

Knovel®

AEROSPACE AND DEFENSE

## Solution Story: Engineer solves crisis that arises during testing of military avionics equipment

Knovel helps pinpoint the cause of an engine cracking problem, keeping a project on schedule



### Summary

When a large conglomerate that focuses on products for the aerospace industry switched a project to a new testing location, the motor they were calibrating began to develop cracks that led to failure.

One engineer hypothesized that the introduction of a new calibration fluid was the root cause. With the help of Knovel's technical references and problem-solving capabilities, the engineer quickly proved that the new fluid caused the cracking, rescuing the project in a matter of days.

## She turned to Knovel, which provided the tools she needed to find the relevant answers to verify her hypothesis.

### Challenge

A large multinational conglomerate that focuses on products for the aerospace industry makes auxiliary power units and other aviation components, such as pumps and engines, for commercial and military aircraft manufacturers. In close collaboration with a client, the company was co-developing a hydraulic motor for an actuator in a military jet.

The motor required extensive bench testing and calibration using a working calibration fluid, whose properties were comparable to those of in-flight jet fuel—except that the calibration fluid was less flammable. Several months into the calibration phase, the client moved the testing to a new facility and decided to change calibration fluids.

At the new facility, the motor began to crack and fail during testing. No one on the team was certain of the cause, although engineer Inez Dou\* had a strong suspicion. With a tight timeline and a significant investment on the line, the company assigned her to pinpoint the cause of the problem and put a stop to the motor failures.



\* For confidentiality purposes, names have been changed

# The information in Knovel and the data insights it catalyzed helped the engineer prove that the new calibration fluid was the cause of the cracking problem.

## Solution

Dou believed that she could demonstrate the new calibration fluid was causing the cracking by analyzing the fluid's behavior at very high temperatures and speeds, such as those produced by the motor's pistons and other metallic parts during testing. She turned to Knovel, which provided the tools she needed to find the relevant answers to verify her hypothesis.

Fast search and aggregated engineering information helped her quickly find foundational knowledge about materials and properties relevant to the calibration fluid and engine parts.

Knovel also surfaced a set of interactive equations that Dou used to calculate the temperature at the precise point where the fluid came into contact with the motor's metal components. These complex equations incorporated a range of heat transfer and lubrication concepts, relating thermal energy transported by the movement of the liquid to the thermal energy conducted away from the region of contact, where energy was dissipated by friction.

The information in Knovel and the data insights it catalyzed helped the engineer

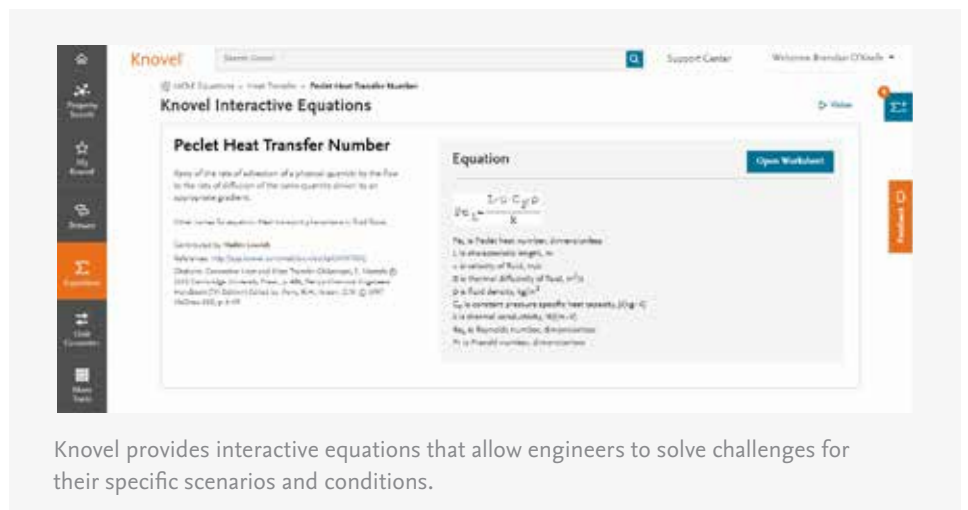
prove that the new calibration fluid was the cause of the cracking problem. She recommended that the client use a different calibration fluid in the bench tests.

## Business Impact

With the assistance of Knovel's extensive library of technical resources and search features, the engineer was able to quickly zero in on the equations relevant to her hypothesis. These resources helped her to prove that using a different calibration fluid would eliminate the cause of thermal cracking and motor failure.

Knovel also enabled Dou to identify and suggest a standard calibration fluid that would allow the motor to function as intended. In combination with the engineer's mathematical explanation of the problem's root cause, this input helped convince the client to switch to another fluid.

Once the calibration fluid was replaced, the motor behaved exactly as the engineer had predicted, thus validating the accuracy and precision of her analyses conducted with Knovel's help. The remainder of the testing phase proceeded on schedule, keeping pace with the project's rigorous military timeline.



Knovel provides interactive equations that allow engineers to solve challenges for their specific scenarios and conditions.

## Knovel

Knovel helps oil & gas businesses minimize risk while maximizing output and efficiency by providing engineers access to technical reference materials and interactive tools for developing and managing projects with greater efficiency and certainty.

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