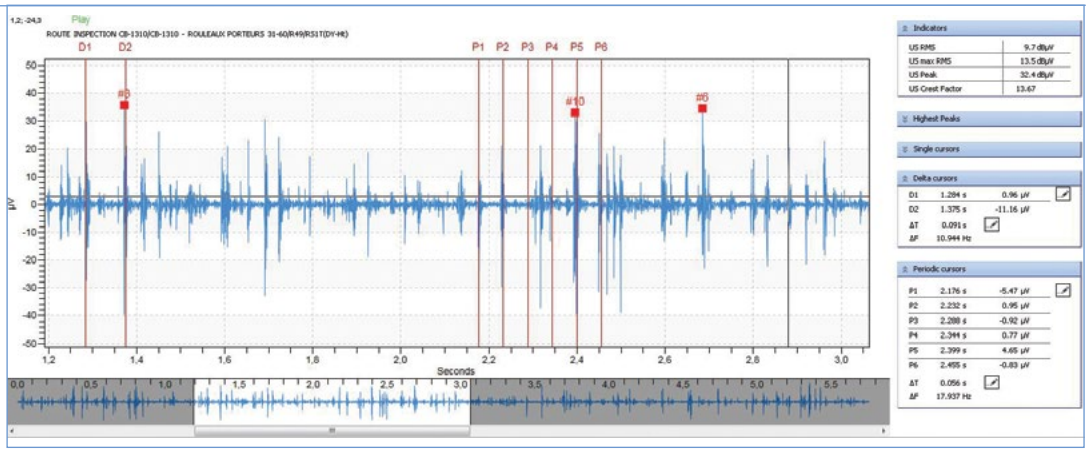
January 3, 2018

Roller Bearing R29 Internal Rolling Cage Failure (BPFI).



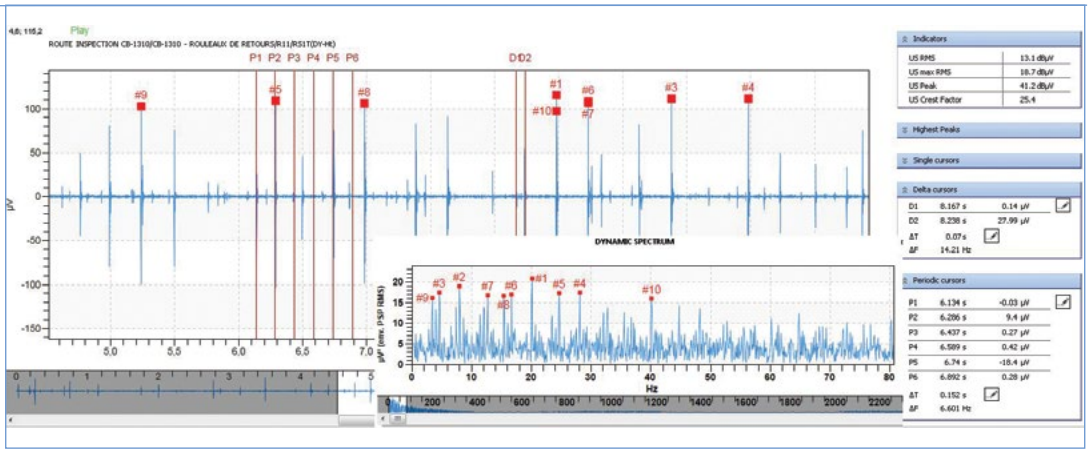
January 25, 2017

Roller bearing R49 presence of internal and external bearing failure (BPFI and BPFO) may be that it was on two different rolls.



August 20, 2018

Roller back R11 bearing ball bearing frequency (BSF)



During the analysis, we see on neighbouring readings the presence of the roll in fault but at lower amplitude. This helps us confirm the faulty roll section. Of course, there are many other parameters to consider, such as dirty rolls and the like. Listening to the time wave also helps to confirm a potential problem.

In conclusion, the program is working very well and the alarm level currently set allows us to identify each time there is an appearance of a defect on a roll. We do not really need to identify the specific fault of the bearing each time because the rolls are not expensive enough to spend so much time.