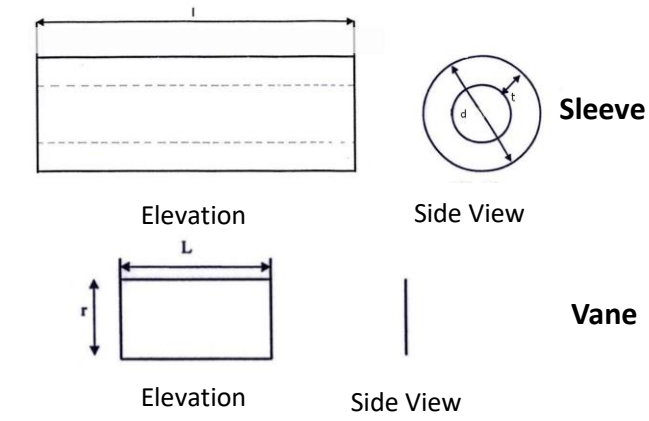
Sketch Depicting - RVCR Principle Elements



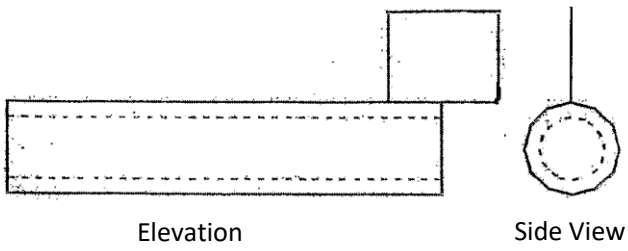


Fig 1 Sleeve Vane Fitting

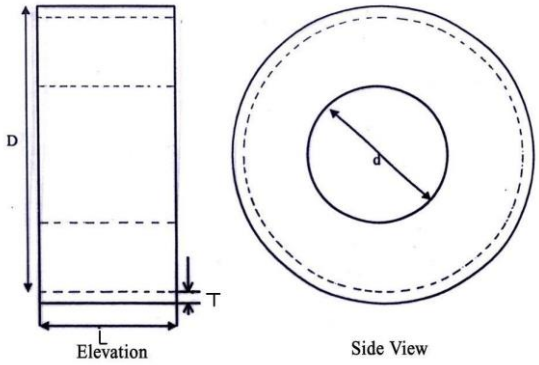


Fig 2 **Liner**

Sleeve a Cylinder of outer diameter 'd', length 'l' and thickness 't'.

Liner : A Cylinder of inner diameter "D", length by " L" and thickness "T" with two circular cover plates on both ends. The cover plates have a hole of diameter "d equal to sleeve's outer diameter 'd'.

Vanes. A rectangular plane of length " l" and width " r" such that r= (D-d)/2. fixed radially to sleeve with half length of it's edge (l) rigidly fixed on sleeve and the other half extruding out of its end Face.

Sketch Depicting - RVCR rotary Element Assembly

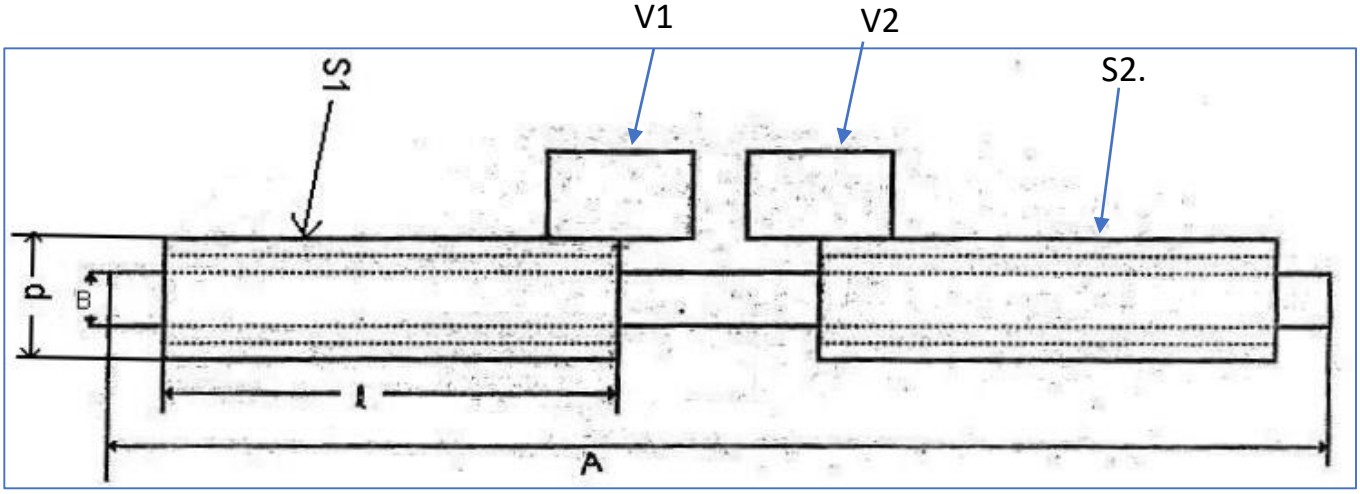


Fig 3 **Sleeve Vane Fitting on shaft**

The surface of V1, V2 is radial to S1, S2. and V1, V2 are fitted on one of the two ends of S1, S2. with Half length of fixed edge projects out of the sleeve. The V1, S1 fitting is here referred to as VS1 The V2, S2 fitting as VS2 .

Sketch Depicting - RVCR Principle Element Assembly

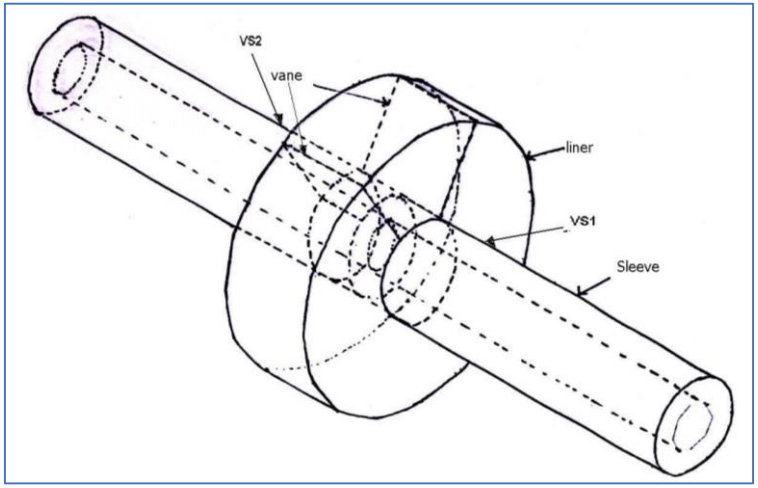
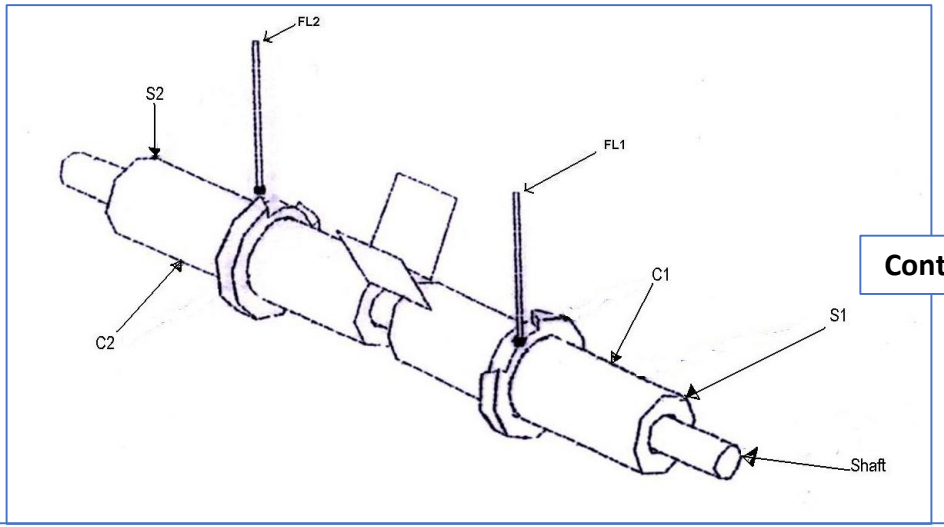


Fig 4 **Sleeve Vane Fitting cased inside Liner**

- VS1 and VS2 are fitted in the liner where 3 edges of vanes touch the inner surface of the liner and half-length (the one projecting out of the sleeve ends) touch the outer curved surfaces of facing sleeve.
- The ends surfaces of the sleeves present inside the liner touch each other, Lengths of (l- L/2) of both sleeves project's out of the end cover plate holes of liner, and sleeve axis liner axis are collinear.
- The space inside the liner is separated into two parts by VS1 and VS2

Sketch Depicting - RVCR Principle Control Elements

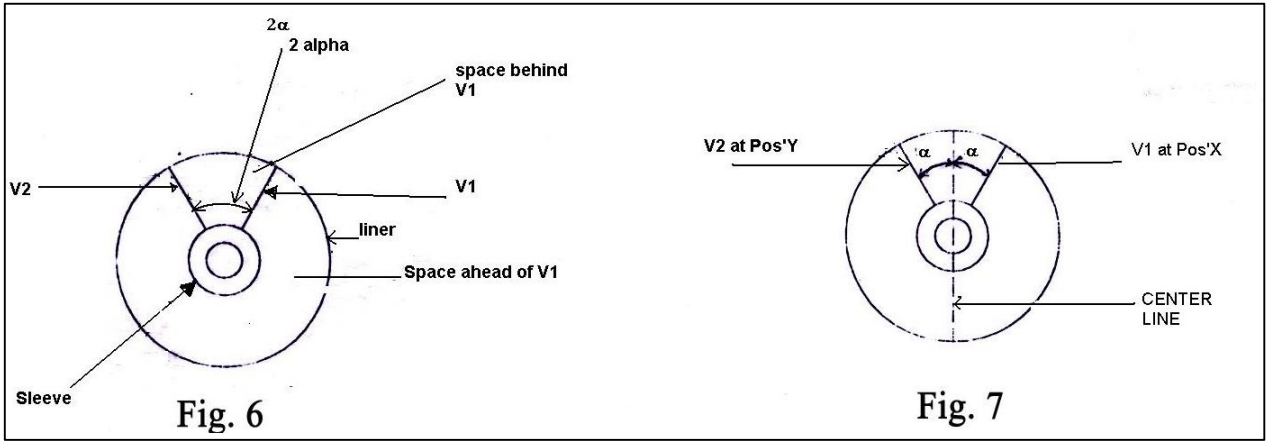


Control mechanism

Fig 5

Cams with negative profile of an angle of 4alpha fitted/driven by sleeve with the line bisecting the profile is parallel to the plane of the center line of the vanes. Cam followers actuate linkages to engage/disengage the sleeves with shaft and sleeve with ground. When V1 is at POS'X the follower of C1 gets out of the profile, disengaging S2 from the shaft and engaging brake to hold S2 at rest. On V1 reaching POS'Z, follower of C1 rides in the profile releasing brake band of S2 and engaging it with the shaft. Now both sleeves rotate. As V2 reaches POS'X, the follower of C2 rides on base circle. Now S1 is disengaged from shaft and its brake holds it stationary. Repeating this results in the RVCR sequence.

Sketch Depicting RVCR Operations Sequence Slide 1



- Initially v1, v2 are placed apart by 2 alpha degrees,
- v1, v2 lie on either side of the vertical plane,
- The vertical plane bisects the inclusive angle between v1 and v2,
- The position the vane v1 is referred to as POS'X and that of vane V2 as POS'Y.

Sketch Depicting RVCR Operations Sequence Slide 2

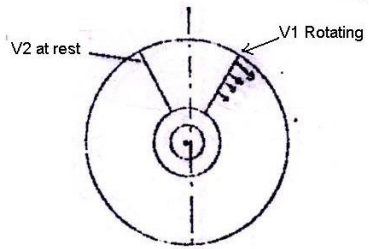


Fig. 8

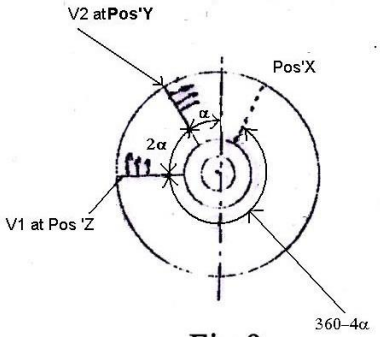


Fig.9

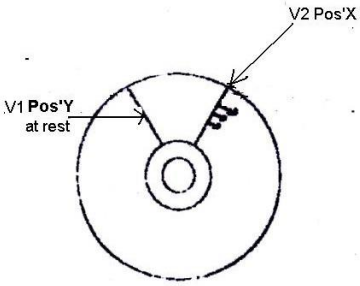


Fig. 10

- VS1 rotated about its central axis in clockwise direction. This leads to reduction of volume of space ahead of v1 and increase in volume of space behind v1.
- As V1 is rotated through 360 - 4 alpha degrees in a position POS'Z;
- Hereafter both VS1 and VS2 are rotated. When VS1, VS2 reach POS'Y, POS'X respectively, VS1 is stopped and only VS2 is rotated.

Sketch Depicting RVCR Operations Sequence Slide 3

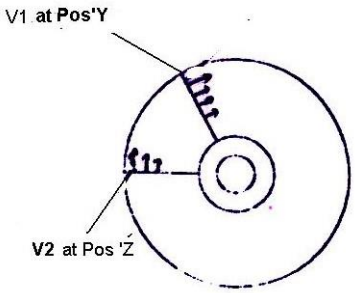


Fig. 11

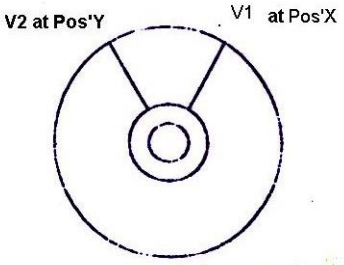


Fig. 12

- Like VS1 when VS2 attains POS'Z, then both VS1 & VS2 are rotated till they attain POS'X & POS'Y respectively.
- Now VS1 start's rotating and the full cycle is repeated

On continuously rotating the vanes in this fashion, the two vanes are simultaneously at POS'X, POS'Y and POS'Y, POS'X alternately, once in every 360-degree rotation of any of the two vanes.

RVCR – Single Stroke I.C.Engine cycle Slide 1

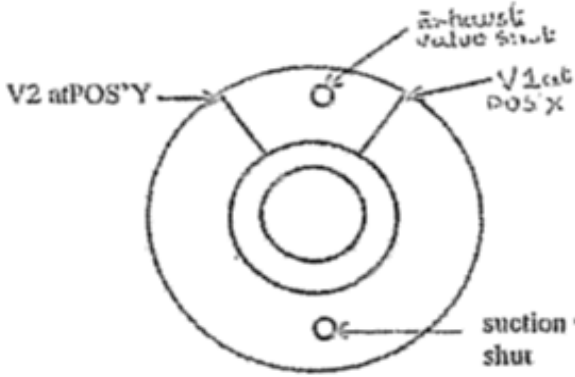


Fig. 17

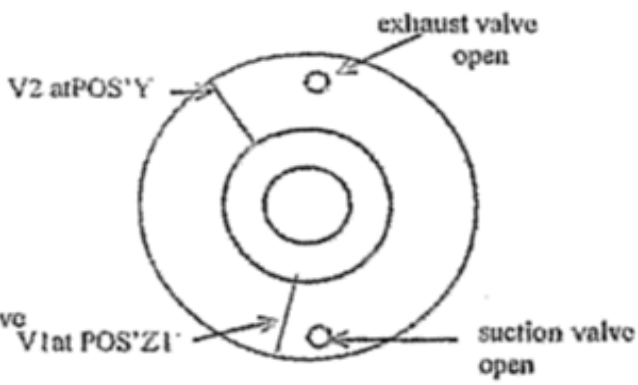


Fig. 18

- Initially V1 and V2 are at POS'X and POS'Y. The suction and exhaust valves are in closed position. Now V1 rotates and gases ahead of it is compressed.
- As V1 reaches position POS'Z1 and exhaust/suction valves open (The vane has rotated past Suction valve and the space ahead of it is sealed from exhaust valve.

Slide 3

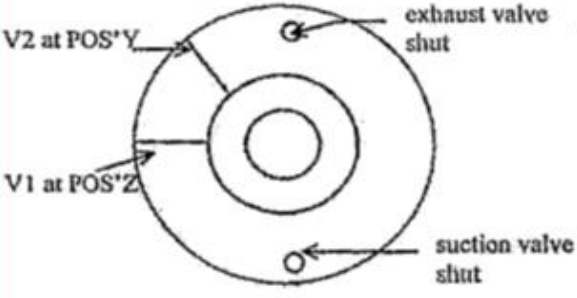


Fig. 19

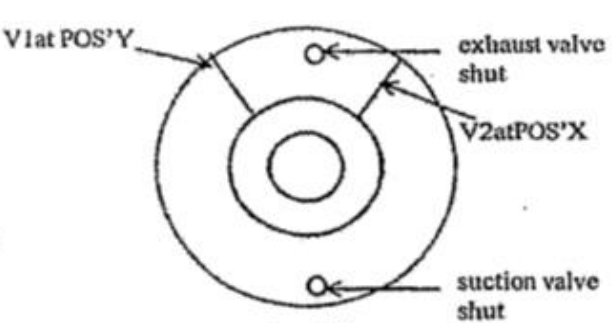


Fig. 20

- Then V1 reaches POS'Z, both V1 & V2 rotate and reach POS'Y, POS'X.
- V1 is now at rest. Heat addition to the compressed gases ahead of V1 takes place.
- Now power stroke for V2 starts and the gases are expanded till POS' Z1 and the exhaust and suction Valve opens and then reaches POS' Z.

RVCR – Single Stroke I.C.Engine cycle Slide 3

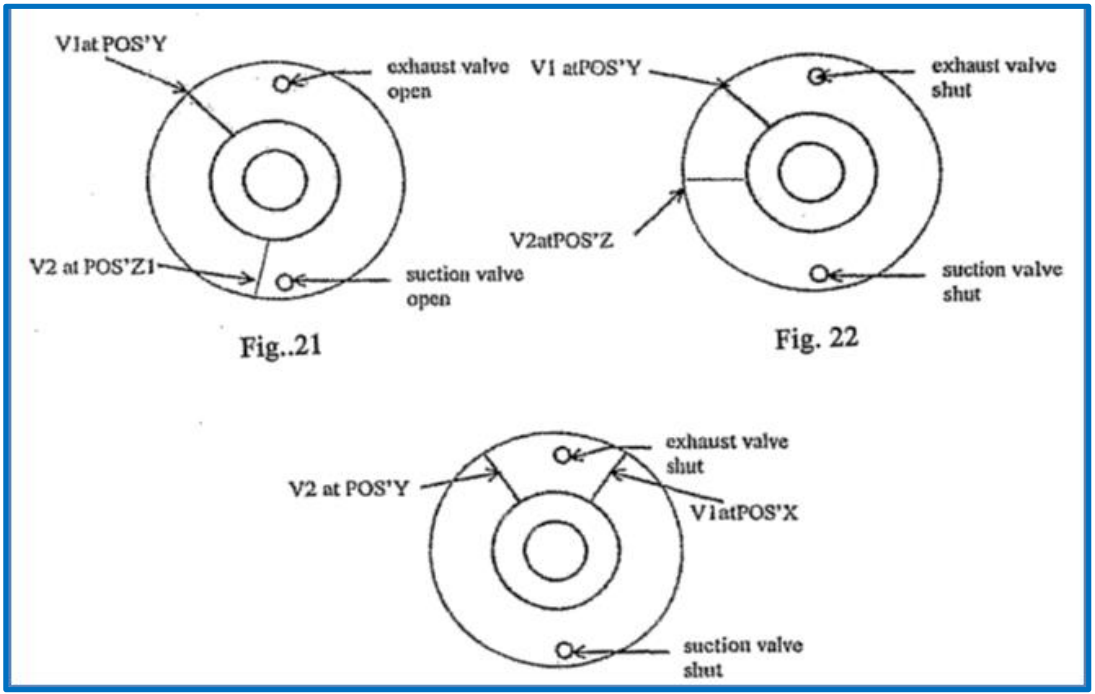


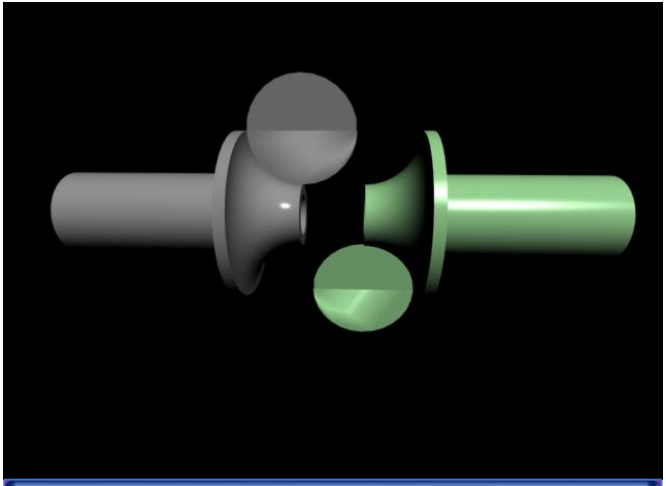
Fig..21

Fig. 22

The sequence now repeats cyclically.

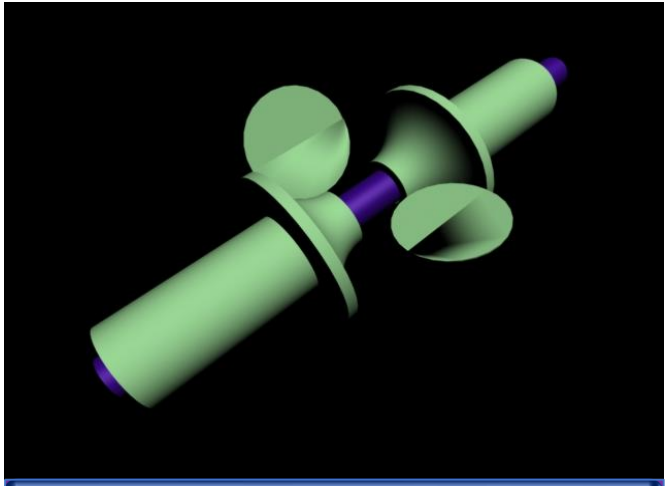
Elements of RVCR – Simplified CAD Models

Sleeve vane fitting- 1



Two circular plates attached to hollow cylindrical sleeves

Central shaft -2

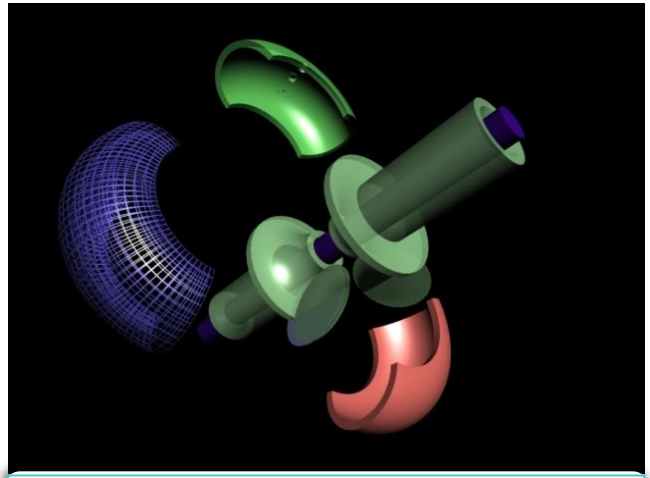


Two sleeve vane fitting' mounted on central shaft

Simplified Geometric Model

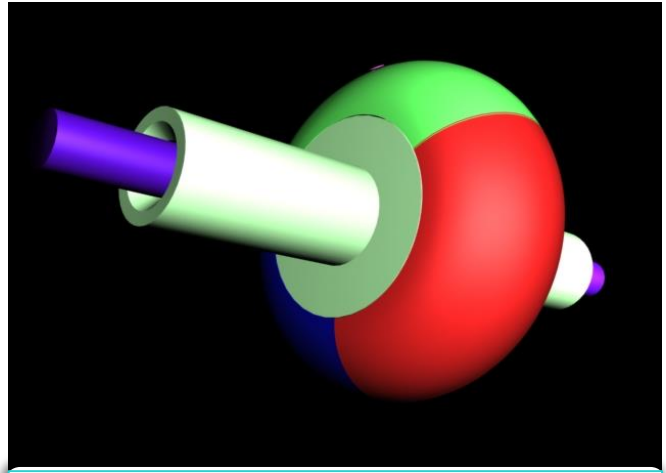
Elements of RVCR – Simplified CAD Models

Outer casing - 3



sleeve vane fitting on shaft & outer covering casing in parts

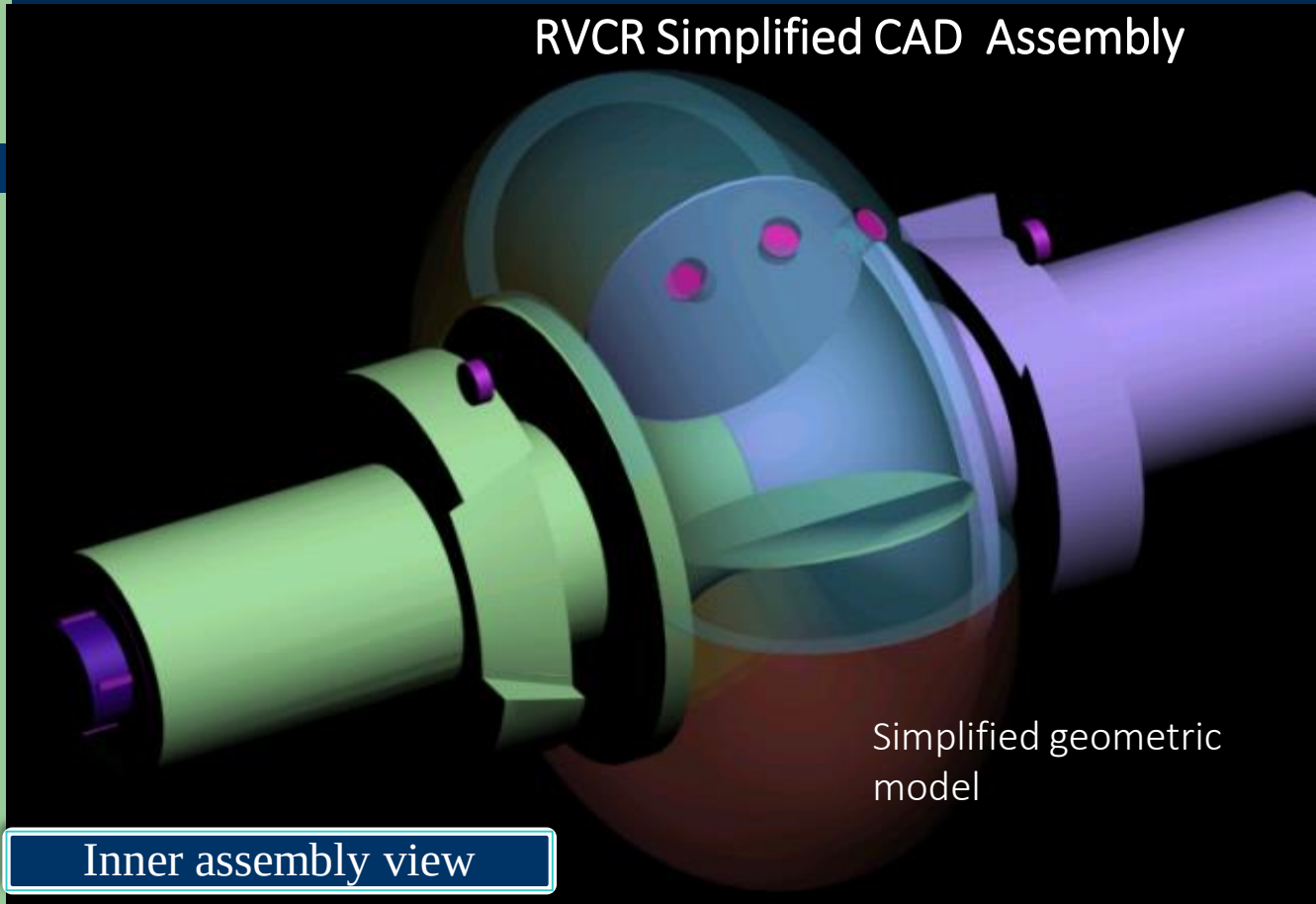
RVCR element assembly



sleeve vane fitting on shaft encased in outer liner part

Simplified geometric model

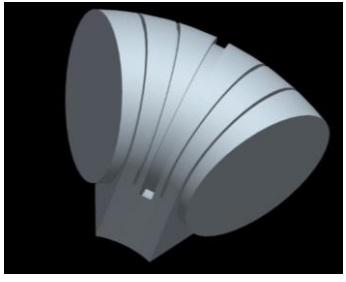
RVCR Simplified CAD Assembly

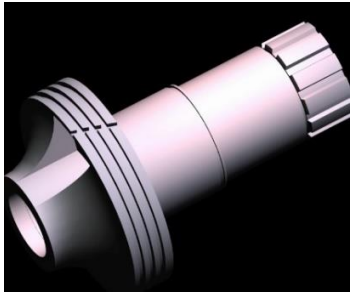


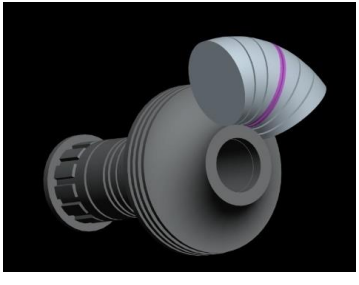
Simplified geometric model

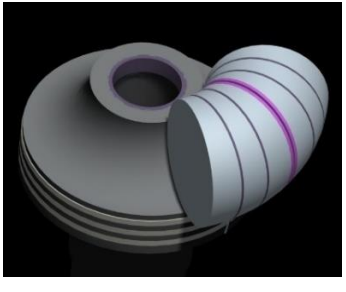
Inner assembly view

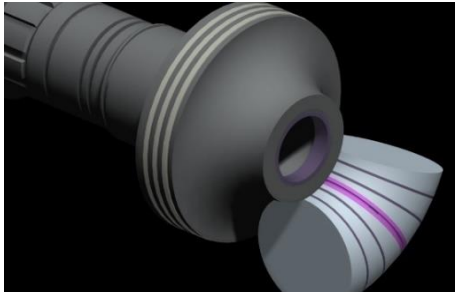
RVCR Base Component Vane Sleeve CAD Models

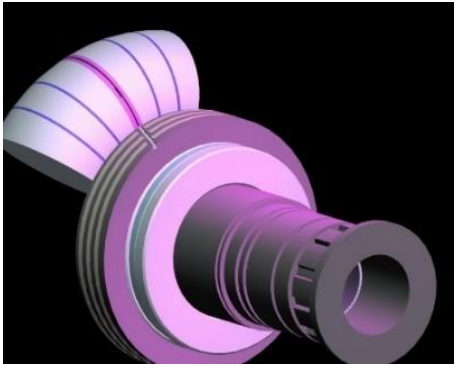




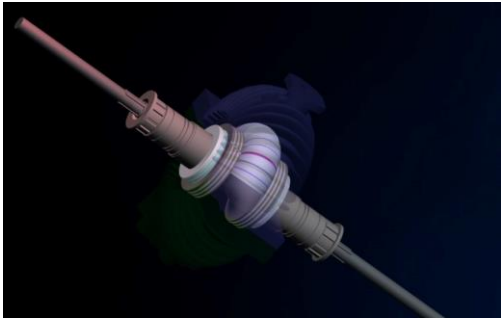


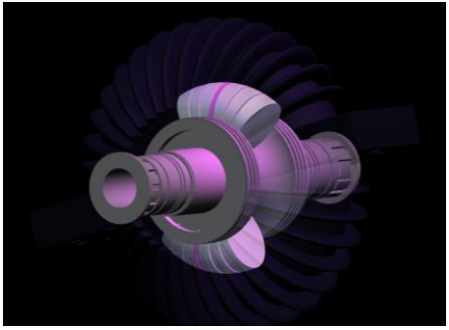


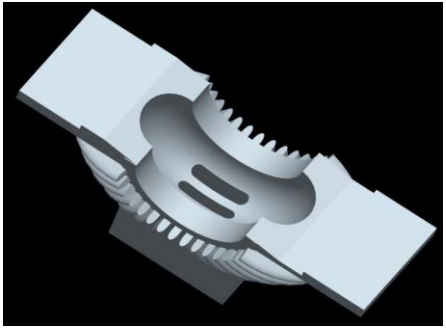


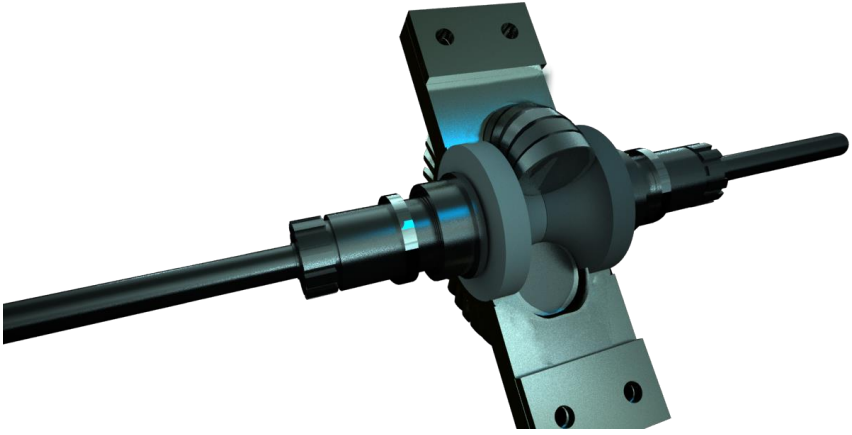


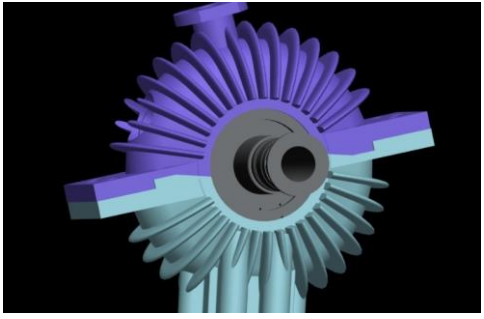
RVCR (Sleeve Vane fitting), Shaft & Casing Assembly CAD Models



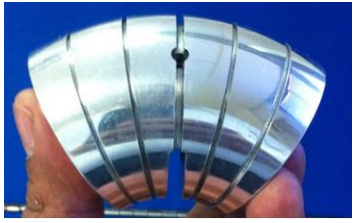


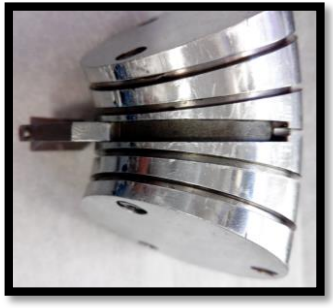


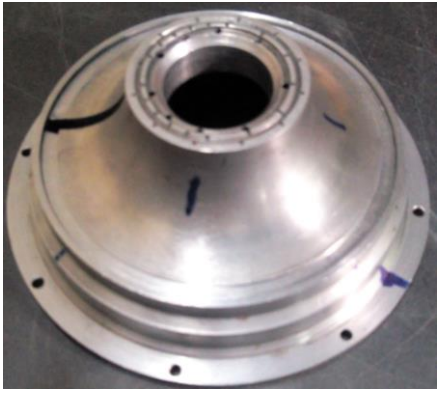




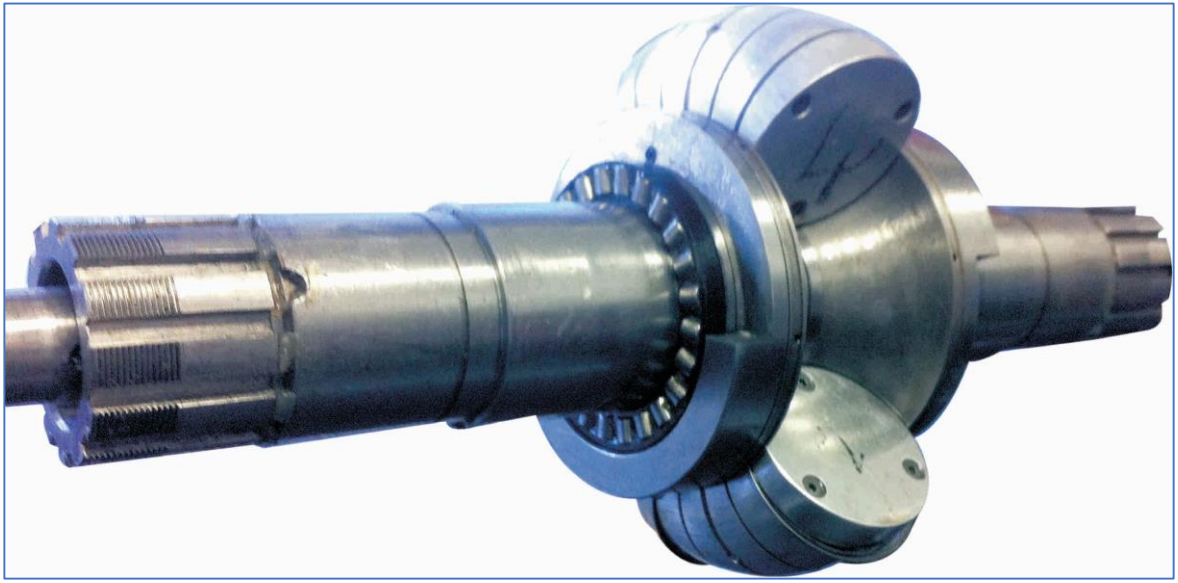
RVCR Manufactured components – Vane & Sleeve

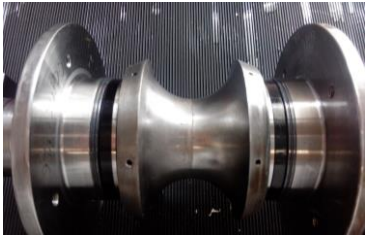






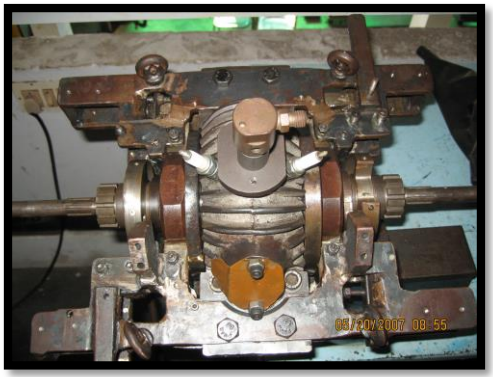
RVCR Physical Subassemblies – Vane Sleeve Fitting on Shaft





RVCR - Physical Components (Casing) & Subassemblies

RVCR – Early Prototype Assembly



RVCR – Early Prototype Assembly

RVCR IS VIABLE VCR, RVCR IS VIABLE VCR, RVCR IS VIABLE VCR