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DESIGN MODIFICATION IN TRIPLE OFFSET BUTTERFLY VALVE TO RESTRICT LEAKAGE OF BI-DIRECTIONAL FLOW

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ABSTRACT

The Challenge often uncounted at the design phase of a typical butterfly valve is how to operate the unit with minimal from the actuator, enabling effective fluid sealing this can be minimized by the triple offset concept.
The District feature of the triple offset concept is the unique manner in which achieves fluid sealing at the disc element and its seat within the valve housing. The arrangement offers excellent sealing with minimal friction at the interfaces during engagement and disengagement.
As the result the disc is suspended relative to its seat interface via three separates offers relative to the valve axis. The valve is used for purpose control valve (its gate, ball, and disc).
The back flow effect appears due to unidirectional flow at fluid due to affected at leakage .so triple offset valve design will helps to save this problem. The analysis on various parameters will be done to check physibillity.

I . NTRODUCTION

Triple offset butterfly valve (typical valve from a family of valves called quarter-turn valves, commonly used in application.
Triple offset butterfly valves are essential in application where bubble –tight shut off is required.
In some application bubble –tight shut off cannot be achieved using double offset butterfly valve, some applications, do not lend themselves well to traditional butterfly valves, for example applications involving harsh chemicals otherwise prone to clogging valves and pipelines , in such applications triple offset technology offers superior profit.
Now we discussed about what exactly triple offset technology,
A Triple offset technology has 3 separate offsets , Two of the offsets be valid to the location of the shaft in esteem to the centerline of the disc / seat seating plane, the third offset is the design in the axis of the seat cone angle.

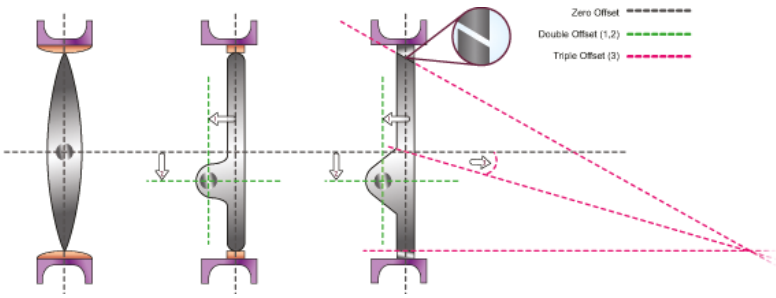

Fig. - 1 concept of triple offset butterfly valve[(1)]

Zero Offset: Disc rotates about the centre axis allowing for a potential 360º rotation. Sealing is achieved by the Disc deforming the flexible seal resulting in full friction through the full operating cycle.

Double Offset: To agree to displacement of the seat the shaft is offset from the centre line of the disc seat and body seal (offset one), and the centre line of the bore (offset two). This creates a cam action during operation to lift the seat out of the seal resulting in friction during the first 10 degrees of opening and final 10 degrees of closing.

Triple Offset: The third offset is the geometry design of the sealing components. The sealing components are every machined into an offset conical profile resulting in a right-angled cone. This ensures friction free stroking throughout its operating cycle. Contact is only made at the final point of ending with the 90° angle acting as a mechanical stop; resulting in no over-travel of the disc seat.

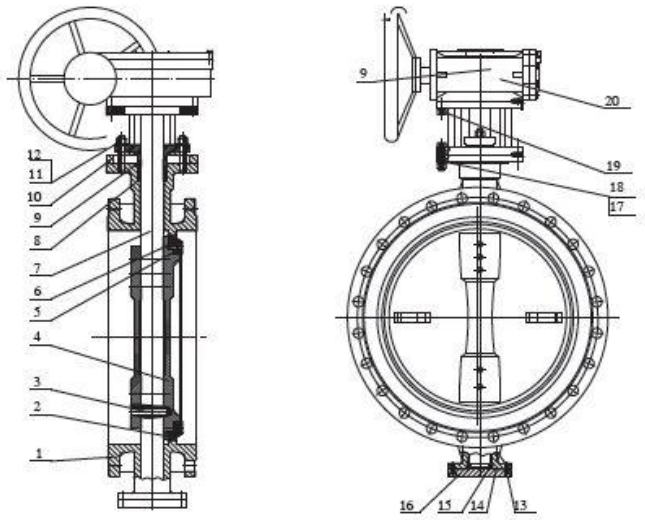

Fig. – 2 Triple offset butterfly valve[2]

II. Application Of TOBV

1) Power Station.
2) Steel Mills.
3) Paper Mills.
4) Chemical Plants.
5) Petrochemical Industry.
6) Refineries.
7) Plant-Building.

Advantages of Triple offset Butterfly Valve

1) The compact sealing is carried out rotation-symmetric .no wash out tendency as usual with lamellar sealing system. The sealing ring simple to change..

2) The selected, materials are depending on media, temp. And corrosion resistance. The valve seat is on hand in stainless steel or in hard faced erosion.

3) No brake way torque during opening the valve , therefore optimal for modeling service..

Etc can be the reward of triple offset butterfly valve.

RESEARCH METHODOLOGY

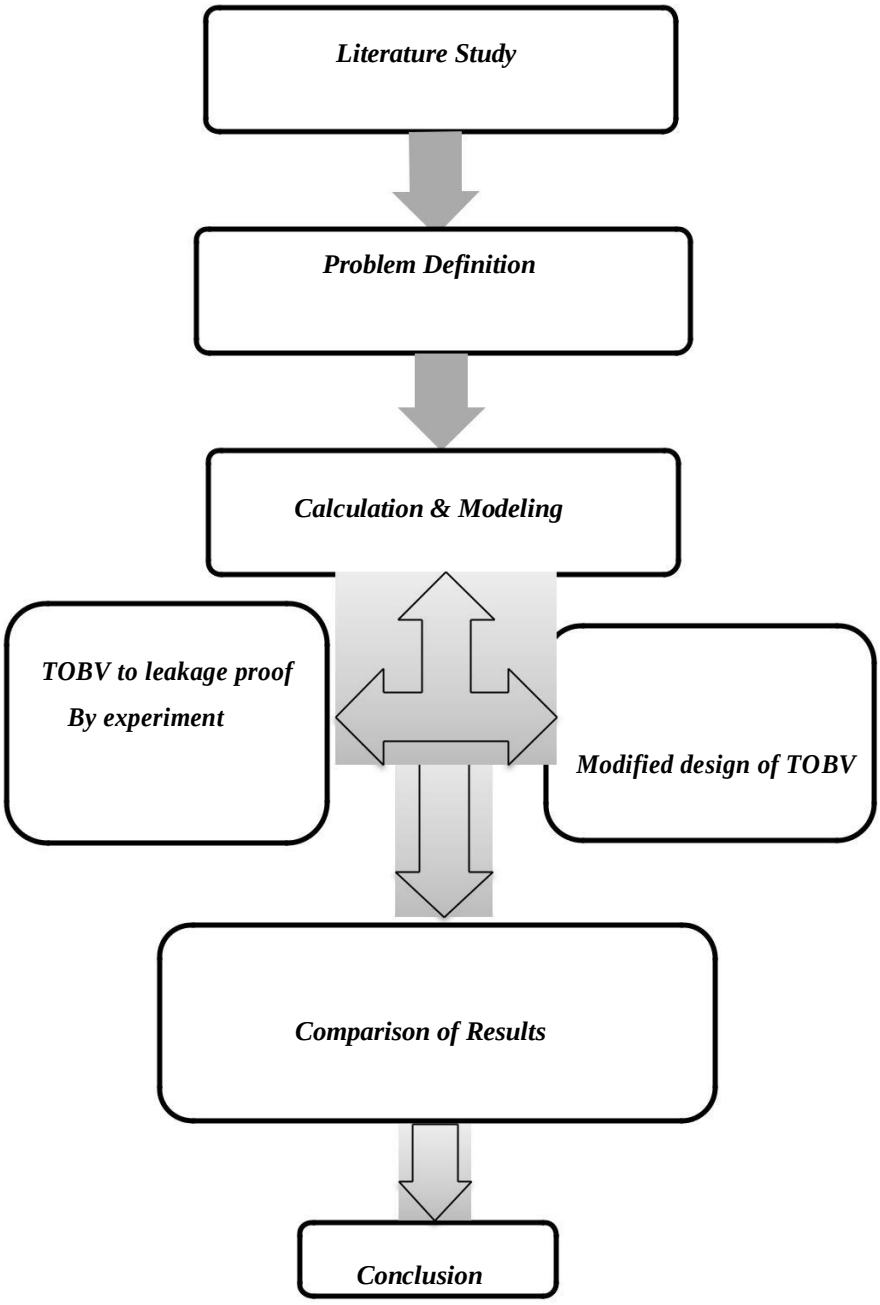

Fig. 3 – Flow Chart of proposed work

PARAMETER	VALUE
ASME B 12.34:2009	10.20
ASME Section VIII , Div 1	3.77
BS EN 12516-1:2004	8.80
BS EN 12516-2: 2005	6.01

Table – 1. Standard Parameters [4]

Table – Minimum test duration API 609&API 598

VALVE SIZE	SHELL TEST(MINUT)	SEAT TEST
15-100	2	2
150-250	5	5
300-450	15	5

Table – 2 STANDERD PERAMETER API 609

- The hydrostatic shell test and seat tests are conduct on each assemble valve
- During The Shell test Ball, Gate or disc Shall be Partially open.
- The test Pressure Performed As per Above API 609& API 598

III. Modified Design :

1. Change body disc die.
2. Increased gasket material.
3. Add bush in both side of shaft.
4. Add grove in male and female ring.

IV. MODEL FORMULATION (Solid works 2016)

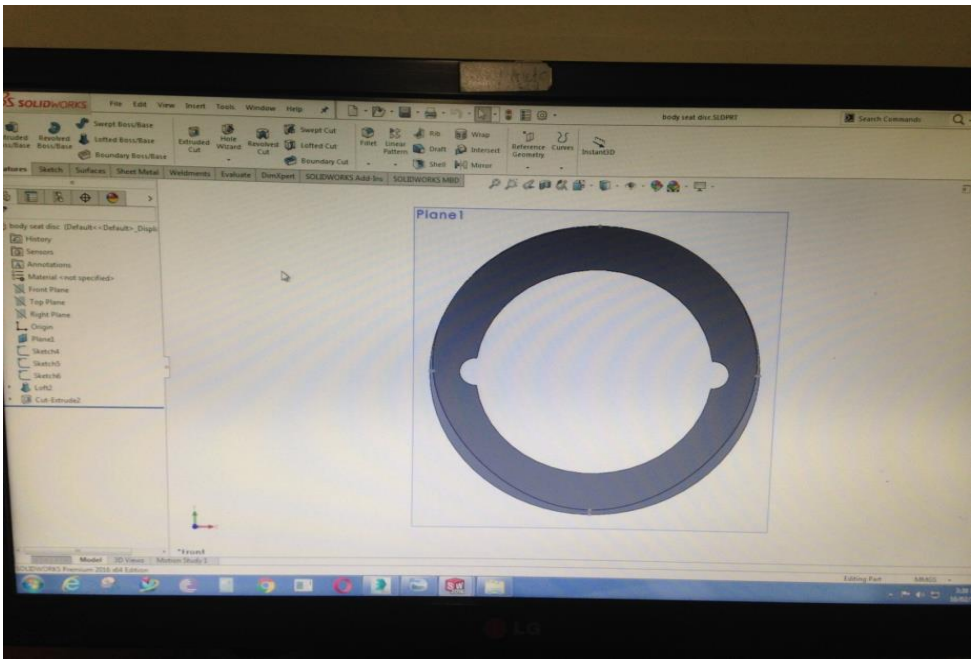

Fig. 4 – body disc Model

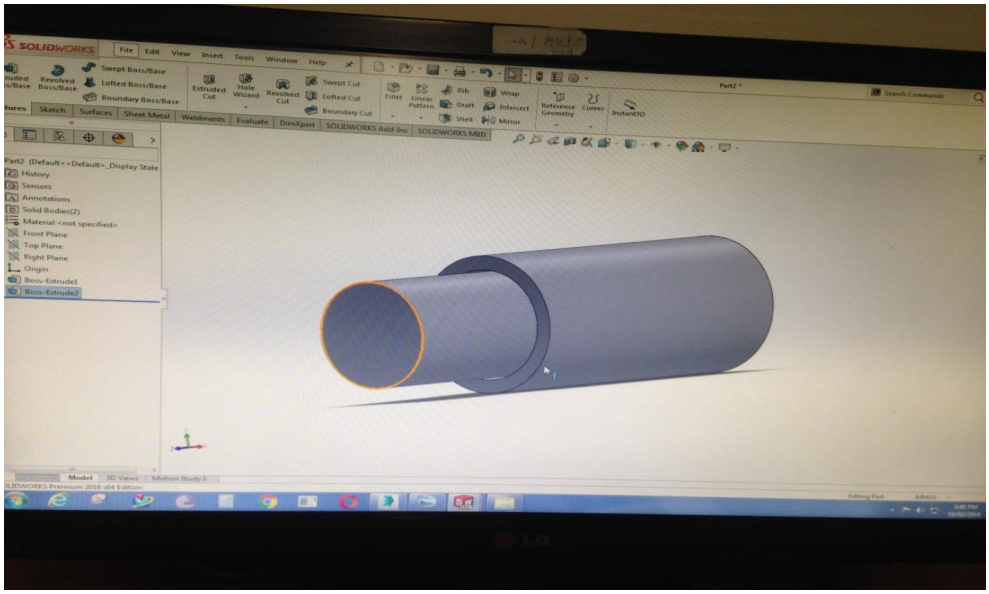

Fig. 5 modified shaft(add bush in both side)

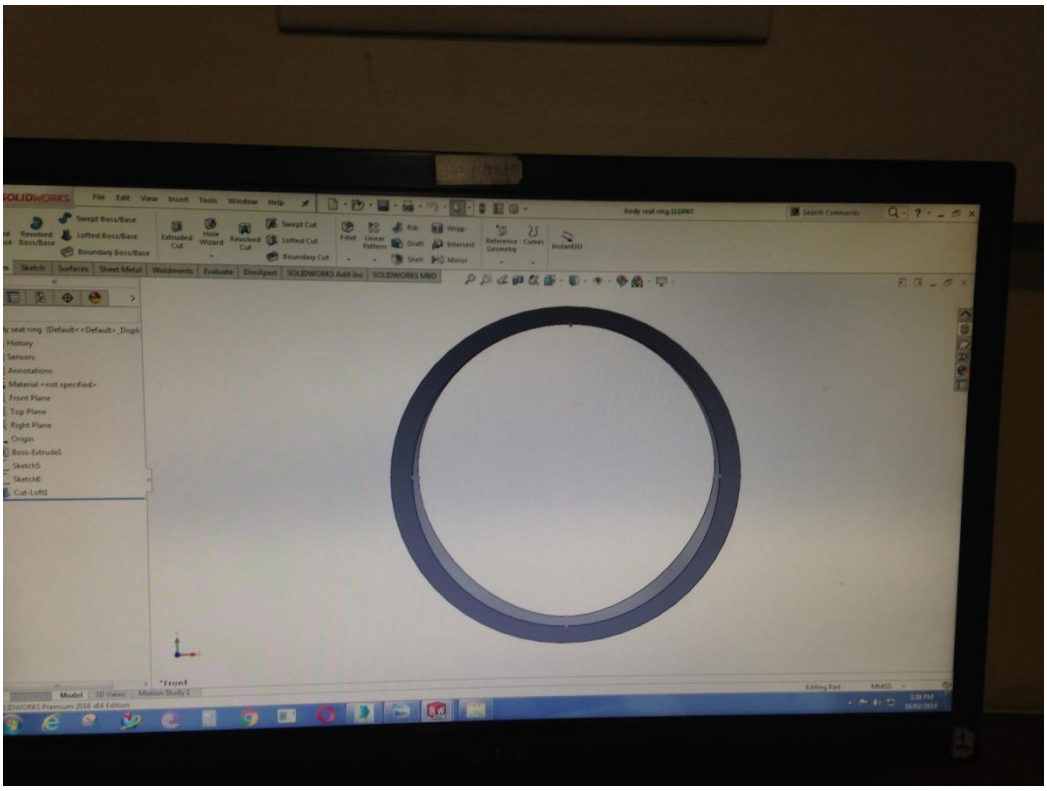

Fig. 6) Disc Seat Modeling

7 ***(Testing leakage of TOBV)***

Fig. 7) Testing Of Leakage (TOBV)

Fig. 7) Air Leakage Testing (TOBV)

CONCLUSION

- As the Disc Offset Increases, torque values decrease with almost constant rate.
- Foe non rubbing action ,sealing of valve should be at zero angle
- Achieved zero leakage in bi-directional way.
- It's give less operating torque and longer service life.
- Modified design feature give, zero leakage, bi- directional flow, metal to metal sealing, low oparating torque and longer life.
- Inherently fire safe and blow out proof design.
- There are no cavities found between sealing components, result is no clogging, low maintenance and extended valve life.

SCOPE

- Triple offset valves are versatile components widely used in hydraulic systems as shutoff and throttling valves.
- Used for high pressure application.

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