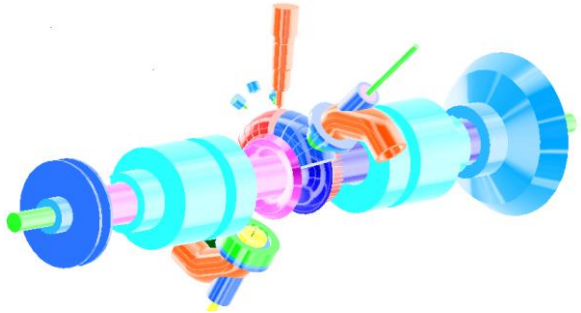
Invention title “Apparatus adopted to perform as compressor, motor, pump and Internal combustion engine”

Gyatk RVCR Technology *For details click “the invention”*

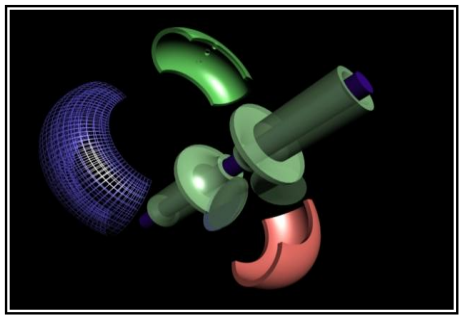
The Invention form the base technology, referred to as GYATK RVCR Technology, here after for across the spectrum engineering applications which, as implied by the title, and leads to a series of varied new genre down stream products.

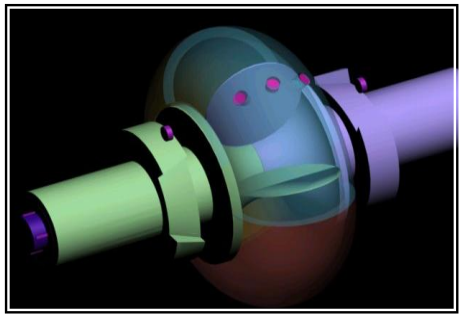
The technology encompassing the base engineering mechanism is not just limited to straight applications listed in the title and applies to vivid lower derivative products like metering devices, Variable delivery pumps, dosing applications and in biomedical equipment etc. A similar example is the mechanism applied to wind power, tidal power generators results in better efficiency “wind and water motors” which are used for generating powers. Such product are designed and developed by gyatk.

VCR I.C. Engines based on the mechanism.



A new dimension in Engineering Mechanism





Thermodynamics

- Thermodynamic gas cycle using fewer and simpler components.
- Employing the curved liner and pistons concept & the vane and sleeve concept

Mechanisms

- Simplifies the relative motion and Elimination of crank mechanism
- Sequential operation of vanes eliminating reversal of inertia forces

Power Delivery

- Delivers lighter and smaller power packs.
- Rotary mechanism eliminates connecting rod and built up structure.

Parameter Control

- Enables intricate control on internal combustion parameters.

1. VCR and RVCR Technology

The I.C. Engines based on the invented mechanism enable the VCR feature.

Knowledge links, VCR

The current challenges of the IC Engine industry, namely stricter **EMISSION NORMS & HIGHER FUEL EFFICIENCY** can be best addressed by VCR or variable compression ration. The VCR aspect in engines has long been researched by almost all players in the industry and by engineering academia. The test results of experiments and performance trials on numerous engine models, capable of achieving VCR has demonstrated the benefits, advantages and implications of VCR which is well published and universally accepted. It is an established fact that I C Engines can achieve huge improvements in all key performance parameters if the compression ratio of engines could be varied while the engine is in operation.

The VCR feature is possible in conventional engines and conventionally the VCR aspect in engines is affected by incremental attachments, modifications and alterations to the base crank mechanism. These are categorized into various different principles but these needs fitting of large number of attachments and complicated add on component mechanism. However most provide VCR in a very limited range E.g. only two choice of compression ratios. All these make Conventional VCR Engines Commercially nonviable. Though engines which achieve VCR to certain limited extent were successfully made, these engines have largely remained experimental engines and not as commercial products. There are various factors, which make the conventional VCR engines commercially unviable.

The invented mechanism enables I.C. Engine with the Variable Compression Ratio VCR commercially Viable

2. RVCR Characteristic

Quantum leap in Fuel efficiency and Emission Quality by combustion control

GYATK Roto – Dynamic VCR achieves analogous variation in compression ratio though out the Compression range of fuels ranging from light fuels like LPG (6:1) to Heavy fuel (22:1). The C R range is unlimited and CR can be dynamically varied through out the entire load range. It opens up the rigid constraints in I.C. Engine and throws open entirely new dimensions in combustion control which makes the whole fuel burning process completely flexible. The Compression Pressure manipulation during operation opens the field for a number of possibilities

Multi-fuel engine: - compression ration can be varied all through the desired combustion ranges of different fuels. Since the compression ratio is also fuel specific, example: petrol to burn inside an engine, requires compression ratio different from that required by diesel. Engines based on the invented mechanism facilitate use of different fuels within the same engine and thence resulting in a Multi-fuel engine. Presently IC engines are designed for burning petrol and as such cannot run on diesel, whereas based on the invented mechanism enable the changeover of one fuel to other during the running of the engine. Also, the thermal efficiency of an engine is improved by Variable compression ratio. The variation in the compression enables choice between various combustion patterns thus enabling enhanced emissions control.

Downsizing engines: - The rotary mechanism eliminates of number of components w.r.t to its conventional equivalents hence resulting in smaller and more compact engines. The rotary mechanism also results in elimination of various vibration imparting components w.r.t its conventional equivalents. The invented mechanism eliminates reciprocating action of pistons as in conventional crank mechanism. Elimination of reversal of stroke eliminates the reversal of inertia forces and mass. This leads to simplifying of design calculations involved and balancing of the engine rotor.

Enhanced Emission control: - controlled Peak pressure manipulation through out the Load range. The ability to achieve higher peak pressures at low loads and reduced at peak loads helps optimize peak pressures through out the load range.

Enhanced Fuel efficiency: - cycle unlike in conventional reciprocating engines where two instantaneous gas volumes can never be equal in both magnitude and direction, the RVCR mechanism provides for constant volume heat addition through a finite angular range during the in gas Cycle. Additionally when the engine is switched over to diesel/ compression ignition cycle the heat addition process is switched over to constant pressure.

Engineering solution for stricter emission standards

3. (VIS-À-VIS the existing VCR engines)

The key advantages Gyatk RVCR mechanism	Limitations of conventional VCR
• It enables smooth, step less and precise variation of the compression ratio enabling multi-fuel operation of an Internal I.C. Engines Combustion Engine (I.C. Engine). • It enables **combustion control by compression pressure manipulation** through out the load range. • It enables Peak pressure manipulation through out the Load range. • It enables constant volume heat addition through a finite angular range in gas cycle. • It enables new High in Design Freeze Levels in Engine Technology Defining higher datum for performance parameters	• Incremental Development of already saturated Conventional Mechanism – Incremental addition on existing Engines – Mechanisms extremely cumbersome • Attains limited VCR range – attains very limited V.C.R (Mostly 2 values, switching over between two Compression ratio Values • Parasitic attachments – Powered by mother Engine to achieve VCR, – VCR drive power demands negates Gains from VCR • Additional cost, weight & volume – The attachments mostly are made up of many individual precession components hence the cost and weight involved offset the disproportional gains – The engines mechanism gets unduly complex and requires expertise and care, resulting in undue increase in maintenance cost and difficulty