



# SKF Engineering Simulation Services

## Benefits

- Reduce unplanned downtime
- Reduce maintenance and repair costs
- Reduce vibration levels and energy use
- Optimize current machinery operation and production
- Help increase safety

## Typical applications

- Steel and concrete structures
- Foundations
- Stationary machinery
- Mobile machinery

## Diagnosing structural and machinery problems accurately and cost-effectively

For many facilities, cracks and excessive displacement in machinery structures, or cracks in machinery frames and shafting, can cause excessive noise and vibration, as well as increased energy use and safety risks. Eventually, these problems can lead to unplanned shutdowns, plus high maintenance, repairs and lost production costs.

Unfortunately, the techniques often used to detect and correct these problems – standard vibration analysis, numerical structural analysis using theoretical inputs, or simple trial and error – can be costly, time-consuming and ineffective. SKF Engineering Simulation Services offers a better solution.

## Collecting field measurements for comprehensive simulations

Instead of using theoretical inputs to generate a structural analysis, SKF Engineering Simulation Services uses dynamic, time-based vibration data captured during machine operation.

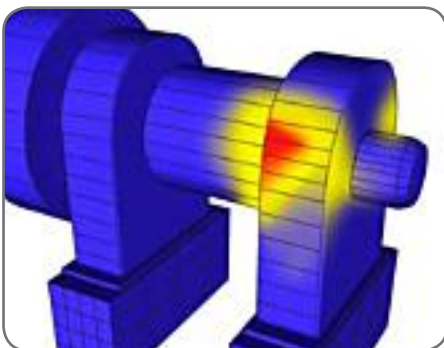


SKF engineers collect machine and structural field vibration measurements and use them as input for a comprehensive simulation analysis, which includes modal analysis, Operational Deflection Shapes (ODS) analysis, Finite Element Analysis (FEA) and simulations in proprietary SKF software programs.

## Identifying and solving problems through advanced analysis

Combined, these analyses enable SKF to identify points of excessive deflection or weakness on the machinery and surrounding structures. Once these areas have been identified, SKF can model different solutions to solve the problem.

SKF engineers can simulate the effects of changing the stiffness, loading and, if applicable, rotational speeds of the structure. They can then offer recommendations to reduce or eliminate structural vibration and deflection to optimize production. Once the improvements have been implemented, SKF can then capture further field measurements to validate the solution.



*SKF Engineering Simulation Services identifies structural weak spots. Here, the red area indicates high deflections on a pinion bearing housing.*



## Increase the return on your maintenance investment with SKF.

The whole idea behind the SKF 360° Solution is to help you get more out of your plant machinery and equipment investment. This may mean lowering your maintenance costs, raising your productivity, or both! Here's an example of the SKF 360° Solution at work in the mining and mineral processing industry.

### SKF saves mining company nearly \$1 million per year in unplanned shutdowns



#### The challenge

A Latin American mining facility was suffering repeated unplanned shutdowns in its SAG mill. The company had been enduring these for several years, along with resulting lost production costs of \$960 000 annually.

All the while, vibration levels in the mill were growing steadily worse. Unsure of the cause of the failures, even after consulting with several local experts, the company looked to SKF for answers.

#### The SKF solution

After capturing a range of machine operating data, SKF Engineering Simulation Services engineers applied it to a series of advanced analyses, including Vibration analysis, Operating Deflection Shape analysis and Finite Element Analysis.

The investigation revealed that years of service under heavy loads had caused the pinion bearing housings to loosen

and lose stiffness. Additionally, the steel frame embedded in the foundation of the electric motor was structurally weak. SKF proposed stiffer bearing housings for the pinion shaft and recommended stiffening the steel frame of the drive motor.

#### The result

The proposed SKF solution eliminated the unplanned shutdowns and, following modifications, even boosted production capability by 2%, resulting in a revenue of \$680 000 in the first year alone.

### Return on Investment (ROI) summary\*

Lost production (unplanned downtime) costs per year . . . . .	\$960 000
Total investment in SKF solution. . . . .	\$280 000
Engineering Simulation Services work . . . . .	\$30 000
Replacement pinion bearings & housings . . . . .	\$250 000
<b>Total ROI . . . . .</b>	<b>243%</b>

\*All numbers are rounded off and based on customer estimates. Your particular cost savings may vary.

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