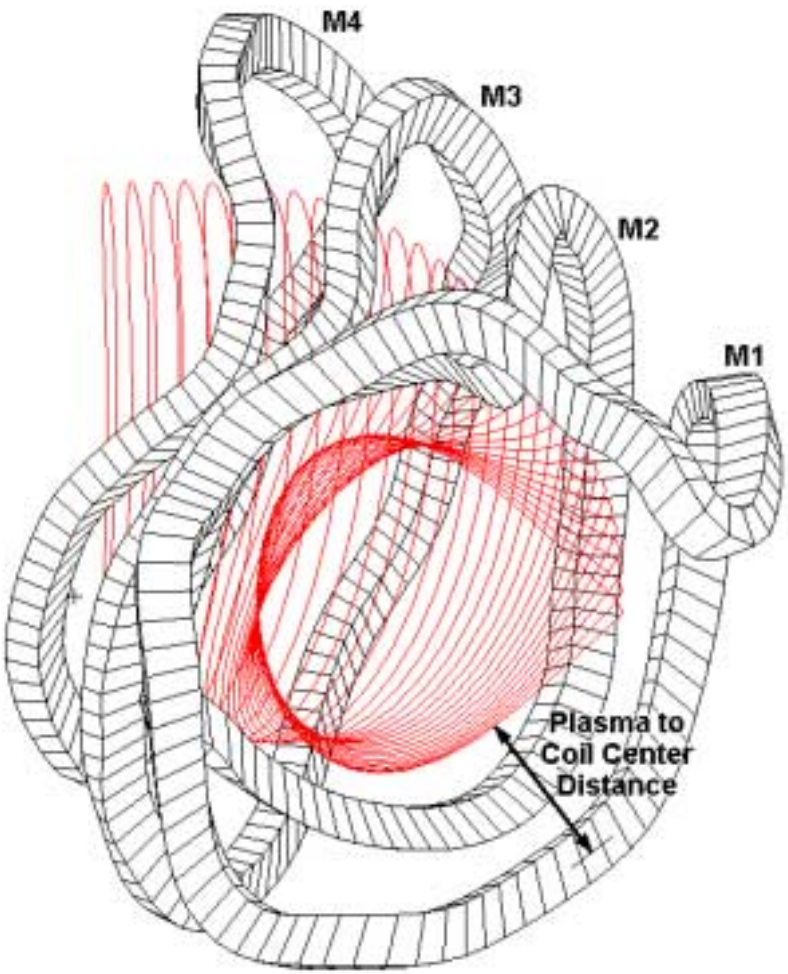
# COILOPT Engineering Constraints

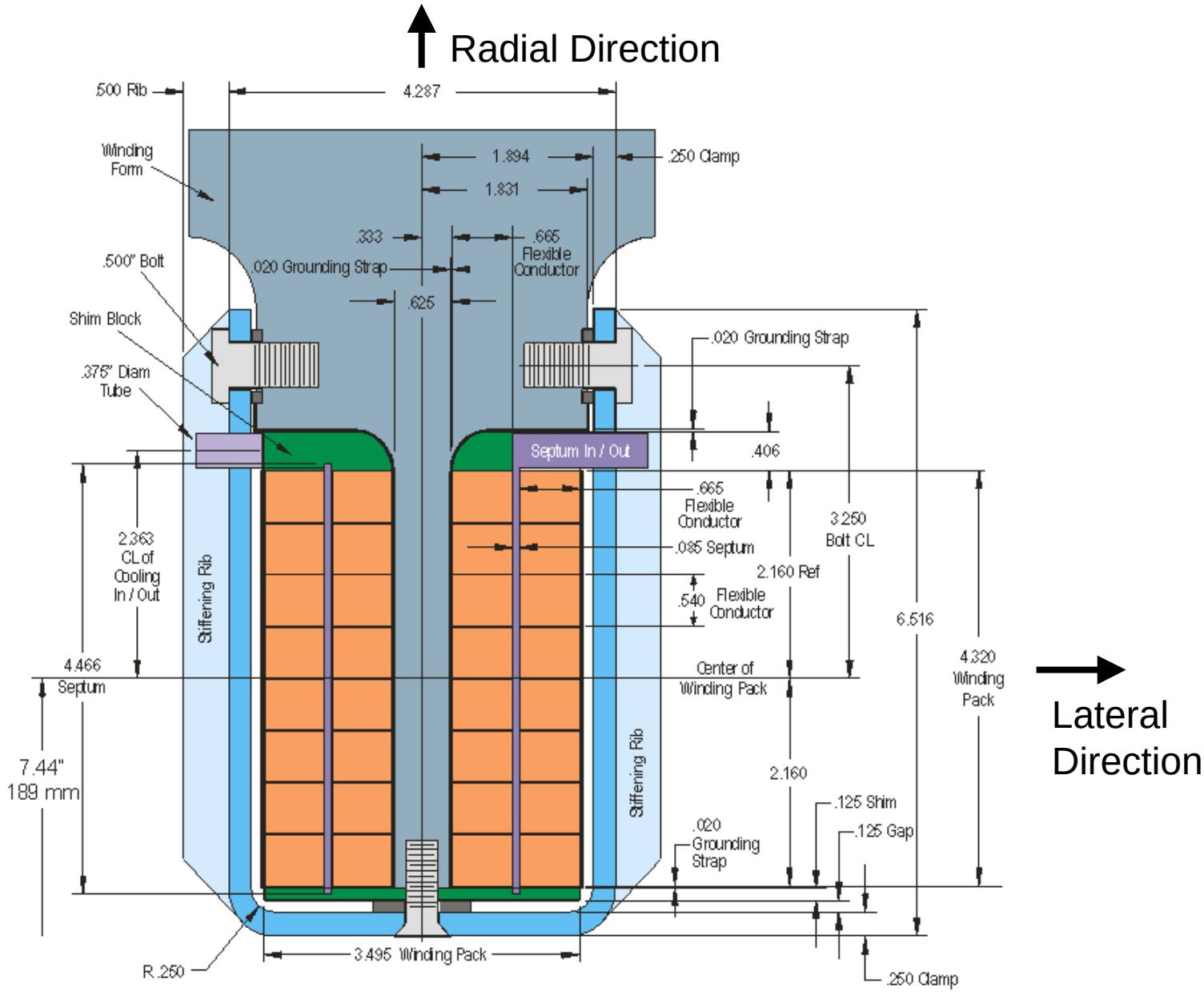
| Target | Value | Comments |
|---|---|---|
| Min Coil-Coil Separation | >12 cm | Determines coil width |
| Min Coil-Plasma Distance | >18 cm | Determines coil depth |
| Max Coil-Plasma Distance | <24 cm | Simplify winding surface;<br>prevent coils from stacking radially |
| Radius of Curvature | | 3 x Wcond + ½ x Wcoil |
| Radial Direction | >10 cm | 3(1.4)+.5(11.3)=9.85 |
| Lateral Direction | >10 cm | 3(1.7)+.5(8.9)=9.55 |
| Min Coil-NB Distance | >27 cm | Define points representing NB centerline; coil proximity to points is penalized. |
| Finite Cross Section / Twist | | Plan A - Provide radial, lateral direction vector for 101 points/coil using one of three methods: normal-to-plasma, global minimizing frame, or sect-by-sect adjustment.<br>Plan B – Perform twist and multifilament optimization with COILOPT |
| Access for Machining | | Penalize out-of-plane variation |

# Example of Coil-Plasma Distance Variation for QPS

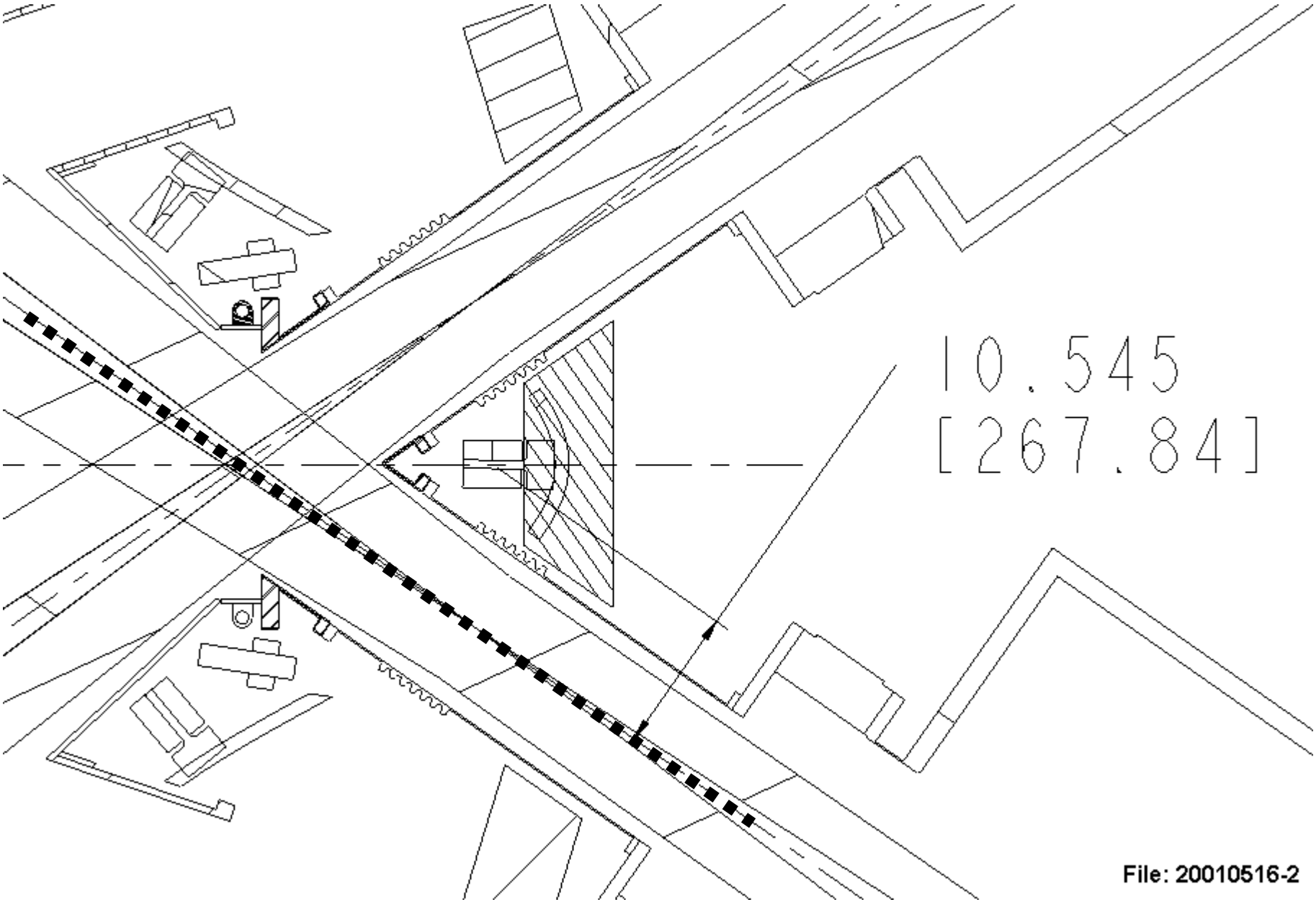



| Coil | Minimum Coil Center to Plasma Distance (cm) | Maximum Coil Center to Plasma Distance (cm) | Average Distance (cm) | Max/Min Ratio |
|---|---|---|---|---|
| M1 | 20.4 | 42.5 | 30.5 | 2.1 |
| M2 | 13.7 | 37.2 | 24.1 | 2.7 |
| M3 | 14.3 | 40.5 | 26.3 | 2.8 |
| M4 | 14.9 | 35.8 | 25.3 | 2.4 |

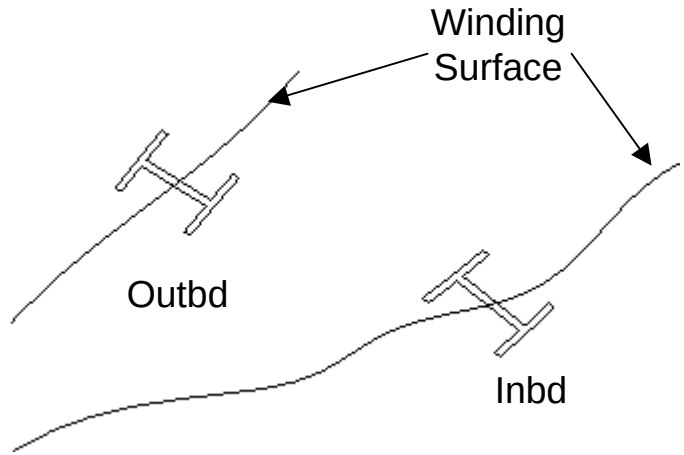
# Cross Section for Radius of Curvature Estimate

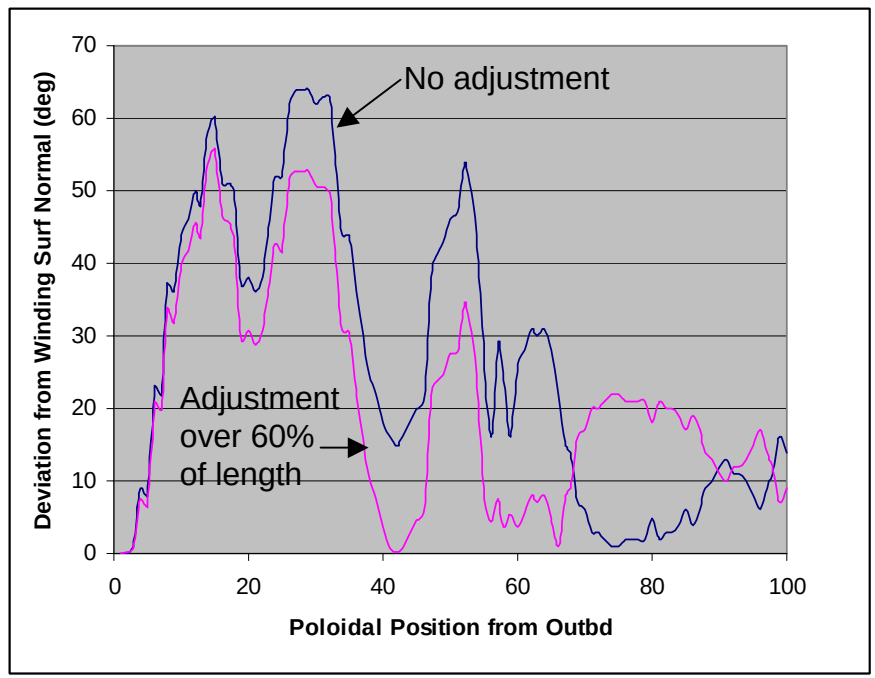


# Minimum Coil-NB Distance



# Example of Finite Cross-Section / Twist Adjustment



# Access for Machining