

Regulatory Changes Affecting Aerospace Manufacturing: An Auditor's Primer

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Agenda

- **Changes in Export Regulations**
- **Changes in FAA Manufacturing Rules**
 - **Safety Management Systems**
 - **Design Organizations**

**Changes in the Way We
Distinguish Defense
Related Parts (ITAR)
from BIS-Regulated
Parts**

Export Prior to October 15, 2013

- **Exporter must determine which U.S. Department has jurisdiction over the aircraft article**
 - **U.S. Munitions List items**
 - » **Designed, produced or modified for military use**
 - » **Review ITARs and USML**
 - **If not a USML item, subject to BIS regulations**
 - » **Review BIS regulations and CCL**
 - » **Determine ECCN**

US Munitions List Categories

- Category I-Firearms
- Category II-Artillery Projectors
- Category III-Ammunition
- Category IV-Launch Vehicles, Guided Missiles, Ballistic Missiles, Rockets, Torpedoes, Bombs and Mines
- Category V-Explosives, Propellants, Incendiary Agents, and Their Constituents
- Category VI-Vessels of War and Special Naval Equipment
- Category VII-Tanks and Military Vehicles
- **Category VIII-Aircraft, [Spacecraft] and Associated Equipment**
- Category IX-Military Training Equipment
- Category X-Protective Personnel Equipment
- Category XI-Military [and Space] Electronics
- *Category XII-Fire Control, Range Finder, Optical and Guidance and Control Equipment*
- Category XIII-Auxiliary Military Equipment
- Category XIV-Toxicological Agents and Equipment and Radiological Equipment
- Category XV-Spacecraft Systems and Associated Equipment
- Category XVI-Nuclear Weapons Design and Test Equipment
- Category XVII-Classified Articles, Technical Data and Defense Services Not Otherwise Enumerated
- *Category XIX-Gas Turbine Engines*
- Category XX-Submersible Vessels, Oceanographic and Associated Equipment
- Category XXI-Miscellaneous Articles

What Aircraft Were Regulated Under ITAR VIII (before Oct. 15)?

“Aircraft ... which are specifically designed, modified, or equipped for military purposes”

- **Gunnery**
- **Bombing**
- **Rocket or missile launching**
- **Electronic and other surveillance**
- **Reconnaissance**
- **Refueling**
- **Aerial mapping**
- **Military liaison**
- **Cargo carrying or dropping**
- **Personnel dropping**
- **Airborne warning and control**
- **Military training**

What About Parts?

- **(h) Components, parts, accessories, attachments, and associated equipment (including ground support equipment) specifically designed or modified for the articles in paragraphs (a) through (e) of this category, excluding aircraft tires and propellers used with reciprocating engines.**

Export Categorization Challenges Prior to October 15, 2013

- **Determining USML versus CCL was often challenging**
 - Vague regulatory language (e.g. USML VIII(h))
 - Unknown design history
 - Dual-use
 - Burdensome Commodity Jurisdiction process
- **Restrictive Re-export controls**
 - Re-export license applications
 - No *de minimus* exceptions for ITAR-controlled parts

October 15, 2013 Rule Change

- **Export Control Reform Initiative**
 - **Moved items that no longer warrant export control on the USML to the CCL**
 - » **This change was specific to aircraft, turbine engines, and related items**

What Changed?

- **Major changes**

- **Revised USML category VIII to establish a clearer line between USML and CCL control**
- **Added the new “600 Series” to the CCL to accommodate most former USML items and to consolidate Wassenaar Arrangement Munitions List entries**

Aircraft Parts Still in the USML

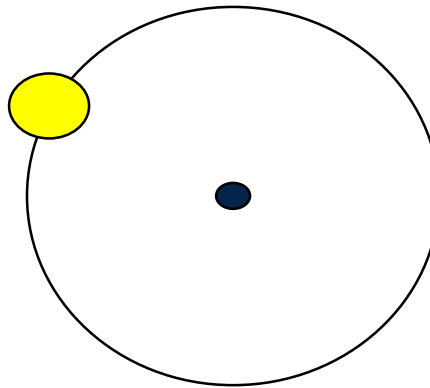
- **Certain articles (and their parts) that are specially designed for controlled aircraft:**
 - Inertial navigation systems (INS)
 - Inertial Measurement Units (IMUs)
 - Attitude and Heading Reference Systems (AHRS)
- **Parts for DoD-funded developmental aircraft**
- **Parts for B-1B, B-2, F-15SE, F/A-18E/F/G [*parts for earlier models are subject to the EAR*], F-22, F-35, F-117**
- **Parts found in a positive list**
 - Published at 22 C.F.R. 121.1 - VIII(h)
 - Articles with defense-specific purposes, like threat-adaptive flight control systems, wing folding systems, etc.

Our Changing Universe

- **Our models for how we see the universe are changing**

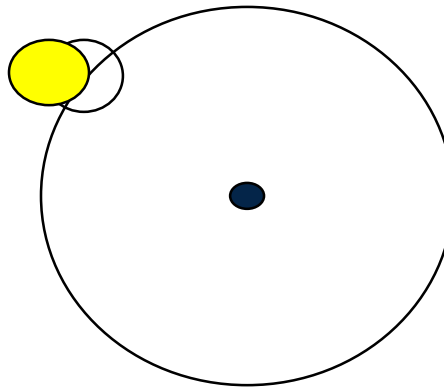
Our Changing Universe: Ptolemy

- **In the second century AD, Ptolemy's model of the solar system had the Sun revolving around the Earth**
- **The revolutions were in circles**



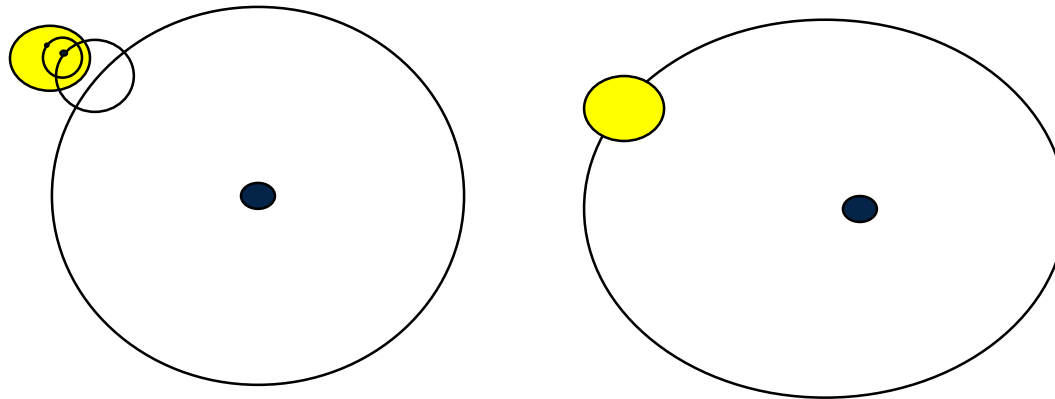
Ptolemaic Epicycles

- **Ptolemy's observations were inconsistent with the circular orbit model of the solar system**
- **Solution: place a circle on a circle (epicycles)**



Epicycles on epicycles

- **Ptolemy's system ultimately involved epicycles on epicycles in order to properly model the way that the sun revolves around the Earth**
- **The resulting shape looked just like an ellipse**



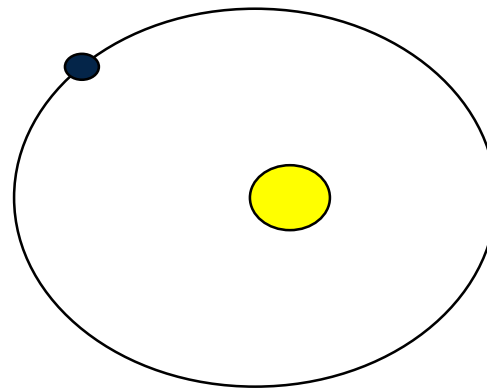
Flat Earth

- Somewhere in the middle of all of this, some people believed in a flat Earth
- Although this was a novel theory, it was not a positive change in the way we viewed the universe



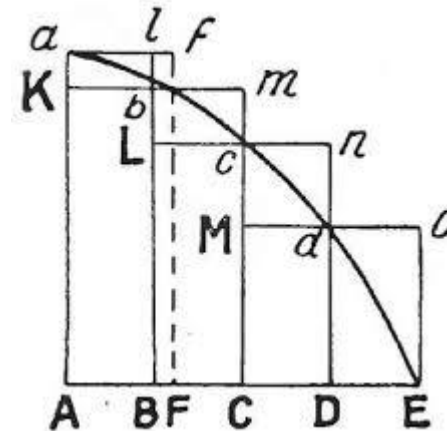
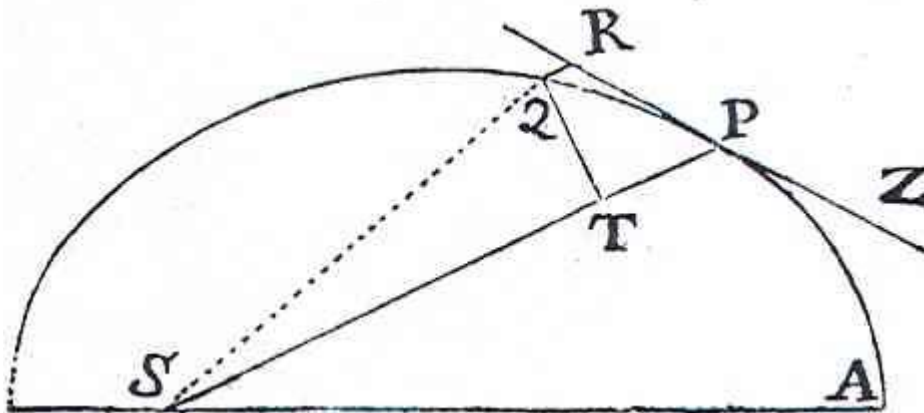
Nicholas Copernicus

- **Observation suggested the Earth and planets revolved around the sun in an ellipse**
- **A heliocentric solar system better suited the data on the planets**



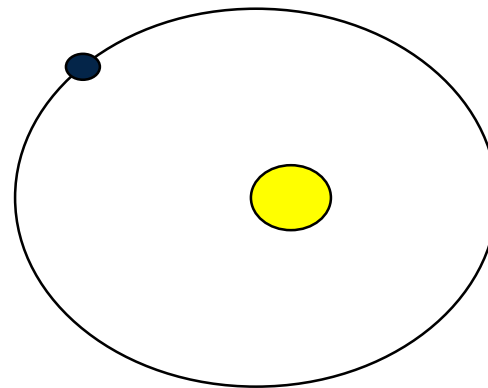
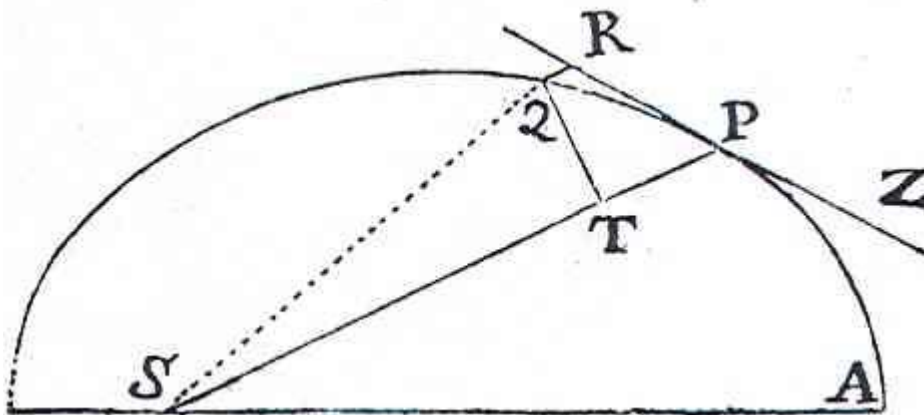
Isaac Newton

- **Observation suggested the Earth revolved around the sun in an ellipse**
- **So Newton developed calculus, which used elegant mathematical equations to take the place of the epicycles-on-epicycles approach**



Our Changing Universe

- **Through all of these changes, the universe did not change. Only humans' perception of the Universe changed.**



Our Changing Industry

- **Our models for how we regulate ourselves are changing**
- **This does not mean that the way we produce aircraft changes**
- **But it may mean that the way that we manage manufacturing, and the way that we audit the management systems, could change**
 - **The most noticeable changes may be in design**

New Opportunities in the United States

FAA, EASA, TCCA and Industry are completing work in an Aviation Rulemaking Committee (ARC) to develop new rules to comply with an ICAO Standard and Recommended Practice (SARP)

FAA ARC Efforts

- **First ARC: SMS for multiple sectors (2009-11)**
- **Second ARC is manufacturing only (2012-14)**
 - *Coordination among FAA, EASA and TCCA*
 - **Many manufacturers participated**
 - **Four Working Groups**
 - » **Design Organizations**
 - » **SMS**
 - » **Oversight**
 - » **Cost-Benefit**

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What is SMS?

What is SMS?

- **Safety Management System**
 - **A system for managing compliance**
 - **Similar to a traditional Quality Management System (QMS) with additional management elements**

The Four Components of SMS



Safety Policy
and Objectives



Safety Risk
Management



Safety
Assurance



Safety
Promotion

Is SMS MORE than QMS?

- **While ISO 9001 lacks many element of SMS**
- **AS9100 has been moving in the direction of SMS**

What does SMS have that my QMS might not have?

- **Formal mechanisms for identifying training needs and implementing training**
- **Formal safety data collection and predictive analysis system**
 - Documented analysis to proactively predict and forestall future issues
- **Details, like:**
 - Accountable executive and reporting structure
 - Employee authority, responsibility, accountability

So What Are the United States' Responsibilities with Respect to SMS?

ICAO Annex 19 (Convention on International Civil Aviation) **Safety Management SARP**

- **States shall establish**
 - **Acceptable levels of safety**
 - **State Safety Programs for achieving acceptable levels of safety**
- **States shall require the following organizations to have Safety Management Systems:**
 - **Aircraft type design holders, and**
 - **Those who manufacture aircraft**

What do SMS Programs Do?

- **Identify safety hazards**
- **Implement remedial action to maintain safety performance**
- **Monitor and assess safety performance**
- **Aim to improve safety performance**
- **Define clear lines of safety accountability within the organization**

What do SMS Programs Do?

- **SMS programs shall:**
 - Identify safety hazards
 - Implement remedial action to maintain safety performance
 - Monitor and assess safety performance
 - Aim to improve safety performance
 - Define the limits of safety performance accountability with **Organization**

Production vs. Design

- **Modern Aerospace Production is based on Organizations with Quality Systems**
 - E.g. FAA regulations require a quality manual defining the quality system and the relationships within the organization that make up that system
- **Modern Aerospace Design is not based on formally-defined organizations**
 - E.g. different manufacturers have different approaches to managing their engineering

49 USC 44704(a)(1)

Issuing Type Certificates

- **(a) Type Certificates.— (1) Issuance, investigations, and tests.— The Administrator of the Federal Aviation Administration shall issue a type certificate for an aircraft, aircraft engine, or propeller, or for an appliance specified under paragraph (2)(A) of this subsection when the Administrator finds that the aircraft, aircraft engine, propeller, or appliance is properly designed and manufactured, performs properly, and meets the regulations and minimum standards prescribed under section 44701 (a) of this title. On receiving an application for a type certificate, the Administrator shall investigate the application and may conduct a hearing. The Administrator shall make, or require the applicant to make, tests the Administrator considers necessary in the interest of safety.**

49 USC 44704(a)(1) Issuing Type Certificates

- **(a) Type Certificates.— (1) Issuance, investigations, and tests.— The Administrator of the Federal Aviation Administration shall issue a type certificate for an aircraft, aircraft engine, or aircraft appliance specified in subsection (b) of this title if the Administrator finds that the aircraft, aircraft engine, or aircraft appliance is properly designed, constructed, and tested, properly described, and meets the minimum standards prescribed in section 44701 (a) of this title. On receiving an application for a type certificate, the Administrator shall investigate the application and may conduct a hearing. The Administrator shall make, or require the applicant to make, tests the Administrator considers necessary in the interest of safety.**

**There is NO
requirement
for an
organization**

Issue Number One

- **In order to implement SMS requirements for existing design approval holders, the United States may need to create the regulatory structure for a design organization**

Design Organizations may provide the organizational foundation for Safety Management Systems

Design Organization (DO) Analogy

- **DOs are like production quality systems for design**
- **Under a production quality system:**
 - **The company manages production compliance within its system**
 - **FAA audits the system, so it does not have to inspect every part**
- **Under a design organization:**
 - **The company manages design compliance within its system**
 - **FAA audits the system, so it does not have to verify every design**

But What Else Can Design Organizations Be?

- **A privilege holder**
 - Replacement for delegation of authority
 - Recognize findings of compliance
- **Reduce FAA burden for certain functions**
- **Safety data generators**
- **Permit FAA to better focus its limited resources on oversight, systems management, and safety-critical functions**

Design Organizations Could Better Manage the Design Process

For example:

- **Processes for flowing down requirements to design partners**
- **Processes for integrating changes from design partners**
- **Processes for using lessons learned from prior designs**
- **Processes for responding to required design changes**

Could FAA Rely on Other-Party Oversight?

- **By implementing SMS within the design organizations, the organizations should benefit from design-process audits**
- **FAA has already suggested that they could rely on (or give credit for) design-process audits under an appropriate standard**
- **Auditors take note!!**

Summary: What's Changing?

- **FAA plans to add safety management systems rules**
- **FAA is examining plans to add design organization rules**
- **EASA and TCCA have participated in this process in the US**

Summary: Where Are The Opportunities?

- **Safety management systems rules will supplement existing production quality rules (requiring possible oversight changes)**
- **New design organization rules will provide new opportunities for safety management oversight**
- **Safety management systems rules will infuse new design organization rules (facilitating new oversight opportunities and strategies)**

Summary

- **Export**
 - **Major changes became effective October 15, 2013**
 - **Movement of many aerospace ITAR items to the EARs**
- **FAA Manufacturing Rule changes**
 - **Part 21 is being rewritten by the Part 21/SMS ARC and the SMS and Design Organization features may pose new opportunities and new challenges for the auditing community**

Thank You!

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