

KNOWLEDGE-BASED ENGINEERING (KBE)

Key product-development technology to enhance competitiveness



Overview

Today's competitive environment demands innovative ideas to bring high quality products to the market in a short time – especially in the context of engineering products, in the aerospace and automotive industry, most of which, are highly knowledge and experience driven. Even today, a significant portion of this knowledge base still exists in the form of tacit knowledge within the heads of experienced engineers, who specialize in niched disciplines.

Knowledge-based engineering (KBE) is an engineering product-development technology, wherein the knowledge of the engineering products and their design processes are captured and embedded into a software system (known as a KBE system), which is then used in the design and development of similar new products. This is product-specific, generic engineering knowledge captured and represented as a product model within the KBE system (suite of KBE applications). These KBE applications are then used by the designers to generate a new, but similar product design for a different set of input specifications. In fact, these KBE applications can be reused to generate as many new, but similar product designs, as one may require.



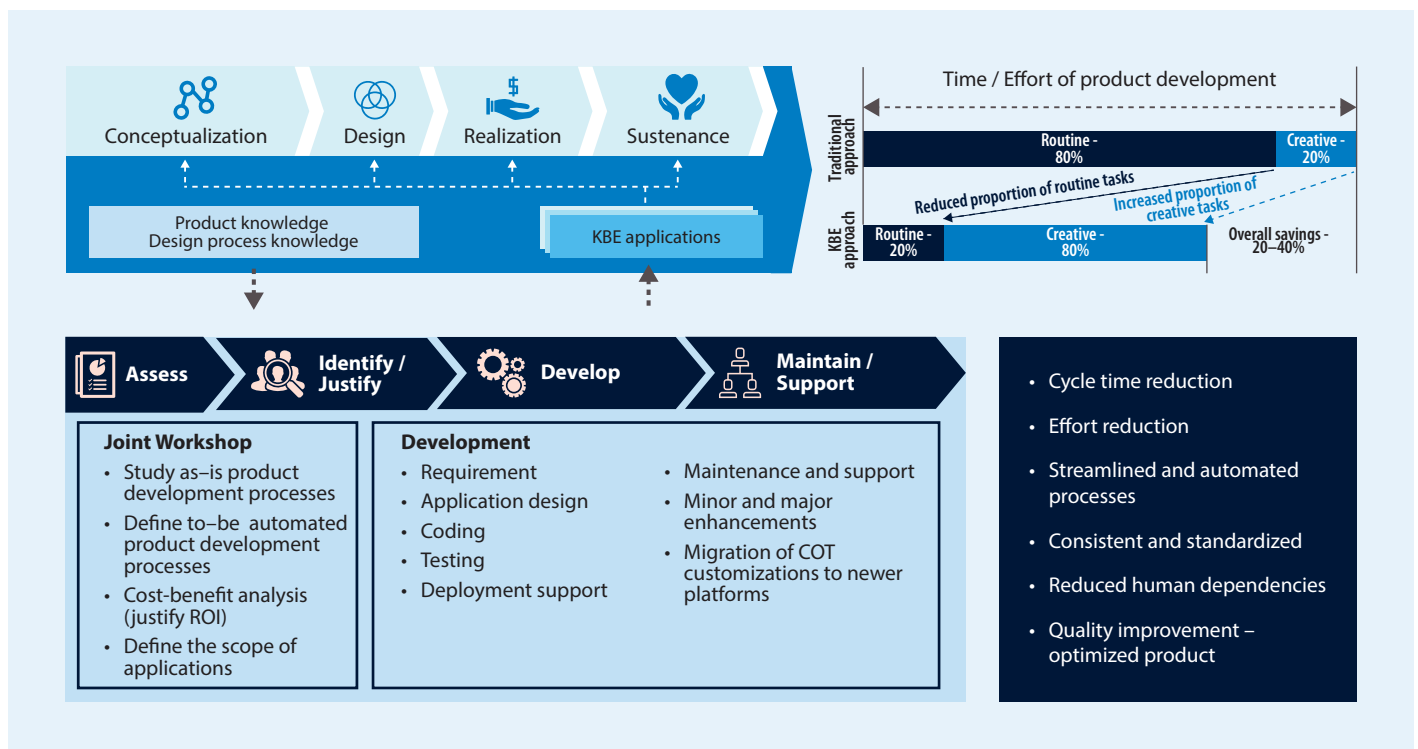
KBE service offerings

Infosys KBE offerings are centered on the core value-creation process for manufacturing industries, such as automotive, aerospace, power, and heavy engineering. The following are the KBE services offered, covering end-to-end engineering product life cycle, and cutting across various industry verticals:

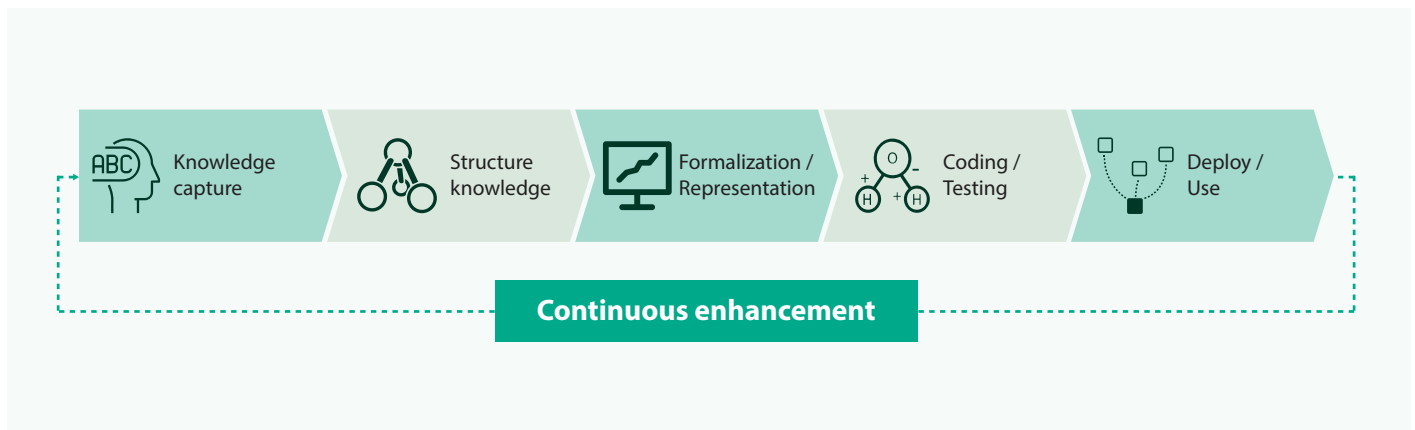
- **KBE system consulting**
 - a. KBE strategy development
 - b. Define KBE-based processes for product development (PD)
 - c. Study the existing PD processes and identify opportunities to improve them using KBE
- **KBE application development**
 - a. Automation of design, analysis, manufacturing simulation, and data generation
 - b. Customization of CAD / CAE / CAM / CAX tools to improve the product development process
 - c. Product development process integration across disciplines
 - d. KBE-based configurator development and customization
- **KBE application maintenance**
 - a. KBE application portfolio management and rationalization
 - b. KBE application migration from lower CAD / CAE / CAM / CAX platforms to higher platforms
 - c. KBE application maintenance

In addition to domain knowledge in engineering product development (EPD), our KBE competencies also include geometric modeling, graphics and visualization, mathematical modeling, optimization and simulation, engineering-knowledge modeling, and representation. Although the manufacturing industry is our primary focus, we also engage with clients in other industries such as the process industry and retail, on projects that require our KBE-specific competencies.

KBE approach and value proposition



KBE application development process



KBE value proposition

- Reducing product development cycle time by automating routine design activities
- Improving the quality of the products
- Capturing engineering expertise and reuse

- Enabling concurrent engineering

KBE is continuously evolving with advances in knowledge-based systems and artificial intelligence techniques, utilizing the best software and CAX technologies to improve

engineering product development processes. We are also working on the Infosys Knowledge Platform (IKP) to capture and formalize knowledge, and also to automate the process of KBE application development.

Did you know - Infosys helped develop floor beams for a major aircraft OEM?

Challenge:

The program involved the design and development of 70+ floor beams for two sections of a commercial aircraft. This involved both sizing as well as the detailed design of all floor beams along with their different sub-components. The start of the program was delayed by over ten months, and a major challenge was to meet the program's timelines despite the significant delay in starting the development.

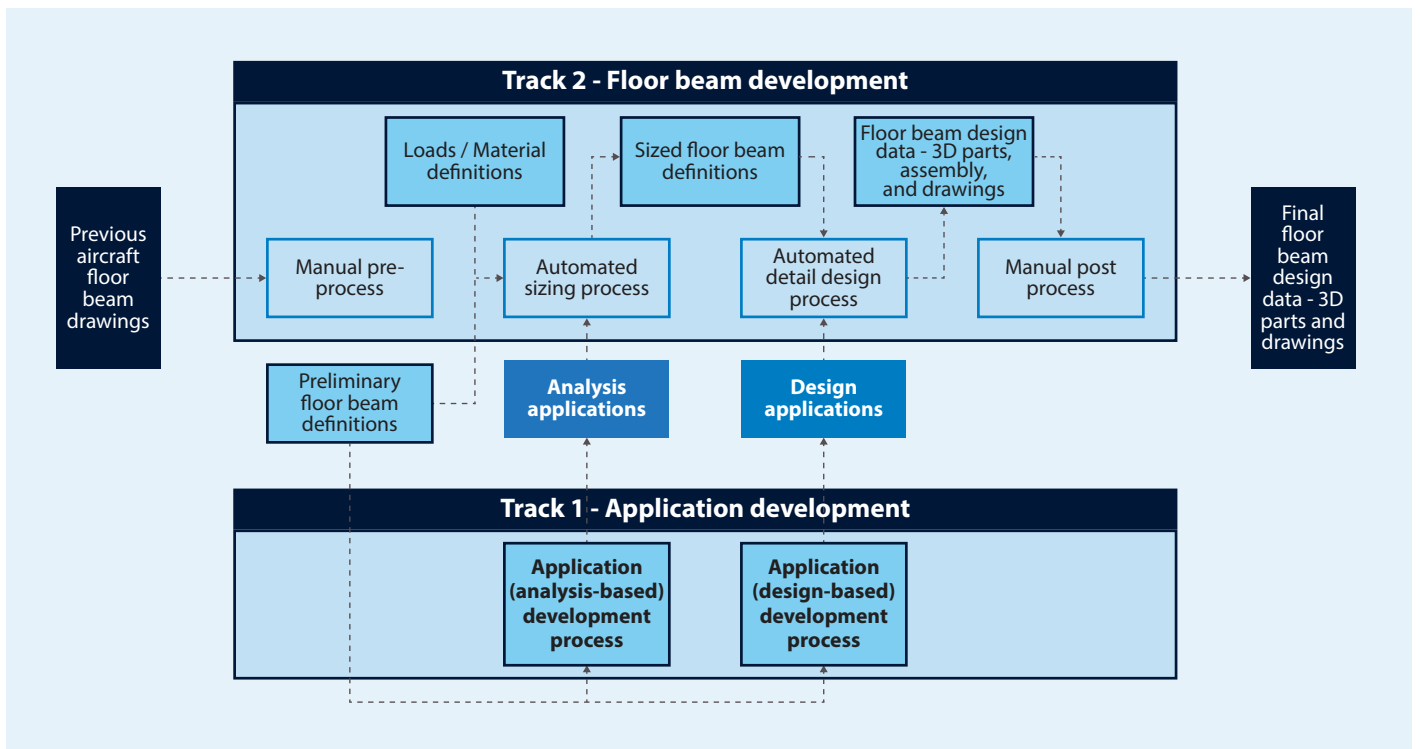
Solutions:

Infosys offered a KBE-based product development approach to address the challenge. This involved automation of end-to-end product development processes that covered both sizing and detailed design.

Engineering process automations solution:

Infosys was engaged on a consulting role during the initial phase, with a joint workshop to study the as-is processes and arrive at the to-be product development process along with the various automation opportunities, as highlighted below:

KBE-based floor beam design and development



In the pilot phase, various challenges were addressed with solutions and some of them were implemented.



Define KBE-based PD process

Define scope of software applications

Develop software applications – sizing and detail design

Pilot the KBE process on a few floor beams



Challenges

- Poor automation capability in CATIA V4
- Variability in component shapes for 73 floor beams
- Complex and evolving engineering rules
- Multiple load cycles



Solution

- Hybrid approach involving CATIA V4 and V5
- Sketch-based algorithms
- Seamless execution of KBE applications

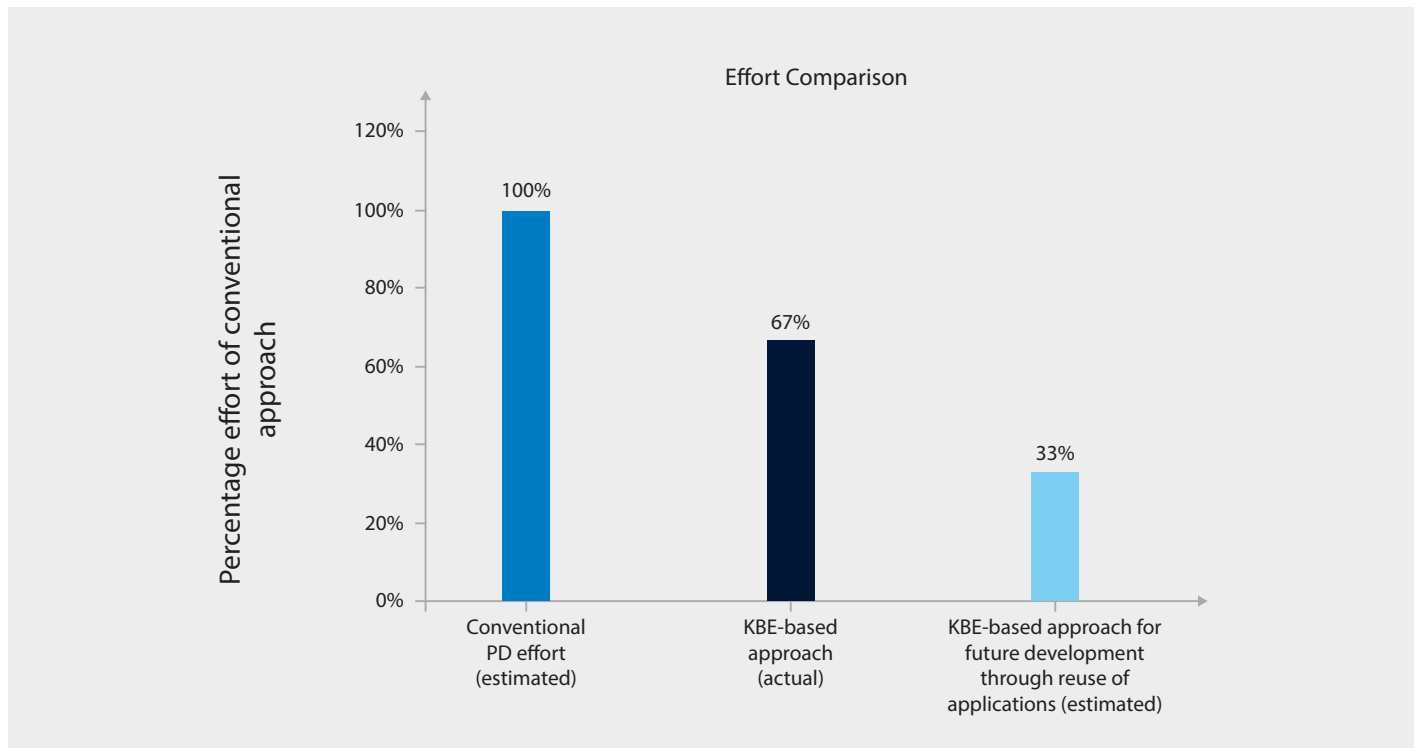
The figure above offers a snapshot of the various challenges and their respective solutions. About six different opportunities were identified and solutions were developed to automate various sizing and detail design activities. Eventually, almost 80% of the design processes were automated.



Benefits

- Automation solutions helped meet the original program timelines
- Significant savings in effort (33%) and cycle time (33%) as compared to the conventional approach
- Improved quality of design – floor beams were made lighter in weight (reducing 4 pounds per floor beam)

Benefits realized through KBE



For more information, contact askus@infosys.com



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