Importance of Accurate Specification Conversions

• Many technical data packages (TDPs) need updating to convert canceled or obsolete specifications to current specifications

• Contracts are often unnecessarily delayed by as much as one year due to inaccurate specifications

• Suppliers no longer support old specs

• Conversion to modern specs is difficult
Ensure These Designations are Updated

• Alloy Number
  – Commercial alloy designations can change

• Casting Inspection Class and Radiographic Grade
  – Critical for determining nondestructive testing (NDT) requirements for inspection frequency and radiographic soundness

• Mechanical Properties Class
  – Determines mechanical property and test coupon requirements
Verify Alloy Designation

Cast aluminum example:
- Commercial designation was 220
- Current Aluminum Association designation is 520

Reference:
https://www.faa.gov/aircraft/air_cert/design_approvals/csta/publications/media/formerdesignations.pdf
Incorrect Specification Conversion
QQ-A-596 to ASTM B686

• Obsolete spec QQ-A-596 specifies the same alloy and temper as ASTM B686, but is NOT specific for soundness/NDT

• ASTM B686 allows soundness/NDT choice between 4 classes and 4 grades, as well as mechanical properties class specification

• Incorrect conversion causes unnecessary over-specification which drives costs up
Impact of Incorrect Conversion
QQ-A-596 to ASTM B686

• Too severe of a soundness requirement may cause part producibility to be impractical or uneconomical

• For example, specifying Class 1, Grade A requires a part to have NO discernable radiographic discontinuities, and that every casting must be x-rayed 100% (all over)

Refer to ASTM B686 paragraph 4.1.2 Note 1 and ASTM B686 paragraph 15.1.4.1 “Class 1 Castings – Each shall be completely examined.”
Correct Specification Conversion
QQ-A-596 to ASTM B108/108M

- Same alloy, temper, tests, and properties
- Incorrect change to ASTM B686 caused alloy change from 356-T6 to A356-T6, no x-ray to Class 2 / Grade B, and higher mechanical property requirements
- If increased requirements are necessary, they should be explained
- Requiring tighter chemistry, x-ray, and test bar properties increased costs and delayed contract delivery by one year
Casting Note Tips

• QQ specs often convert closely to ASTM
• ASTM typically have multiple alloys and testing requirements
• MIL specs often convert directly to SAE / AMS
• SAE / AMS have single alloy and temper designations
• Critical application parts often use SAE / AMS
• MIL-C-6021H converts closely to SAE / AMS 2175
• MIL-C-6021G has different class and grade designations and requires special attention when updating
MIL-C-6021G to AMS 2175

Class Changes are Confusing

MIL-C-6021G converts to

- Class 1A
- Class 1B
- Class 2A
- Class 2B

AMS 2175

- Class 1
- Class 2
- Class 3
- Class 4
Considerations for Conversion of MIL-A-21180 to AMS-A-21180

• Very similar (almost identical) specs
• Used for high-strength and critical applications
• Mostly used for aircraft parts
• Provides critical and non-critical requirements
• AMS-A-21180 references modern versions of NDT, for example, it uses AMS 2175 in place of obsolete MIL-C-6021

Correct conversions of NDT class and grade are essential!
# Modern AMS Specs for AMS-A-21180 Conversion

<table>
<thead>
<tr>
<th>AMS-A-21180</th>
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<tbody>
<tr>
<td>A201-T7</td>
<td>4229 &amp; 4242</td>
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<tr>
<td>354</td>
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<td>C355-T6</td>
<td>4215</td>
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<td>A356-T6</td>
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<tr>
<td>A357-T6</td>
<td>4218, 4289, 4241, 4249</td>
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<td>E357*</td>
<td>4288</td>
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* Not in original MIL-A-21180
Recommendations

TDPs should:

• Call out alloy designations and temper (strength) designations accurately and completely including alloy, class, and grade

• Cross-reference old (former) alloy designations to current designations (e.g. 220 is now 520) so that there is no question which alloy is required

• Provide current specifications that are still active (not cancelled)

• Not over-specify requirements when specs are converted