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## TKR Flex Cable Accommodation

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## Routing Around Grid Top Flange

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- **Issues**
  - CDR Grid design was based on cable routing using bend radius smaller than preferred 8 mm minimum
  - Notch in top flange is significant, and there is little room to implement changes without breaking into HP/Purge grooves
- **Proposed design modifications in Grid**
  - Decrease depth of notch in top flange by 1 mm (add material) → increases min wall thickness in flange
  - Change radius at top of top flange to a blended 0.03” x 30 degree chamfer, to save space on flange → ensures smooth transitions without using too much area on top of flange
  - Add blended ramp cut into underside of top flange, to clear CAL stay-clear and ensure smooth transition → this is OK per Tapemation
- **Effect on TKR cable routing**
  - Cable once again stays out of CAL stay-clear
  - Min inside bend radius of 8 mm accommodated everywhere
  - Blended corners and transitions will minimize likelihood of abrading cable
  - Height of cable out-of-plane bend is increased by 1 mm, which marginally affects length of cable run
- **Remaining issues and actions to be worked**
  - Update Grid model and drawings (Olson)
  - Complete check on cable length, including this design change (Foss)
  - Update TKR 3-D cable layout to show increased height of jog (Bhatnagar)



## Chaseways Down Grid Walls

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- **Issues**
  - EM TKR cables on mini-tower interfered with 1 x 1 EM Grid built by I&T group
  - Interference occurred in mis-match between jogs in flex cable and machined chaseways in Grid walls
  - Out-of-plane bending of flex cable around top flange affects the z-location of the jogs through these chaseways
- **Proposed design modifications / Actions underway**
  - Source of problems in as-built hardware is being checked by TKR and I&T (Hartmut)
  - No changes planned until cable routing is finalized
- **Effect on TKR cable routing**
  - No plans to modify TKR cable to address these issues
- **Remaining issues and actions to be worked**
  - Finalize 3-D cable design (Bhatnagar)
  - Finalize cable routing through Grid after 3-D cable design has been finalized
  - Check on cable and chaseway width and width tolerances to confirm good fit at MMC (Foss)



## Clearance Inside EMI Skirt

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- **Issues**
  - During CAL integration, TKR cable connector interferes with inside of EMI Skirt
  - Pockets were added in EMI Skirt pieces, but their location is dependent on the connector size and length of the cable
  - Connector savers are being considered for these connectors, which affects this clearance significantly
- **Proposed design modifications / Actions underway**
  - Double-check cable connector geometry (Foss)
  - Plans for using connector savers are being finalized by TKR group (Hartmut) → use connector savers with removable pig-tails to connect to flight TEM
  - Connector saver geometry is being checked against hardware (Bhatnagar) → these need to be added to CAD model to use in fit studies
  - Modifying cable length/connector location (Foss) → cable length beyond Grid is being studied as it relates to bend radius, TEM connector interface and EMI Skirt pockets
- **Effect on TKR cable routing**
  - Length of cable is affected by the bend and connector saver choice
- **Remaining issues and actions to be worked**
  - Finalize cable configuration and connector saver (Foss)
  - Layout final configuration in pulled-back configuration to check on effect on EMI Skirt pieces (Foss)
  - Modify pockets in EMI Skirt pieces and confirm that structural, EMI, and design impacts are not an issues (Olson)



## Cable Integration into TEM Box

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- **Issues**
  - Original cable bend out of CAL and into TEM is not suitable for TKR group due to likelihood of kinking cable
  - Cable layout being used in solid model does not reflect realities of actual cable design (10 mm rigid section at connector impacts bend configuration)
  - Z-location of TEM box recently changed to accommodate X-LAT Plate mounting solution
  - X, Y, and Z tolerance stack-up has not been checked, as it relates to cable length and integration onto TEM connector
- **Proposed design modifications / Actions underway**
  - Update cable CAD model to reflect actual cable details and TEM location (Foss)
  - Lay out new single-bend cable bend (Foss)
  - Lay out cable in uninstalled, partially installed, and fully installed configuration (Foss)
  - Establish “hard direction” (in-plane) cable bending allowables (Hartmut)
- **Effect on TKR cable routing**
  - Final length of cable depends on results of these studies
  - With a single-bend configuration, there is little room for error in cable length—too long and too short both produce integration problems
- **Remaining issues and actions to be worked**
  - Run tolerance stack-up on TEM and cable position to establish max mismatch of cable to TEM connector (Foss)
  - Build CAD model of connector saver and pigtails and check fit around TEM box (Bhatnagar)



## Closure Plan for PRR

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- **Complete action items listed above**
  - These are being worked now
  - Work is being tracked 1-2 times per week by group representing TKR, Mech, I&T, and Design Integration
  - Plan to have a closure review on this, once interface issues are resolved
- **Update IDD**
  - Current cable design violates IDD, and IDD reflects old bending configuration
  - IDD needs to be updated to formally close out this interface (affects TKR, Mech, CAL, Elec subsystems)
- **Finalize fabrication drawings**
  - TKR flex cable: complete flat plan fab drawings and 3-D as-installed drawings before PRR (Bhatnagar)
  - Grid: complete changes to top flange and cable chaseways prior to releasing for machining (Olson)
  - EMI Skirt pieces: complete changes to pockets prior to part machining (Olson)
- **Requirement documentation**
  - Update ICD to include bend radius, hard-bend requirements, and need for connector savers during flight integrations (Bielawski/Borden)
- **Draft procedures**
  - Write procedure and sequence for mechanical and electrical integration of flex cables into Grid and to TEM (Hartmut)