

**REALIZE THE BENEFITS OF DESIGN,  
OPERATE, MAINTAIN TODAY**

**WHITE  
PAPER**

# Realize the benefits of Design, Operate, Maintain thinking today

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Design, Operate, Maintain (DOM), the term coined by industry analysts ARC Advisory Group, gives us a vocabulary to talk about some of the key concepts in asset management and in industrial maintenance, repair and, operation.

Indeed, industrial facility designers and those who operate and maintain those facilities need to work together closely if plant efficiency and business profitability are to improve over time. Communication between these various entities has been lacking, however. Modern enterprise resource planning tools (ERP), computerized maintenance management systems (CMMS), and CAD design packages are moving toward a point of integration that could facilitate greater communication between these disciplines.

Interestingly, many industries were in a better position to implement DOM concepts years ago than they are today. As early as the 1980s, growth in the number of process control and systems engineering firms indicated that more and more industries were outsourcing their plant engineering. Although in-house plant engineering departments gave an organization greater control over design and information standards, corporate “rightsizing” and a growing movement toward open standards and interoperable components made it possible to involve numerous outside vendors, ranging from industrial engineering firms, manufacturer representatives, and system integrators in plant design. The in-house data created by a captive engineering department may not have been leveraged fully, but lack of communication between designers and the industries they serve seems only to have grown as outsourcing has become the trend. According to the Control System Integrators Association, the independent control systems integration market has grown to \$12 billion by the turn of the millennium from a fraction of that 20 years before. More and more, technical data, drawings, and specifications once developed and maintained in-house come from outside an industrial organization.

As gaps in communication between design and operations/maintenance have widened, consulting engineers often have been free to design simply to meet a particular capacity increase outcome. Design data is developed separately, often on different platforms, from those used by manufacturing operations and maintenance personnel who will live with the industrial design into the future. Currently, an ISO data standard

for this information is being developed, and that standardization should at least allow in-house staff and outside design consultants to more seamlessly communicate and share data that leads to greater industrial efficiency. But even before this ISO 15926 standard is finalized, there is plenty that maintenance and plant operations professionals can do to make DOM a reality today.

### The challenge

The switch has just been thrown on a renovated production line at your process manufacturing facility. As pressures and temperatures start to come up to spec and product begins flowing, a head pressure problem develops in a critical compressor unit. Maintenance is dispatched to the site but quickly finds that it lacks the information to diagnose the problem.

The necessary data, it turns out, is buried in a stack of CDs and binders left by the consulting design engineers. The lack of communication leads to unplanned down time as the necessary information is located and the problem diagnosed.

Or what about the maintenance engineer who finds that a new production line suffers from unplanned stoppages caused by the same design features as the line it replaced? Although data contained in years of maintenance records could have revealed that design changes that are necessary, the system engineers did not have the ability to milk that data for meaningful information.

WO No	Directive	Object ID	Completion Date
<a href="#">202297</a>	Cleaning of Flow Transmitter	<a href="#">PM-312-FT-001</a>	5/14/06
<a href="#">202292</a>	Vibration Measurement - Malfunction	<a href="#">PM-311-PA-003</a>	5/7/06
<a href="#">202291</a>	Circuit Breaker Release	<a href="#">PM-312-PA-003</a>	5/5/06
<a href="#">202288</a>	Pump Motor Overheating	<a href="#">PM-312-PA-001</a>	4/3/06
<a href="#">202296</a>	Cleaning of Flow Transmitter	<a href="#">PM-312-FT-001</a>	3/23/06
<a href="#">202295</a>	Level Transmitter - Incorrect Reading	<a href="#">PM-311-VZ-001</a>	1/2/06
<a href="#">202294</a>	Level Transmitter - Incorrect Reading	<a href="#">PM-311-VZ-001</a>	12/5/05
<a href="#">202293</a>	Level Transmitter - Incorrect Reading	<a href="#">PM-311-VZ-001</a>	2/28/05
<a href="#">202290</a>	Pump Motor Overheating	<a href="#">PM-312-PA-001</a>	12/6/04
<a href="#">202289</a>	Circuit Breaker Release	<a href="#">PM-312-PA-003</a>	12/6/04

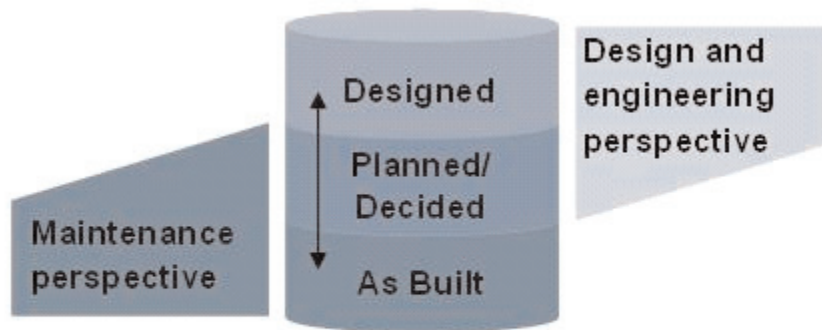
Figure 1: By giving engineers access to the maintenance history, repeated production problems caused by design errors can be avoided.

But not every problem is the fault of the industrial engineer. Imagine logging hundreds of hours on a design for a new mix-and-fill line, only to find out later that maintenance engineers had upsized several pumps on the line you are replacing—a change not included in the as-built information on the pre-existing line. You have spent tens of thousands of dollars to engineer a suboptimal system and now are faced with the prospect of asking your client to split the cost overrun caused by this miscommunication. Technology can offer only a partial solution to the problems caused by inadequate communication between industrial designers, plant operators, and maintenance managers. Integrated asset lifecycle management (ALM) tools that encompass all three disciplines will do so much good only if there is inadequate communication with an outside industrial designer who does not use the ALM tool. Even in-house departments can fail to work together effectively and mesh completely to optimize the DOM process. So regardless of what technology is available to members of the team, a proactive approach is probably the most important factor in implementing DOM processes in your organization. Technology can only facilitate and standardize your proactive, cooperative approach, and in some cases, can automate parts of the DOM process. Here are three steps that can help you realize the benefits of DOM today.

### Maintain a flexible, open IT system

Whether they are used by you or your consulting engineering firm, proprietary data standards are barriers to communication. If you keep your operation and maintenance information in an open, easily-accessed format, you can import and export information in a controlled way and have public application program interfaces (APIs) to handle that export and import. If the asset information management solution you are using supports flexible and configurable import and export from standardized file formats such as Excel, XML, etc, you have an even better position.

To operate in a DOM modality, it will also be important to have an asset management system with a layered architecture. This will enable you to view information on projects as they are in the design phase and track them through construction and design. At each step of the process, different departments can view layers of a project that are relevant to them and provide feedback. This will give you the ability to start collecting information during a project and make sure you are getting the design that meets your needs. This early access to information will also allow you to work ahead in planning a preventive maintenance program and otherwise give you a head start for the day when the new production facility goes into operation.



### Asset Information Repository Document Management System

Figure 2: With a layered architecture of your asset management system, you are in control of what and when information should be available to design/engineering and maintenance/operations. Both document management and asset management solutions can be configured to comply to your company standards. This puts you in control of the technical attributes and requirements regarding different pieces of equipment, and allows you to adopt the data to your system. The system provides dynamic links between information on assets, equipment and facilities.

#### Take control of your information

Information about your plants and assets is worth a great deal. You need that cumulative operation and maintenance history data to optimize your processes on an ongoing basis. If you are undertaking projects to improve your production capacity, you need to be able to share that information with the design engineers. To do this, you must agree on a format you and your designer can both use and that you are capable of exporting from your own systems.

Conversely, before work starts, agree with your design engineer on data formats and frequency of communication on the new design. Generate a list of each feature, component or piece of equipment you will need to manage on an ongoing basis. Determine what information you need about each item on the list, at what points in the project you need it, and how data must be structured to tie into your existing asset management system. Whether it is a series of Excel spreadsheets, an Access database, or XML documents, you will want this data structured to allow it to be tied to information about your current operations and maintenance activities.

Agreeing in advance on how and when information will be exchanged can be a workaround to the fact that you and your designer are likely on different information platforms. The spreadsheet contents and/or tables your engineer provides will have to be mapped to fields in your existing system, but at least information will be flowing from design into your asset management systems.



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On some major infrastructure projects in which I have been involved, the project owner was in a position to establish a Web portal open to the design and contracting teams, and that portal became the medium through which a collaborative process took place. Whether your collaboration takes place internally with in-house departments or with outside designers, whether through an integrated ALM tool or through a patchwork of applications mapped together with lots of human intervention, a real-time collaborative environment is where DOM will ultimately take those who employ these concepts.

*Christian Klingspor has 20 years' experience in developing and implementing solutions for asset lifecycle management covering plant design, document management, maintenance management, and process automation. He holds a B.S. in computer science and systems analysis, and came to IFS through the 1997 acquisition of IDOK, where he was responsible for developing that company's plant design solution.*

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