Knowledge Aware Engineering

Executive Summary

What is it?

- Knowledge Aware Engineering (KAE) – KAE is the emerging new approach for managing technical knowledge. KAE replaces traditional passive ‘Reference Shelf’ paradigms* with an integrated, active Knowledge System that directly influences technical decision making.

* Examples of passive ‘Reference Shelf’ systems include Lessons Learned/Best Practices, Wikis, blogs, etc.

Why is it important?

- Increases the productivity and capability of engineers
- Prevents recurring engineering errors and promotes quality
- Ensures consistent, global engineering processes
- Promotes the exchange of knowledge and expertise across and within engineering communities. Retains know-how as an Asset.
- Reduces the cost and effort of managing technical Know-How.

How does it work?


- Decision Support - Integrates into existing engineering workflows: CAD, PLM, DMU, CAE, etc. Harvests Technical Memory in real-time and delivers relevant Retained Know-how in context. Provides tools which automatically apply Technical Memory.

- Tight integration between Decision Support and Technical Memory automatically distributes Know-how throughout the Enterprise;

'Retained Know-how’ becomes an Active part of engineering decisions.
# Knowledge Aware Engineering in Practice

## I. Aerospace - OEM

<table>
<thead>
<tr>
<th>Industry</th>
<th>Aerospace</th>
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<tbody>
<tr>
<td><strong>Decision Support Infusion Points</strong></td>
<td>CAD Modeling (Catia);</td>
</tr>
</tbody>
</table>
| **Types of Knowledge Managed** | 3 Key Parameters  
3 Project Targets and Assumptions  
3 Engineering Design Standards  
3 Conceptual CAD models |
| **Material Benefits**      | 3 Controlled Input Assumptions Sets to Conceptual Models  
3 Tracked Conformances/issues with each Assumption Set  
3 Enhanced Systems Integration  
3 Systems Decision support and trade-off analysis  
3 Program Engineering Health Visibility |

## II. Automotive - OEM and Tier Suppliers

<table>
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<tr>
<th>Industry</th>
<th>Automotive</th>
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</table>
| **Decision Support Infusion Points** | CAD Engineering (Catia and NX)  
PLM BoM and BoP Development  
Process Planning  
DMU  
Other Engineering tools and processes |
| **Types of Knowledge Managed** | 3 Engineering Design and Manufacturing Standards  
3 Product Requirements  
3 Best Practices  
3 Key Parameters  
3 Engineering Methods |
| **Material Benefits**      | 3 Enhanced Product Quality  
3 Enhanced Engineering Productivity  
3 Reduced Engineering rework  
3 Faster Engineering Cycle times  
3 Accumulation of Corporate Technical Memory  
3 Program Engineering Health Visibility  
3 Integrated Decision Support  
3 **Consolidated One-Stop Enterprise Knowledge System** |

Note: Knowledge Aware Engineering is not specific to Aerospace or Automotive and will apply to any engineering intensive firm.
The only thing that gives an organisation a competitive edge, the only thing that is sustainable, is what it knows, how it uses what it knows, and how fast it can know something new.

Laurence Prusak

**Introduction**

The current economic realities facing engineering leadership demand an innovative approach to all phases of engineering. This manifest imperative reaches beyond the need for incremental improvement; required is a fundamental and game changing approach to engineering, a change that produces significant increases in both product quality and engineering process efficiency.

Knowledge Aware Engineering is such an approach. The cornerstone of the Knowledge Aware Engineering is its ability to capture, retain, refine and dynamically deliver engineering ‘know-how’ into engineering processes where it directly supports engineering decisions. Integrated ‘Know-how’ leads to the game changing benefits of higher engineering productivity, and higher quality products.

![Knowledge Aware Engineering Exemplar](image)

Figure 1 – Knowledge Aware Engineering Exemplar

With Knowledge Aware Engineering, digital representations of ‘Product’ and ‘Manufacturing Process’ are driven by, and infused with, the technical expertise which
continually evolves within engineering intensive firms; Retained Know-how is accumulated, consolidated, and managed as an asset.

At a macro level, Knowledge Aware Engineering can be thought of as a broad strategy comprised of a set of principles and tools; similar to the way that ‘Lean’ and ‘Six Sigma’ strategies encapsulate a broad set of principles and tools. From a technology perspective, Knowledge Aware Engineering should not be confused with PLM, Knowledge Management, or Design Automation/KBE; although these technologies do play a predecessor role in its establishment. Rather, Knowledge Aware Engineering is a comprehensive strategy combining these existing technologies with a new set of tools for deploying ‘Retained Know-how’. This new combination results in the infusion of ‘Retained Know-how’ into engineering workflows.

Importantly, Knowledge Aware Engineering is not a distant point on the horizon. Supporting technologies are commercially available and adopters have demonstrated and measured success.

*The true value of a Company’s Technical Knowledge and Experience is determined by how well it is maintained, grown, and applied consistently in support of engineering decision making across the organization.*

*Greg Burek*

For the full White Paper, please submit a request to info@emergentks.com