Comparative analysis of supercritical CO2 cycles

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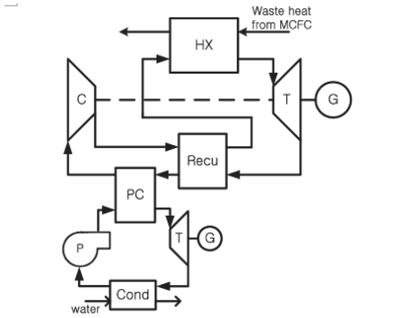
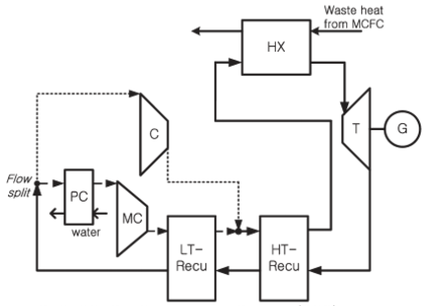
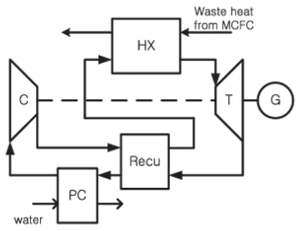
Supercritical CO_2 Power Cycles Symposium



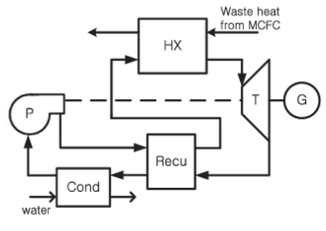
A. S−CO_2 Brayton and Rankine Cascading (BRC) cycle



B. S−CO_2 Re−Compressing Brayton (RCB) cycle



C. S−CO_2 Simple Recuperated Brayton (SRB) cycle



D. S−CO_2 Simple Recuperated Transcritical (SRT) cycle

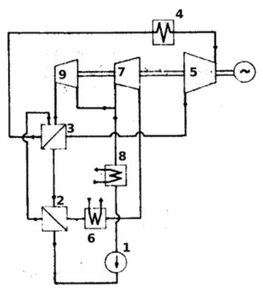


Figure 10 Layout of split-flow recompression Brayton cycle components ([81])

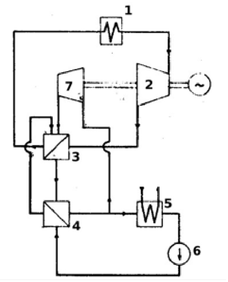
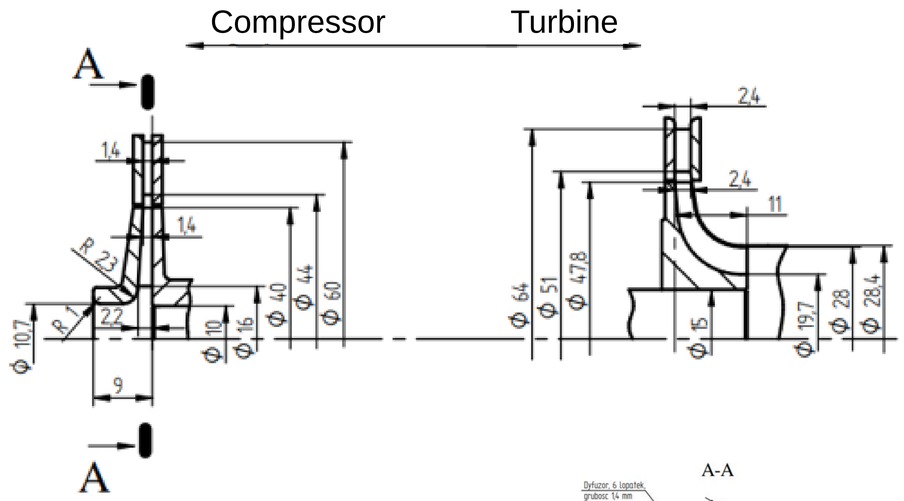
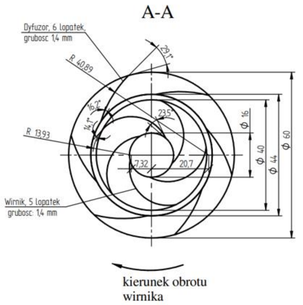


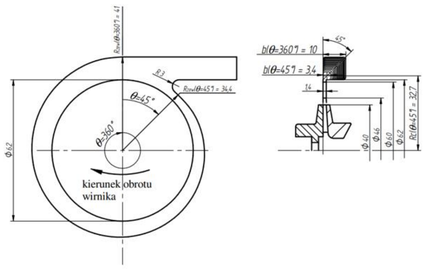
Figure 11 Schematic diagram of the recompression Brayton cycle ([81])

Table 1: Results comparison of various algorithms.

Parameter	Value
Turbine Inlet Temperature, °C	700
Turbine Inlet Pressure, MPa	20.2
Turbine Isentropic Efficiency, %	80
Compressor efficiency, %	85
Heat exchanger effectiveness	0.6







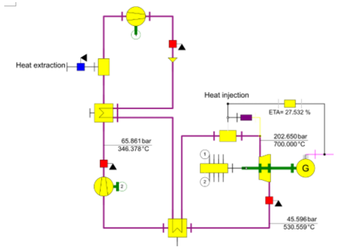


Figure 12 Schematic diagram of the pre-compression Brayton cycle impleme)nted in Ebsilon software

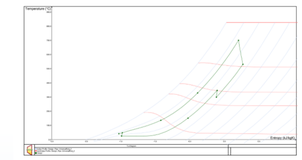


Figure 13 Temperature-entropy diagram of the pre|compression Brayton cycle implemented in Ebsilon software

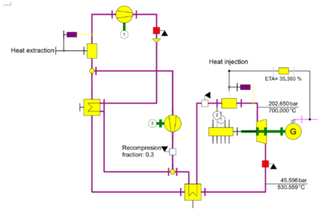


Figure 16 Schematic diagram of the recompression Brayton cycle implemented in Ebsilon software

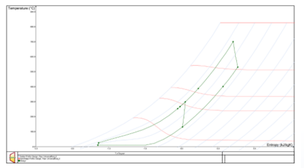


Figure 17 Temperature-entropy diagram of recompression Brayton cycle shown in T-s diagram

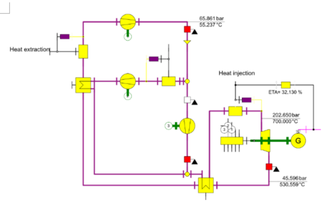


Figure 14 Schematic diagram of the partial cooling Brayton cycle implemented in Ebsilon software

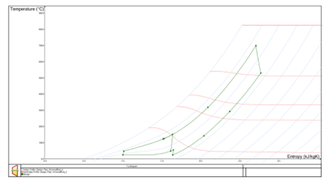


Figure 15 Temperature-entropy diagram of partial cooling Brayton cycle shown in T-s diagram

Table 2: Comparison of simulation results

Brayton cycle layout	Pre-compression	Partial cooling	Recompression
Cycle efficiency, %	27.5	32.1	35.4
Number of heat exchangers	2	1	2
Number of compressors	1	3	2
Number of expanders	1	1	1