



Highlights of [GAO-10-439](#), a report to congressional requesters

Why GAO Did This Study

Cost growth and schedule delays are prevalent problems in acquiring defense weapon systems. Manufacturing systems has proven difficult, particularly as programs transition to production. In December 2008, the Department of Defense (DOD) issued an updated version of its acquisition policy that reflects earlier consideration of manufacturing risks. A joint defense and industry group developed manufacturing readiness levels (MRL) to support assessments of manufacturing risks. Use of MRLs on all weapon acquisition programs has been proposed. In response to a congressional request, this report assesses the manufacturing problems faced by DOD, how MRLs can address manufacturing problems, how MRLs compare to manufacturing best practices of leading commercial firms, and challenges and barriers to implementing MRLs at DOD. In conducting our work, we contacted DOD, military services, and contractors; held interviews with leading commercial firms; reviewed program documents and policy proposals; and spoke with manufacturing experts.

What GAO Recommends

GAO recommends that the Secretary of Defense require the use of MRLs across DOD programs, strengthen the MRL criteria (process control) for production start, assess the need for tools, and assess the manufacturing workforce to address knowledge gaps. DOD partially concurred with the first recommendation, and concurred with the other three. View the full [GAO-10-439](#), or key components. For more information, contact Michael Sullivan at (202) 512-4841 or sullivanm@gao.gov.

BEST PRACTICES

DOD Can Achieve Better Outcomes by Standardizing the Way Manufacturing Risks Are Managed

What GAO Found

DOD faces problems in manufacturing weapon systems—systems cost far more and take much longer to build than estimated. Billions of dollars in cost growth occur as programs transition from development to production, and unit-cost increases are common after production begins. Several factors contribute to these problems including inattention to manufacturing during planning and design, poor supplier management, and a deficit in manufacturing knowledge among the acquisition workforce. Essentially, programs did not identify and resolve manufacturing risks early in development, but carried risks into production where they emerged as significant problems.

MRLs have been proposed as new criteria for improving the way DOD identifies and manages manufacturing risks and readiness. Introduced to the defense community in 2005, MRLs were developed from an extensive body of manufacturing knowledge that includes defense, industry, and academic sources. An analysis of DOD's technical reviews that assesses how programs are progressing show that MRLs address many gaps in core manufacturing-related areas, particularly during the early acquisition phases. Several Army and Air Force centers that piloted MRLs report these metrics contributed to substantial cost benefits on a variety of technologies and major defense acquisition programs.

To develop and manufacture products, the commercial firms we visited use a disciplined, gated process that emphasizes manufacturing criteria early in development. The practices they employ focus on gathering sufficient knowledge about the producibility of their products to lower risks, and include stringent manufacturing readiness criteria to measure whether the product is sufficiently mature to move forward in development. These criteria are similar to DOD's proposed MRLs in that commercial firms

- assess producibility at each gate using clearly defined manufacturing criteria to gain knowledge about manufacturing early,
- demonstrate manufacturing processes in a production-relevant environment, and
- emphasize relationships with critical suppliers.

However, a key difference is that commercial firms, prior to starting production, require their manufacturing processes to be in control—that is, critical processes are repeatable, sustainable, and consistently producing parts within the quality standards. DOD's proposed MRL criteria do not require that processes be in control until later.

Acceptance of MRLs has grown among some industry and DOD components. Yet, DOD has been slow to adopt a policy that would require MRLs across DOD. Concerns raised by the military services have centered on when and how the MRL assessments would be used. While a joint DOD and industry group has sought to address concerns and disseminate information on benefits, a consensus has not been reached. If adopted, DOD will need to address gaps in workforce knowledge, given the decrease in the number of staff in the production and manufacturing career fields.