Model a six-blade twisted-tooth pinion shaft with splined end

Software: CATIA V5

Task statement

Build a single solid part of a spiral-type pinion shaft as shown in the supplied dimensioned diagrams. These are diagram_01.png, the overall sheet with top, front, right side and isometric views, and its enlargements diagram_01_detail01.png to diagram_01_detail04.png. All dimensions are in millimetres. The views are in third-angle projection.

The part is a straight shaft with one rotational axis. From the head end to the tail end it has the following sections:

1. Head: a domed, bell-shaped head carrying six identical twisted blades (teeth). The blades are spaced evenly at 60° around the axis. Each blade sweeps helically along the curved conical profile, which tapers toward the flat end face of the head.

2. Collar: a thin flange directly behind the blade root.

3. Bearing journal: a cylindrical journal of R39.

4. Step and neck: a short shoulder step, then a necked section with a concave circumferential groove of rounded profile.

5. Spline: a splined section with straight, rectangular axial teeth spaced evenly around the circumference.

6. Tail: a plain cylindrical end spigot with a flat end face.

Key dimensions:

- Overall length along the axis: 253.
- Blade tip envelope in the front view: 170 across the tips horizontally and 154.72 vertically.
- Radii called out in the front view: R45 for the collar/hub circle and R39 for the journal.

Take the remaining proportions (section lengths, spline tooth size, groove profile) from the views in the supplied diagrams.

Model the part as one CATPart.

- Build the revolved shaft body from a sketched profile about a single axis.
- Add the blades as one blade feature repeated with a circular pattern of six instances.
- Create the spline teeth as a circular pattern of one tooth.
- Keep the feature tree named and ordered logically: shaft body, blades, spline, groove.

Save the work as a single native CATPart file.

Rubrics

- **R1:** The model shall be a single part whose overall length along the shaft axis is 253 mm.
- **R2:** The model shall have a blade envelope measuring 170 mm by 154.72 mm in the view along the shaft axis.
- **R3:** The model shall have exactly six blades on the head, equally spaced at 60° about the shaft axis.
- **R4:** The model shall have blades that are twisted (helically swept) along the curved conical head profile rather than straight radial fins.
- **R5:** The model shall have a head that tapers along the axis toward its end face, with a domed/bell-shaped

outer blade profile.

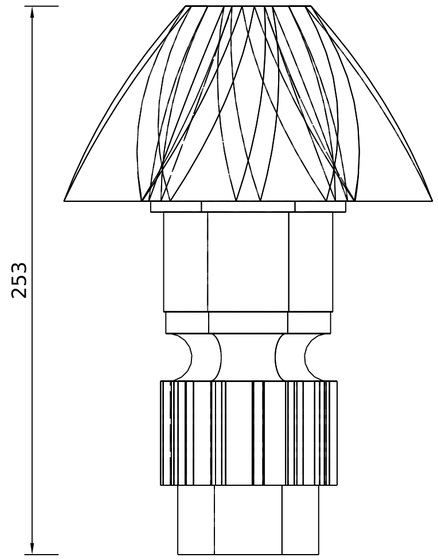
- **R6:** The model shall include a thin collar flange between the blade root and the journal, sized to an R45 circle.
- **R7:** The model shall include a cylindrical bearing journal of radius 39 mm coaxial with the head.
- **R8:** The model shall include a necked section with a concave rounded circumferential groove between the journal and the spline.
- **R9:** The model shall include a splined section with rectangular axial teeth evenly spaced around the axis.
- **R10:** The model shall end in a plain cylindrical spigot with a flat end face beyond the spline.
- **R11:** The model shall have all revolved features (head, collar, journal, neck, spline core, spigot) coaxial on one axis.
- **R12:** The model shall be dimensioned in millimetres.

Input files

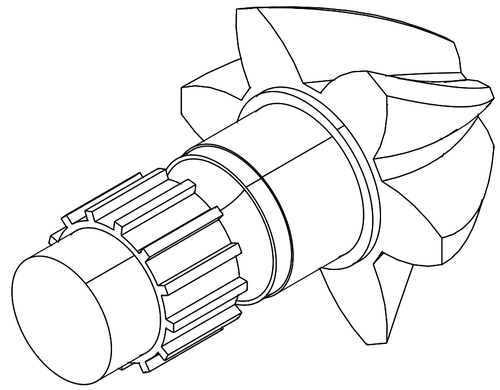
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Deliverables

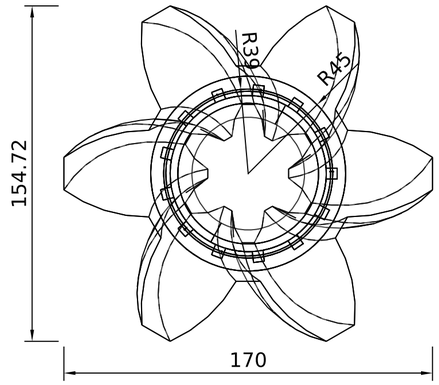
- **.catpart:** output_files/project_files/2D_Engineering_Drawing_of_a_Six-Blade_Axial_Fan_Impeller_with_Central_Hub_and_Twisted_Blades_in_CATIA.CATPart: A single native CATIA V5 CATPart containing the feature-based model of the six-blade pinion shaft with collar, journal, grooved neck, spline and end spigot.
- **.igs:** output_files/project_files/2D_Engineering_Drawing_of_a_Six-Blade_Axial_Fan_Impeller_with_Central_Hub_and_Twisted_Blades_in_CATIA.igs: IGES export of the model in the same units.



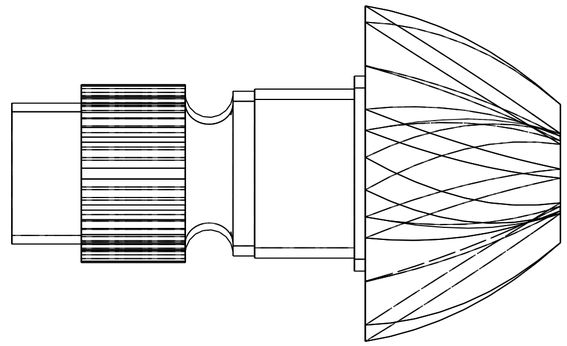
TOP VIEW



ISOMETRIC VIEW



FRONT VIEW



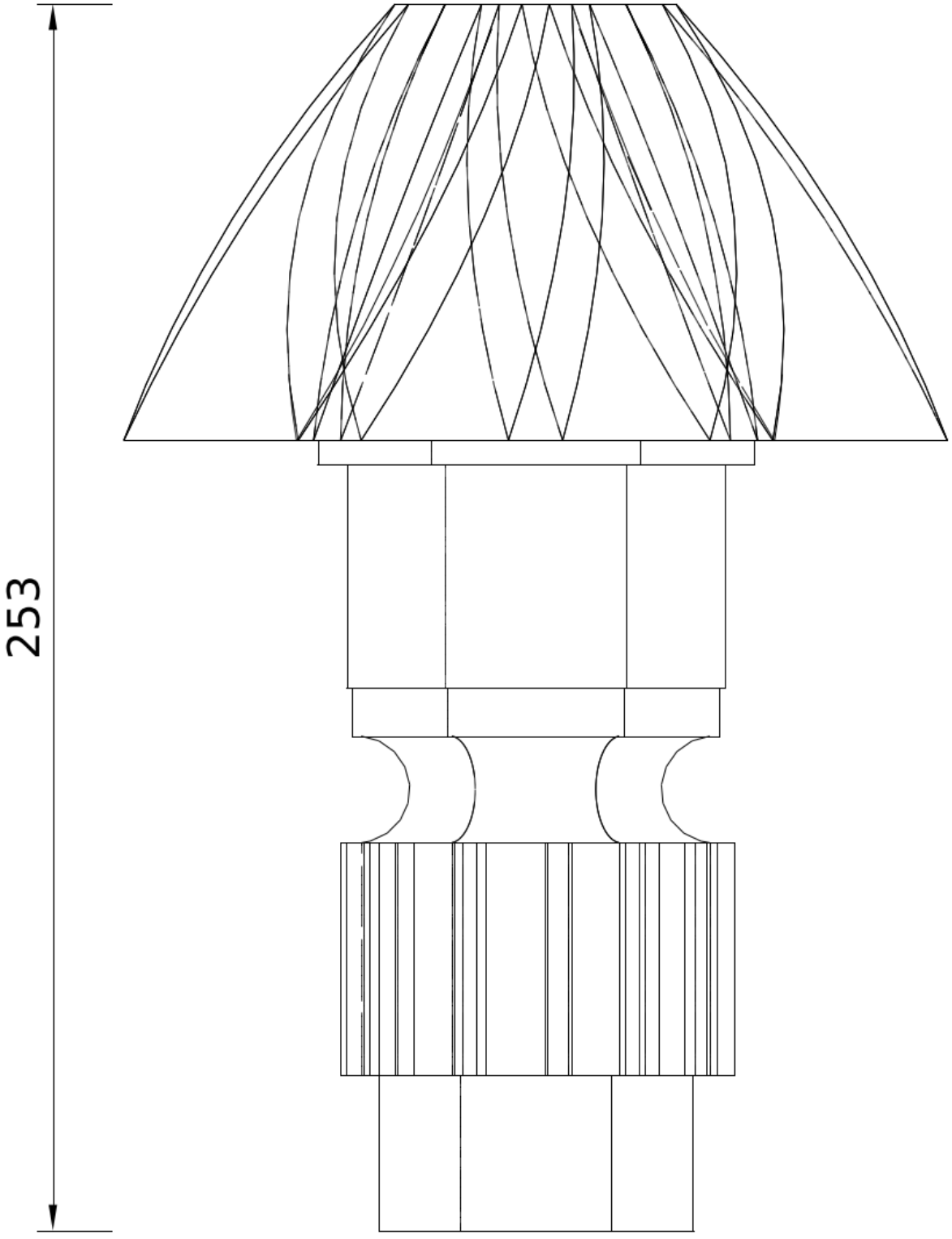
RIGHT SIDE VIEW

NOTES
1. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE STATED.
2. DO NOT SCALE THE DRAWING; USE THE FIGURED DIMENSIONS.
3. VIEWS IN THIRD ANGLE PROJECTION.

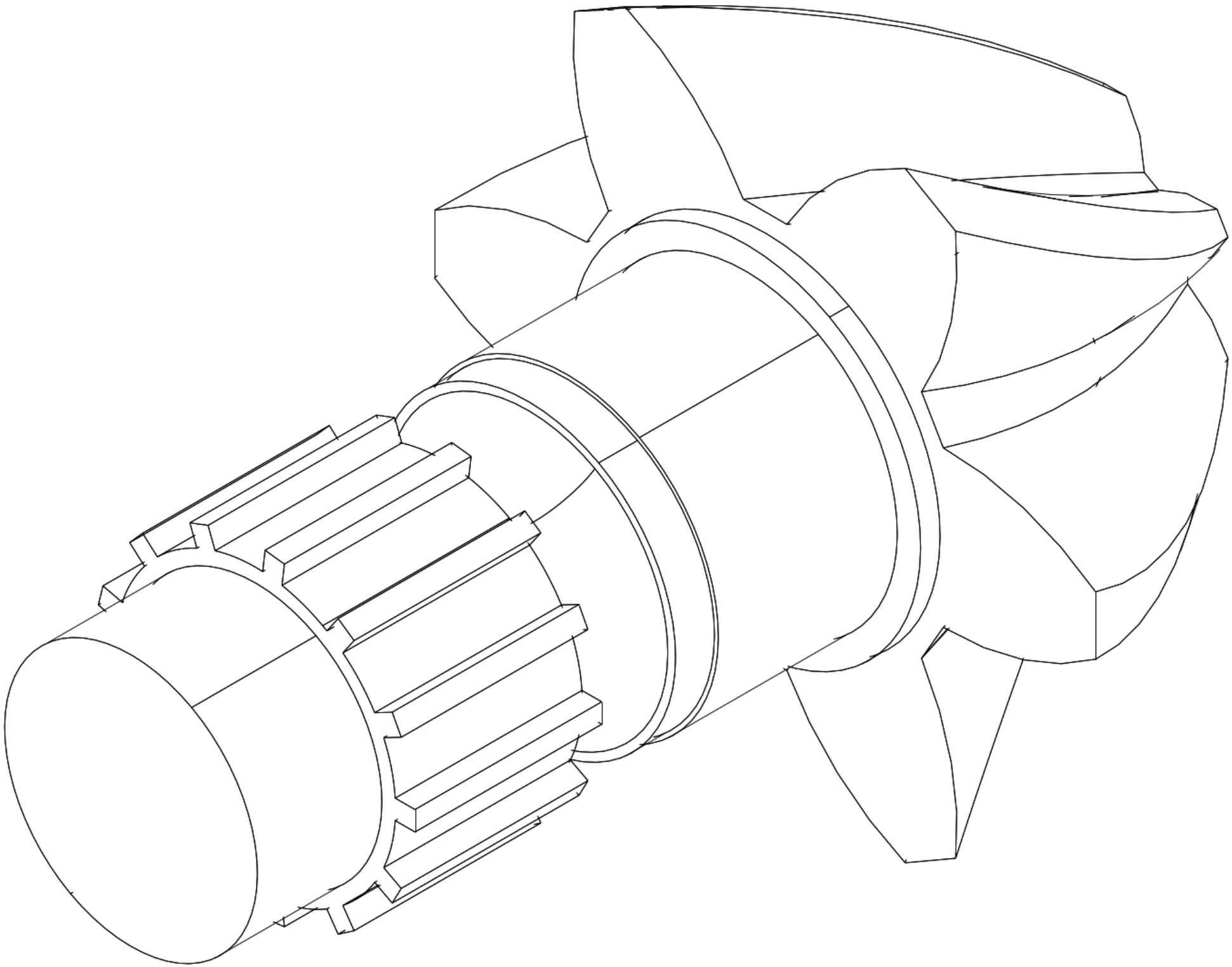
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MILLIMETRES	**1:2**	

TITLE	SIZE
SIX-BLADE TWISTED-TOOTH PINION SHAFT WITH SPLINED END	**A2**

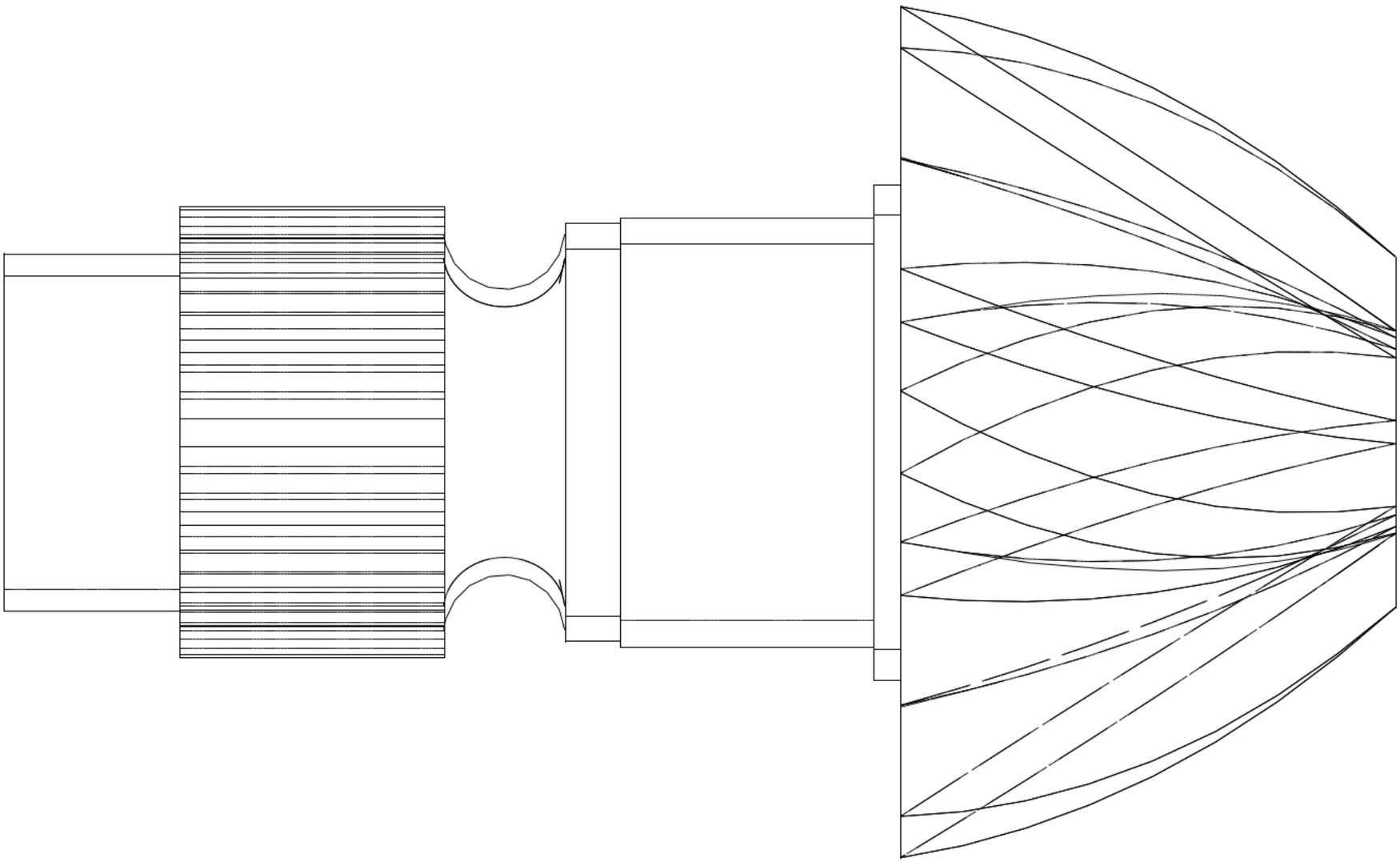
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MKV-4BD6FA9C-01	**0**	**1 OF 1**



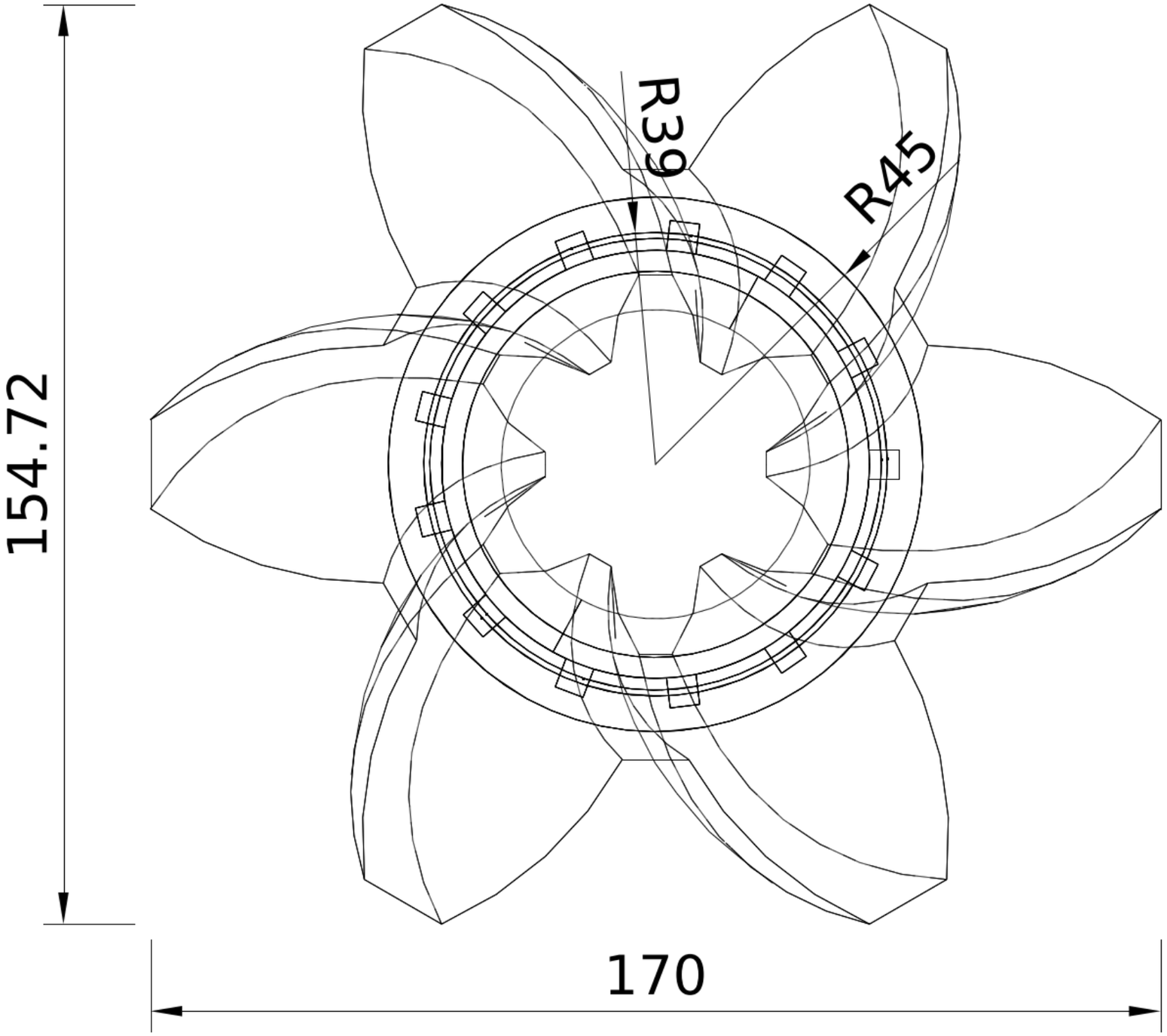
TOP VIEW



ISOMETRIC VIEW



RIGHT SIDE VIEW



FRONT VIEW