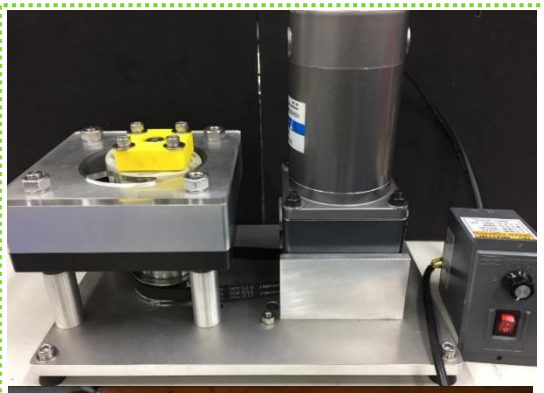
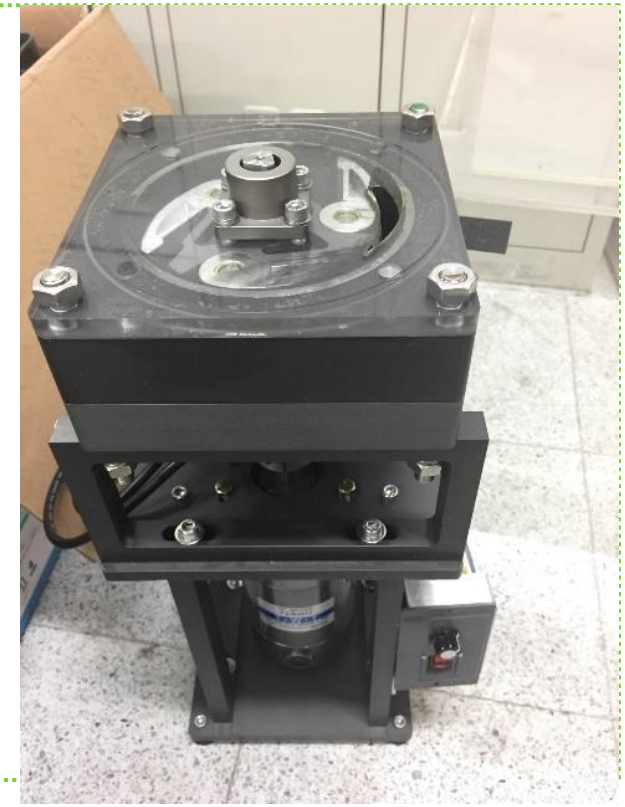
偏心擺葉轉子迴轉式引擎之開發(1/2)

執行單位	國立台灣大學機械工程研究所	計畫主持人	馬小康

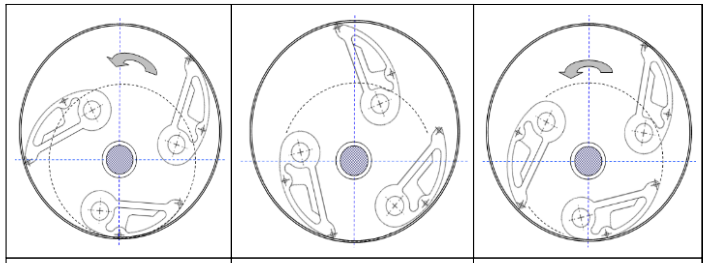
- 本計畫擬開發一結構簡單、輕巧的內燃機引擎，以提升我國在運輸載具之多元化和競爭力。
- 本研究的偏心擺葉轉子迴轉式引擎，體積僅有多缸活塞式內燃機的5分之1，重量僅有6分之1，多出來的空間與重量可讓給電動機與電池，使混合動力的車輛更省油、加大里程數及降低CO2排放。
- 由於轉子引擎具有重量輕之優點，極適合作為混合動力車及無人飛機之先進推進器，除了能對我國在節能減碳議題上有所貢獻，並且可提高我國在相關產業的國際競爭力。

專利申請案號106218131: 本偏心轉子式迴轉引擎，係由壓縮部、燃燒室、動力部組合同步運轉。壓縮部轉子組完成壓縮行程，經由迴轉閥孔口將混合氣體壓進燃燒室。燃燒室點火爆發所產生之高壓氣體，經動力部迴轉閥進入動力部，推動動力部擺葉旋轉，產生動力。為求運轉順暢，壓縮部與動力部轉子在同一主軸上需要有一相位差角度。此一相位差角度，可由壓縮部與動力部的汽缸在不改變主軸的狀況下，以不同角度相切於轉子圓弧，製造一個夾角，產生一個運轉的相位差。此一新衍生設計足以在最簡單的機構下，達成順暢運轉的目的，是為新專利申請之主題。

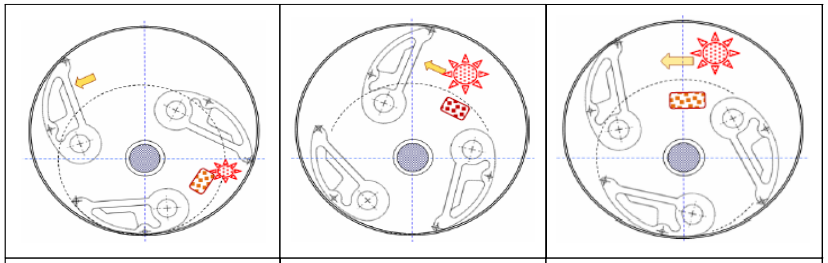




內容



1. 擺葉尖前緣緊貼汽缸壁擺葉尖前緣緊貼汽缸壁前進，推動前部空間氣體。	2. 轉子持續旋，擺葉將前緣的氣體空間壓縮。擺葉後方的空間加大，從進汽缸氣口吸入新空氣。	3. 轉子將擺葉驅動到近乎與轉子閉合，此時迴閥進氣孔口轉到與燃燒室孔口接合，高壓縮氣體被推進至燃燒室。



1. 從迴轉閥孔口高溫高壓氣體進入動力部轉子擺葉空間，擺葉受到壓力葉尖與汽缸壁密接，高壓氣體推動擺葉轉動。	2. 燃燒室經過迴轉閥氣道將高壓氣體持續送到動力部擺葉與轉子所構成的空間，膨脹驅動擺葉與轉子旋動。	3. 下一個爆發趨動下一個擺葉作動，並將擺葉後方的已經膨脹的氣體，從排氣口排出。

理論及技術創新

1. 本計畫建立偏心轉子引擎擺葉運動的計算軌跡公式、擺葉尖端速度及引擎工作空間，並為後續計算（動力輸出、節能效率、碳排放...等）奠定理論計算基礎。

2.專利發明人劉念慈先生將此原創專利智財權提供給國立台灣大學機械系、光陽工業股份有限公司與本研究合作團隊，共同達成本產學合作案所訂定之效益目標，提高合作企業產值及相關產業之國際競爭力。

節能效益

本研究的偏心擺葉轉子迴轉式引擎，體積僅有多缸活塞式內燃機的5分之1，重量僅有6分之1，它可以讓車輛架構可以更具機動性，多出來的空間與重量可讓給電動機與電池，使混合動力的車輛更省油、加大里程數及降低CO2排放。

培育核心技術人力

本轉子引擎開發可結合廠商培植轉子引擎設計、製造及測試能量，並落實學界、廠商與國家研究機構等單位合作開發，達到資源共享及應用，建立產學研長期合作模式。

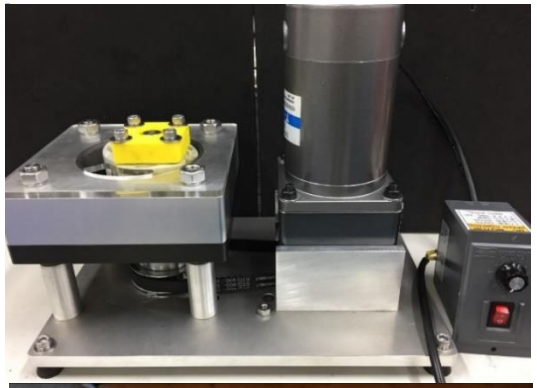
國際研討會展示及刊物發表

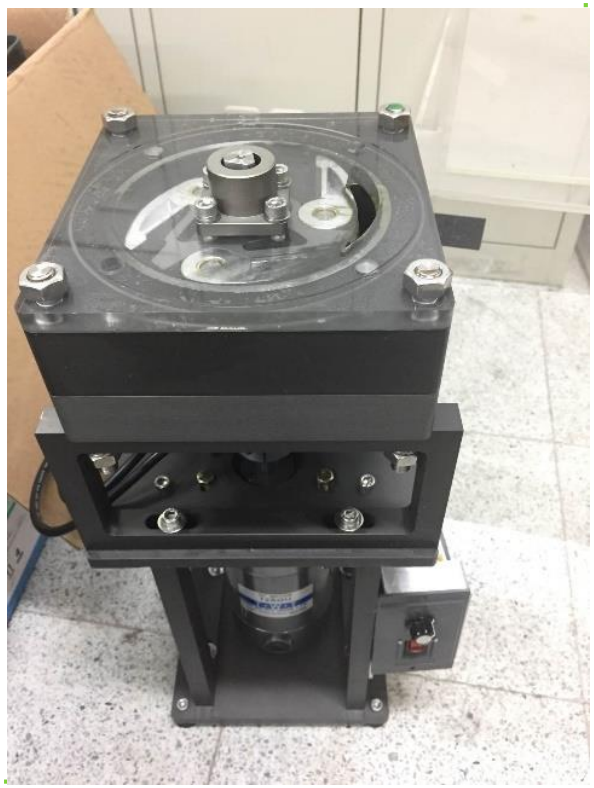
Development of Eccentric Blade Rotor Rotary Engine

Execution Unit	**National Taiwan University**
Project Director	**Hsiao Kang Ma**

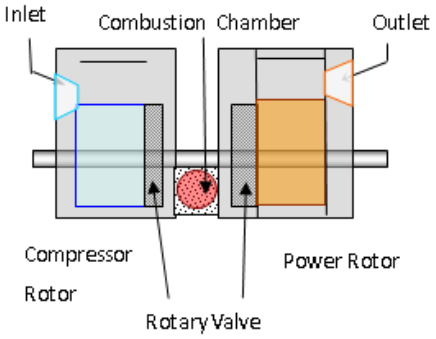
- The rotary engine moves in a spinning motion with higher efficiency in kinetic power.
- A new form of rotary engine that is lightweight and small will have numerous applications in motor cycles, unmanned aerial vehicles and the automotive industry.

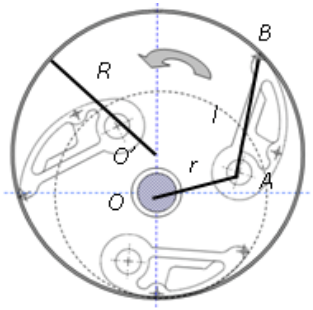
Application number: 106218131: The eccentric blade rotary engine is internally divided into a compression section, a combustion chamber, and a power section. In order to run smoothly, the compressor and the power unit rotor need to have a phase difference on the same spindle. This phase difference angle can be made by the compressor and the power cylinder without changing the spindle condition, tangent to the rotor arc at different angles to create an included angle, resulting in a phase difference of operation. This new derivative design is sufficient for smooth operation under the simplest structure and is the subject of a new patent application.

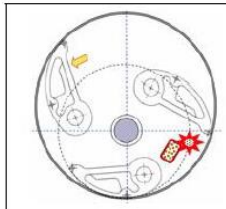




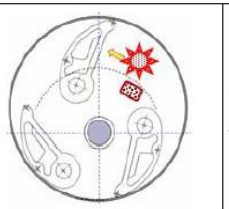
- For the three swing blades on the rotor, each swing blade comprises a cylindrical roller mounted to a front end and a curved back, and each of the rollers is provided, at an inner side, with a support device that is capable of sustaining a counteracting force applied by a cylinder wall to the roller.
- The contact engagement between the roller of the front end or the curved back of the swing blade with the cylinder wall of the internal combustion engine is rolling contact to reduce the frictional force between the swing blade and the cylinder wall.
- The support device comprises a base and a plurality of roller needles arranged between the base and the roller. With the rolling motion of each of the roller needles and a supply of lubricant, the frictional force between the roller and the support device is reduced.



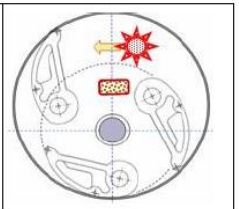




From the rotary valve orifice, high pressure gas to promote swinging.



After the rotary valve airway, the expansion drives the swing leaves with the rotor.



Moves to a next swing, the expanded gas is discharged from the exhaust port.