1. Install SPM in MATLAB
2. Install CAT12 toolbox in SPM12
3. In the SPM12 Menu, Open DICOM–Import
4. Load DICOM files and set directory structure as Flat, set Output Directory as the required output folder, and then set the various conversion options as

   Output image format → Single file (nii)

   Export metadata → No

   Use ICEDims in filename → No
5. Then Run the batch to convert DICOM to NIFTI
6. NIFTI files and MATLAB metadata obtained. Large NIFTI files correspond to the MRI volume, and smaller other NIFTI files correspond to the localizers.
7. SPM→Display/Check Reg is used to view the MRI volume, various views of the MRI are displayed.
8. For cortical thickness estimation, a T1 weighted MPRAGE scan is most suitable. This can be found out by using SPM to auto-group series. SPM can group all DICOMs by SeriesInstanceUID automatically. Thus in DICOM Import Module, set Directory structure → By series, Output Directory → <ProtocolName> , choose a new folder and Output Structure → Separate folders for each series. In the new output folder, the files will be grouped into folders labeled t1_mprage, t2_space_darkfluid, etc
9. Next load the T1 into CAT12, and choose the Segment option. Run the segmentation on the .nii file within the t1_mprage folder. For this pipeline i have chosen the Sagittal orientation. Any of the three orientations can be chosen.
10. The .nii file is added to the Volumes option of the Batch Editor. Leave all other settings as default, namely
    Tissue Probability Map → default
    Affine Regularisation → late European brains (don't change)
    Strength of inhomogeneity correction → medium (default + recommended)
    Internal resampling → Optimal
    Use COM to set origin → Yes

Shooting Template → default
Voxel size → 1.5 mm (CAT12 default, best for morphometry)
Surface & thickness → Yes
Process Volume ROIs → Yes

11. Now run the pipeline. CAT12 will now perform:
    Segmentation
    Partial volume estimation
    Surface extraction
    Cortical thickness computation
    Spherical mapping
    Gyrification, fractal dimension
    Asymmetry
    Quality reports

    It will create folders:
    /mri
    /surf
    /report
    /label
    /stats

12. Ensure that T1 is aligned in the MNI-ish orientation to perform affine regularisation. Set Origin to Anterior Commissure (AC). Then Reorient.
13. CAT12 successfully did **all core cortical morphometry steps**:

    Noise reduction (SANLM)
    Bias-field / inhomogeneity correction
    Center-of-mass correction (your AC step paid off)
    Affine + nonlinear registration
    Tissue segmentation (GM / WM / CSF)
    Skull stripping
    Surface reconstruction

Cortical thickness estimation
ROI parcellation

14. Now, extract Mean Cortical Thickness values. Use the vertex-wise cortical thickness maps for CAT12 ROI extraction. Chose the lh and rh thickness surfaces and set Atlast as Desikan-Killiany. The output of this will be a .csv file with Mean cortical thickness per ROI separated on the basis of left and right hemisphere.

15. The global mean cortical thickness can be obtained from the cat12_report file.
    It contains:

- Image quality metrics (resolution, noise, bias, IQR)
- Total intracranial volume (TIV)
- GM / WM / CSF volumes
- Mean cortical thickness
- Visual QC slices
- 3D cortical thickness maps

16. ROI based cortical morphometry is done by running the “Extract ROI based surface values” where essentially

This means CAT12:

- Took the **cortical thickness surface** (`lh.thickness.*`)
- Took a **cortical atlas** (`aparc_DK40`)

- Computed **mean cortical thickness per ROI**
- Saved those values to disk