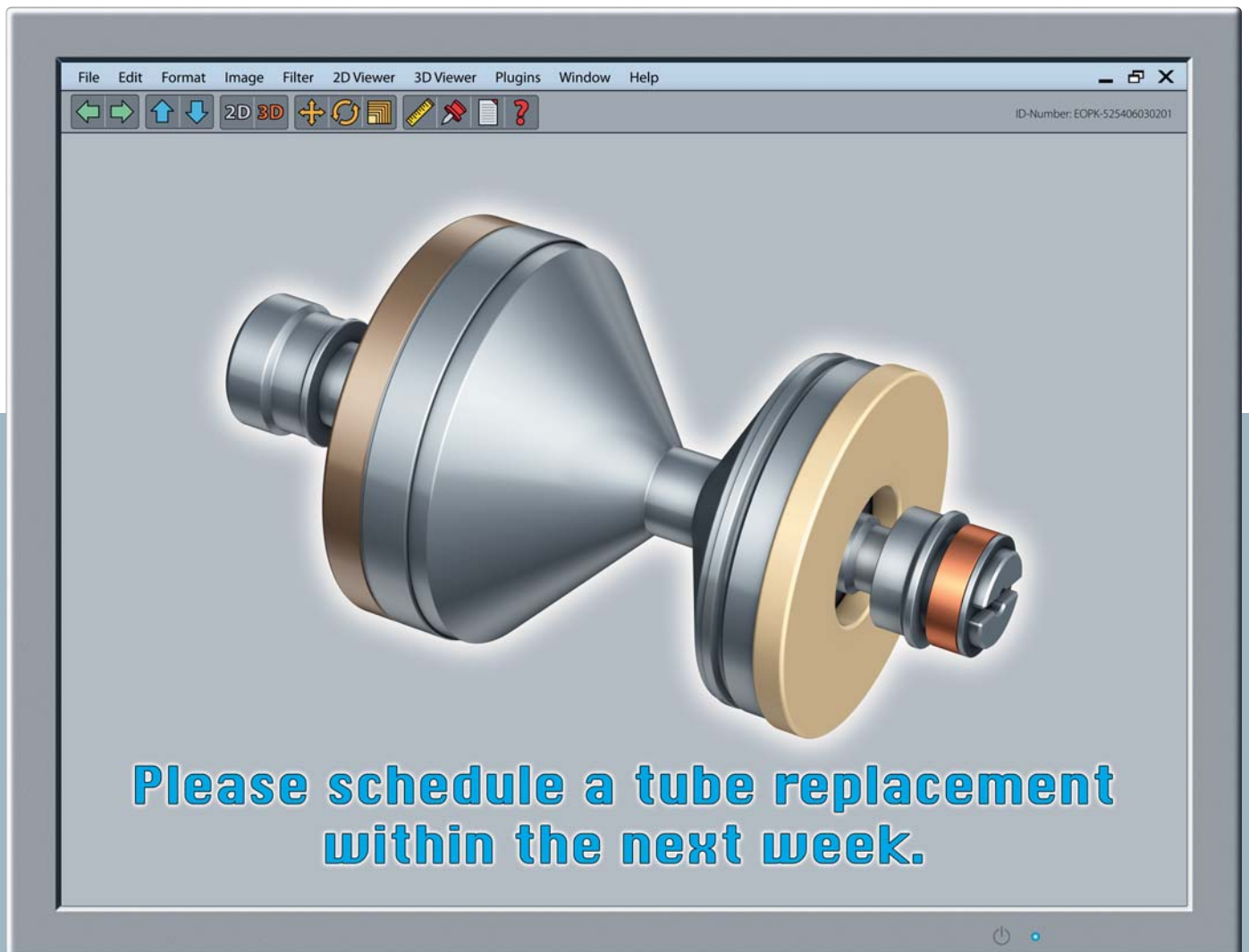


Proactive Tube Failure Prediction

China's renowned Shandong Medical Imaging Research Institute has been relying on Siemens for most of its computed tomography equipment since 1984. When the facility decided to put its latest service innovation, the Guardian Program including TubeGuard, to the test, the results were both positive and enlightening.

By Justus Krüger



Professor Xu Zhuodong and his team of 20 doctors and technicians work a very busy schedule. "On an average day, we have about 200 patients in need of a computed tomography [CT] scan," he says. Xu is Head of the CT Department at Shandong Medical Imaging Research Institute, affiliated with the Shandong University Qilu Hospital. The hospital, located in Jinan City, the capital of Shandong Province, is among the best in China; the research institute is unique in the country. Xu and his colleagues are working with state-of-the-art technology. Since 1984, the institute has been relying on Siemens for most of its medical imaging equipment.

Due to the excellent reputation of the institute and its position as a leader in medical imaging, Xu and his team – as well as the systems they are operating – are constantly working at full capacity. The CT scanners are in regular operation from eight in the morning until nine in the evening. In addition, the hospital's emergency department makes use of the top-notch equipment in Xu's department whenever there is a need for the sophisticated technology. Consequently, the CT scanners and other imaging equipment have to be available 24 hours a day, on every day of the year. That means the systems have to be extremely reliable. "A smooth workflow is absolutely central for us," says Xu. "We want our patients to be satisfied, so the downtime of our equipment needs to be kept at a minimum."

This is why normal wear and tear can constitute a challenge. CT tubes, a part absolutely vital to system availability, have a limited lifespan. This is not due to any malfunction in the system. Rather, at some point in time, the tubes are simply worn out and the timing of the failure cannot be predicted.

Preventing "Hard Down"

That was the status – until Siemens introduced the Siemens Guardian Program™ including TubeGuard at the beginning of 2009. As an additional service offered by the Guardian Program, TubeGuard can predict the majority of all potential CT tube failures within the SOMATOM®



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Professor Xu Zhuodong, MD,
Head, CT Department,
Shandong Medical Imaging Research
Institute, Jinan City, China

Definition family. As a result, tube breakdowns, or "hard downs," are avoided, permitting instead a proactive tube exchange or "soft down."

The benefit for the users: With TubeGuard, downtime becomes more predictable. That means a lower risk of workflow disruption and consequently, higher patient satisfaction. Planning downtimes ahead of time also means potentially less revenue loss, proactive rescheduling of patients and staff, and a safeguard for the users' reputation.

Once TubeGuard has been installed, sensors proactively monitor the tube functions via real-time data flow with Siemens Remote Service (SRS) – the efficient and comprehensive infrastructure for medical equipment-related remote services. Based on TubeGuard's complex algorithms and customer-specific system usage data, qualified SRS tube monitoring experts perform an ongoing assessment of remaining tube life. One example of monitoring is the measurement of cooling performance. The measurement via SRS is based on sensor data of oil temperature, gantry temperature, and

oil pressure. If the cooling performance falls under defined limits and the tube could possibly fail, the customer will be informed within a specific time limit. As a result, the tube change can be made during a planned service visit, such as during prescheduled system maintenance – without causing unnecessary downtime, delays, and interruptions in workflow for Xu and his team.

Putting TubeGuard to the Test

When Xu first began working with TubeGuard, however, he wanted to find out for himself how precise the information obtained through it really was. "We were right in the middle of an extensive examination when we received a call from the Siemens Service Center telling us that our tube would fail within the next week," he says. "Since it was the first time that we had received this kind of information, we did not immediately schedule the tube exchange. Instead, as agreed with Siemens, we observed the system to find out whether there would actually be a failure within the next few days – as a kind of validation



The CT scanners are in operation from eight in the morning until nine in the evening.

of TubeGuard. And this was exactly the case: In the following days, we actually had problems with the tube, and ten days after the end of the time limit, the emitter had a complete breakdown, as predicted. We were pleased – and convinced that TubeGuard worked. Brilliant!” TubeGuard means tangible benefits for the institute. “We have a significantly smaller risk of unscheduled downtime,” says Xu. “This means that we do not need to disrupt our schedule for repair work. If Siemens gives us a call today and predicts that one particular tube will break within the next few days, we can have a Siemens engineer come over that very evening. He can change the tube outside of our regular working hours. The next morning, we just continue our work with our patients. Nobody needs to wait.” Avoiding disruptions of the clinical workflow is important for every medical service provider. It is especially significant for a facility like the Shandong Medical Imaging Research Institute and its CT department, because of the high percentage of outpatients among the people in Xu’s care. They come from all parts of

Shandong Province, sometimes traveling considerable distances to come for a scheduled CT scanning session. Of the approximately 200 patients served by Xu and his team every day, more than 80 receive diagnostic services that require the injection of contrast agents before scanning to enhance the visibility of blood vessels and tumors. Xu explains this procedure can be necessary, for instance, to establish whether a tumor is benign or not. Because these patients are often under considerable psychological strain, rescheduling caused by a tube breakdown may lead to further distress for them. “Such problems are very annoying for a patient,” says Xu. “And, this is precisely the sort of problem that TubeGuard helps to prevent.”

Protecting a Good Reputation

According to Xu, the Shandong Medical Imaging Research Institute has always had an excellent relationship with Siemens – even before TubeGuard was available. “In the event of a tube failure, Siemens engineers would be onsite on the very same day and fix the problem for us,” he says.

However, an unscheduled hard down could take between two and three days to fix, posing a serious disruption in the tightly scheduled workflow of Xu and his colleagues. “One scanner’s breakdown would cost us around 3,000 euros per day,” he explains. “The money is not the main problem, though. The most important thing for us is our institute’s reputation, and, above all, the satisfaction of our patients.”

Founded in 1975, the Shandong Medical Imaging Research Institute not only diagnoses patients, but also conducts clinical and medical research. Today, the institute has more than 265 staff members, including 89 professors and associate professors as well as 49 graduate students. “Our facility has a unique standing in China,” says Professor Wu Lebing, President of the Institute. “We have been using Siemens’ equipment for a quarter century now,” he adds, “and the ratio of Siemens’ systems in the mix has been rising steadily. That is, of course, due to the quality of the equipment – but also due to the

Summary

Challenge:

- Accommodating approximately 200 patients in need of a CT scan daily, many traveling considerable distances
- Keeping CT and other imaging equipment up and running with minimum downtime despite heavy wear and tear
- Maintaining the excellent reputation of Shandong Medical Imaging Research Institute
- Maintaining patient satisfaction and comfort level

Solution:

- Siemens Guardian Program including TubeGuard for predicting and proactively avoiding potential CT tube failures
- Ongoing assessment via proactive and real-time remote monitoring with Siemens Remote Service
- Quality equipment backed up by quality service

Result:

- Ability to have necessary tube changes done during prescheduled service calls
- Disruptions of clinical workflow avoided
- Smaller risk of unscheduled downtime
- No breakdowns equals no waiting for patients
- Less revenue loss

quality of the service, which is equally important.”

The Siemens Guardian Program including TubeGuard makes this service even better. “With TubeGuard, Siemens has become the first company to provide real, scheduled, proactive service for CT tubes,” says Xu. “It’s a revolutionary innovation.”

Justus Krüger lives in Hong Kong and Beijing. He works as a China correspondent for the Berliner Zeitung newspaper.

Further Information

www.siemens.com/tubeguard