

EXPERIMENT No. - 3

INSPECTION OF CRANK SHAFT AND JIG PLATE

• Aim :

- To measure eccentricity of the crankshaft
- To measure all necessary dimensions of the jig plate.

• Instruments used: A set of slip gauges and accessories

• Theory: The crankshaft, sometimes casually abbreviated to crank, is the part of an engine which translates reciprocating linear piston motion into rotation motion.

The offset distance i.e. the axis of the crank throws from the axis of the crankshaft, called as eccentricity of the crank shaft. The eccentricity determines the piston stroke measurement or engine displacement. The crankshaft typically connects to a flywheel, to reduce the pulsation characteristic of the four-stroke cycle and sometimes a torsional or vibrational damper at the opposite damper, to reduce the torsion-related vibrations.

A jig guides the tool along a path defined by the shape of the jig. The jig may hold the tool during the operation. The primary purpose of a jig is for repeatability and exact duplication of a part for reproduction. Example of a jig is when a key is duplicated.

There are many types of jigs, and each one is custom-tailored to do a specific job. Many jigs are created because there is a necessity to do so by the manufacturers. Jigs include machining, woodworking jigs etc. A drill jig is a type of jig that expedites repetitive hole

center location on multiple interchangeable parts by acting as a template to guide the twist drill or other boring device into the precise location of each intended hole center.

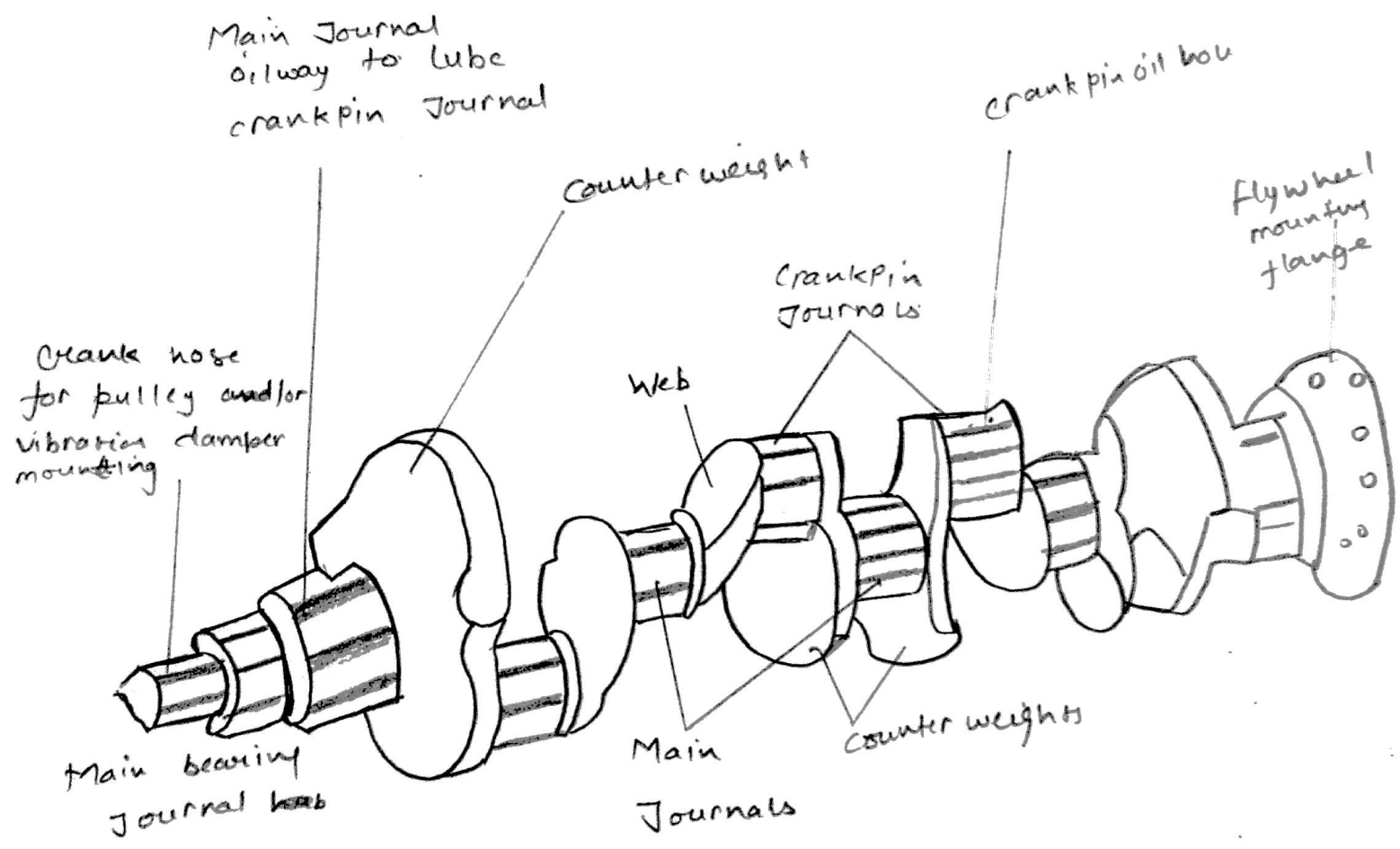


Fig 1: Crank Shaft with flywheel

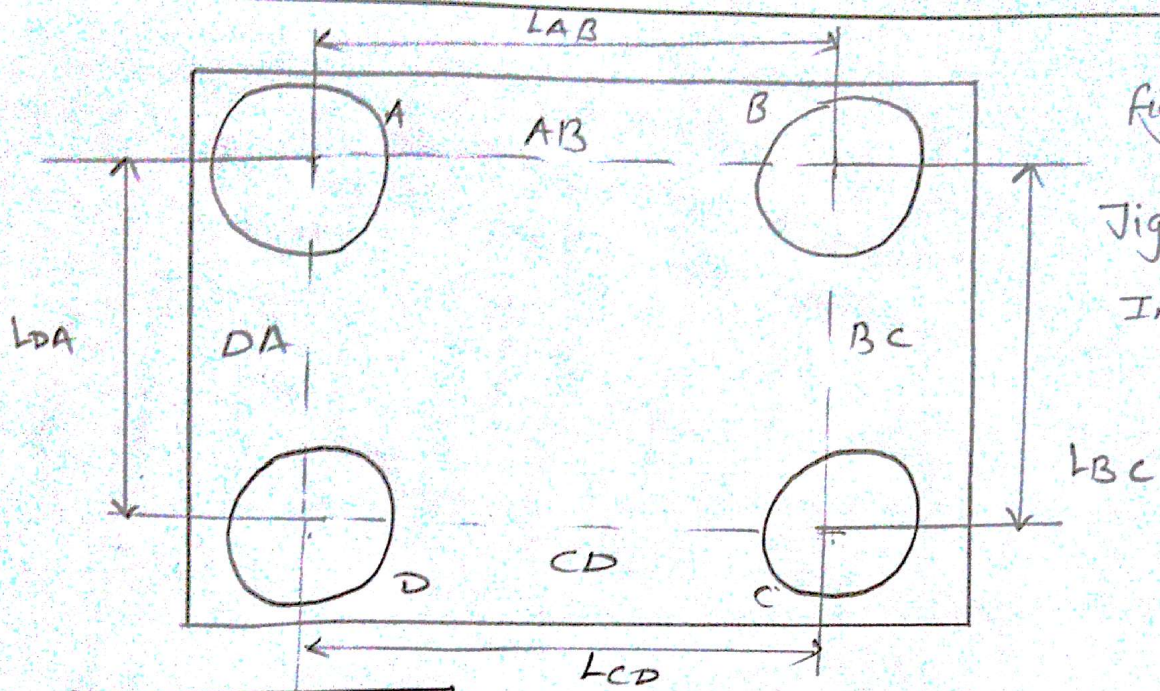


Fig. 2.
Jig Plate Inspection

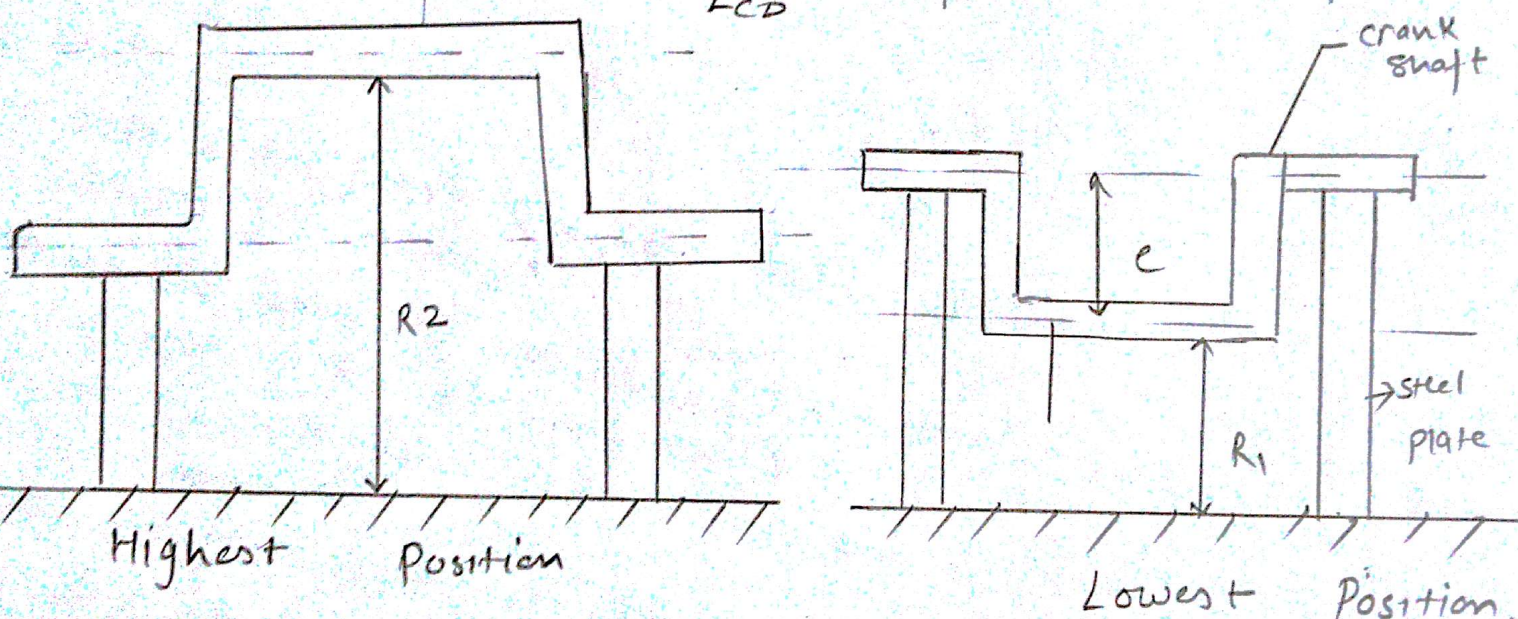
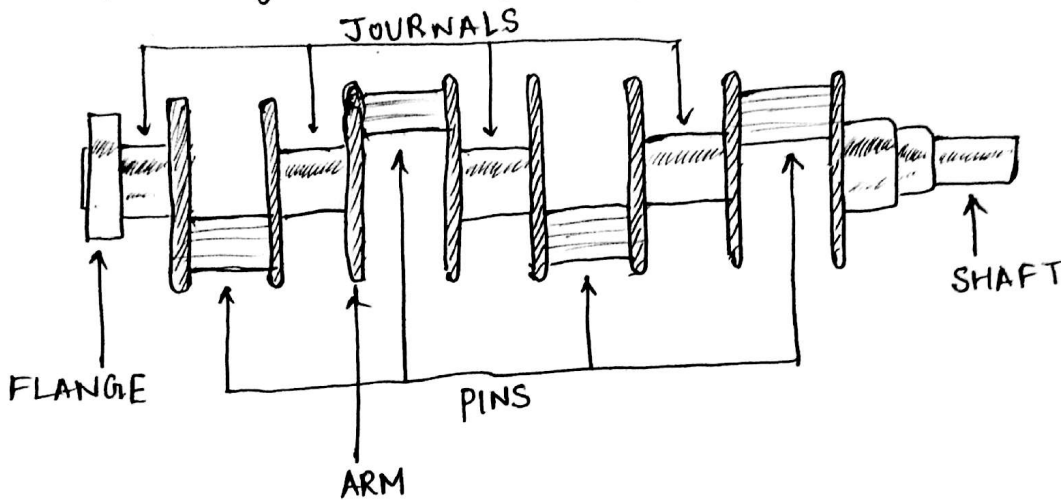


Fig. 3:- Determination of Eccentricity of the crank shaft

• Discussions

Q1 What is a crankshaft? With a neat sketch briefly explain the functions of each part of a crankshaft assembly. Discuss briefly about its application areas.

Ans A crankshaft is a mechanical part able to perform a conversion between reciprocating motion and rotational motion. For example, when used in a reciprocating engine, it translates reciprocating motion of the piston into rotational motion.



Functions of parts:

JOURNALS - serve as the points of support and as the center of rotation for the shaft.

PINS - serve as the point of connection between the crankshaft and big end of the connecting rod.

ARM - PINS are mounted eccentrically between two arms. They also have the counter weight.

SHAFT - final rotational output is obtained at the shaft.

APPLICATION AREAS

- ① Reciprocating engines - To obtain power from fuel
- ② Reciprocating compressors - To obtain compressed air by consuming work

Q2 What is jig? Why is it required in manufacturing industries?

Ans A jig is a type of custom-made tool used to control the location and/or motion of parts or other tools.

A jig's primary purpose is to provide repeatability, accuracy and interchangeability in the manufacturing of products.

It is required in manufacturing industries because using a jig to manufacture the same part again and again drastically reduces the time required in manufacturing the part while maintaining the same level of accuracy hence resulting an efficient production rate.

Q3 Differentiate between a jig and a fixture?

Ans Fixtures differ from jigs, in that the fixture holds the workpiece in one place while a tool or cutter is moved in relation to it. A jig guides the tool along a path defined by the shape of the the jig. The jig may also hold the tool during this operation.

• Observations

FOR CRANKSHAFT

$$R_1 = 13.07 \text{ mm}$$

$$R_2 = 37.77 \text{ mm}$$

$$\therefore e = \frac{R_2 - R_1}{2}$$

$$\Rightarrow e = \frac{37.77 - 13.07}{2} \text{ mm}$$

$$\Rightarrow \boxed{e = 12.35 \text{ mm}}$$

FOR JIG

Diameter of the holes:

$$\boxed{D_A = 25.09 \text{ mm}}$$

$$\boxed{D_B = 25.09 \text{ mm}}$$

$$\boxed{D_C = 25.09 \text{ mm}}$$

$$\boxed{D_D = 25.09 \text{ mm}}$$

~~Distances between~~

Distances:

$$L_{AB} = 85.065 \text{ mm}$$

$$L_{BC} = 85.065 \text{ mm}$$

$$L_{CD} = 85.065 \text{ mm}$$

$$L_{DA} = 85.065 \text{ mm}$$

$$L_{AC} = 109.92 \text{ mm}$$

$$L_{BD} = 109.92 \text{ mm}$$

Distance between centres:

$$AB = 59.975 \text{ mm}$$

$$BC = 59.975 \text{ mm}$$

$$CD = 59.975 \text{ mm}$$

$$DA = 59.975 \text{ mm}$$

Distance between diagonals:

$$AC = 84.83 \text{ mm}$$

$$BD = 84.83 \text{ mm}$$

Since the diagonals are equal, and all the sides are equal
 \therefore the jig plate holes form a SQUARE