



وزارت علوم تحقیقات و فناوری
دانشگاه فنی و حرفه‌ای

نام درس: تکنولوژی مولد قدرت



استاد: مهندس حسین طیاری

سر فصل مطالب



- ❖ مقدمه
- ❖ موتور و انواع آن
- ❖ قطعات موتور
- ❖ محاسبات موتور
- ❖ موتورهای اشتعال تراکمی (موتور دیزلی)
- ❖ موتورهای اشتعال جرقه ای (موتور بنزینی)
- ❖ اصول طراحی و عملکرد موتور
- ❖ تجهیزات جانبی موتور
- ❖ موتورهای هیبریدی





- شاسی و بدنه
- سیستم تعلیق
- سیستم فرمان
- سیستم ترمز
- مولد قدرت
(موتور)
- سیستم سوخت
رسانی
- سیستم انتقال
قدرت
- برق خودرو

موتور و انواع آن



➤ موتور

➤ تاریخچه موتور

➤ انواع موتور

➤ موتورهای احتراقی

➤ موتورهای احتراق داخلی

➤ مراحل عملکرد یک

موتور احتراق داخلی

قطعات موتور



بدنه سیلندر (بلوک س

سر سیلندر



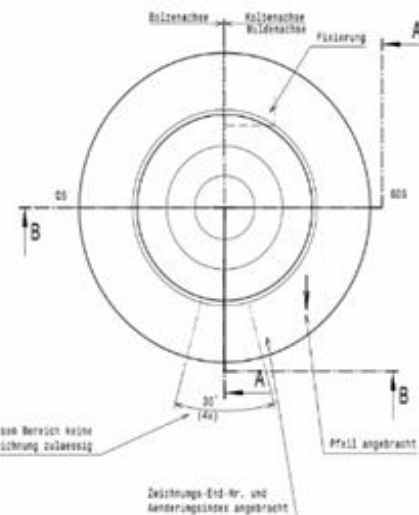
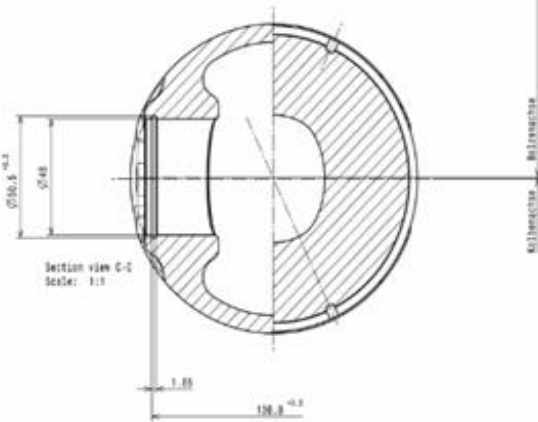
پیستون

شاتون

میل لنگ

فلایویل

میل سوپاپ



15331_03_40900_04_1
piston_assembly

Rangträgerbindung nach DIN 104 T06

1. Customer name 2. Customer address 3. Customer phone 4. Customer fax 5. Customer e-mail 6. Customer website 7. Customer country 8. Customer city 9. Customer state 10. Customer zip 11. Customer contact 12. Customer title 13. Customer email 14. Customer phone 15. Customer fax 16. Customer website 17. Customer country 18. Customer city 19. Customer state 20. Customer zip 21. Customer contact 22. Customer title 23. Customer email 24. Customer phone 25. Customer fax 26. Customer website 27. Customer country 28. Customer city 29. Customer state 30. Customer zip 31. Customer contact 32. Customer title 33. Customer email 34. Customer phone 35. Customer fax 36. Customer website 37. Customer country 38. Customer city 39. Customer state 40. Customer zip 41. Customer contact 42. Customer title 43. Customer email 44. Customer phone 45. Customer fax 46. Customer website 47. Customer country 48. Customer city 49. Customer state 50. Customer zip 51. Customer contact 52. Customer title 53. Customer email 54. Customer phone 55. Customer fax 56. Customer website 57. Customer country 58. Customer city 59. Customer state 60. Customer zip 61. Customer contact 62. Customer title 63. Customer email 64. Customer phone 65. Customer fax 66. Customer website 67. Customer country 68. Customer city 69. Customer state 70. Customer zip 71. Customer contact 72. Customer title 73. Customer email 74. Customer phone 75. Customer fax 76. Customer website 77. Customer country 78. Customer city 79. Customer state 80. Customer zip 81. Customer contact 82. Customer title 83. Customer email 84. Customer phone 85. Customer fax 86. Customer website 87. Customer country 88. Customer city 89. Customer state 90. Customer zip 91. Customer contact 92. Customer title 93. Customer email 94. Customer phone 95. Customer fax 96. Customer website 97. Customer country 98. Customer city 99. Customer state 100. Customer zip 101. Customer contact 102. Customer title 103. Customer email 104. Customer phone 105. Customer fax 106. Customer website 107. Customer country 108. Customer city 109. Customer state 110. Customer zip 111. Customer contact 112. Customer title 113. Customer email 114. Customer phone 115. Customer fax 116. Customer website 117. Customer country 118. Customer city 119. Customer state 120. Customer zip 121. Customer contact 122. Customer title 123. Customer email 124. Customer phone 125. Customer fax 126. Customer website 127. Customer country 128. Customer city 129. Customer state 130. Customer zip 131. Customer contact 132. Customer title 133. Customer email 134. Customer phone 135. Customer fax 136. Customer website 137. Customer country 138. Customer city 139. Customer state 140. Customer zip 141. Customer contact 142. Customer title 143. Customer email 144. Customer phone 145. Customer fax 146. Customer website 147. Customer country 148. Customer city 149. Customer state 150. Customer zip 151. Customer contact 152. Customer title 153. Customer email 154. Customer phone 155. Customer fax 156. Customer website 157. Customer country 158. Customer city 159. Customer state 160. Customer zip 161. Customer contact 162. Customer title 163. Customer email 164. Customer phone 165. Customer fax 166. Customer website 167. Customer country 168. Customer city 169. Customer state 170. Customer zip 171. Customer contact 172. Customer title 173. Customer email 174. Customer phone 175. Customer fax 176. Customer website 177. Customer country 178. Customer city 179. Customer state 180. Customer zip 181. Customer contact 182. Customer title 183. Customer email 184. Customer phone 185. Customer fax 186. Customer website 187. Customer country 188. Customer city 189. Customer state 190. Customer zip 191. Customer contact 192. Customer title 193. Customer email 194. Customer phone 195. Customer fax 196. Customer website 197. Customer country 198. Customer city 199. Customer state 200. Customer zip 201. Customer contact 202. Customer title 203. Customer email 204. Customer phone 205. Customer fax 206. Customer website 207. Customer country 208. Customer city 209. Customer state 210. Customer zip 211. Customer contact 212. Customer title 213. Customer email 214. Customer phone 215. Customer fax 216. Customer website 217. Customer country 218. Customer city 219. Customer state 220. Customer zip 221. Customer contact 222. Customer title 223. Customer email 224. Customer phone 225. Customer fax 226. Customer website 227. Customer country 228. Customer city 229. Customer state 230. Customer zip 231. Customer contact 232. Customer title 233. Customer email 234. Customer phone 235. Customer fax 236. Customer website 237. Customer country 238. Customer city 239. Customer state 240. Customer zip 241. Customer contact 242. Customer title 243. Customer email 244. Customer phone 245. Customer fax 246. Customer website 247.	
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[illegible]

1	176,300		177,470	177,460	176,5	176,5	176,5	176,5
Intorno al 2000	176,300		177,470	177,460	176,5	176,5	176,5	176,5
Intorno al 2000	176,300		177,470	177,460	176,5	176,5	176,5	176,5



- ❖ نقاط مرگ پایین و بالا
- ❖ کورس پیستون
- ❖ حجم مفید سیلندر (حجم جابجایی)
- ❖ نسبت تراکم
- ❖ راندمان حجمی موتور
- ❖ سرعت پیستون و میل لنگ
- ❖ رابطه گشتاور و توان موتور
- ❖ فرایند حجم ثابت و فرایند فشار ثابت

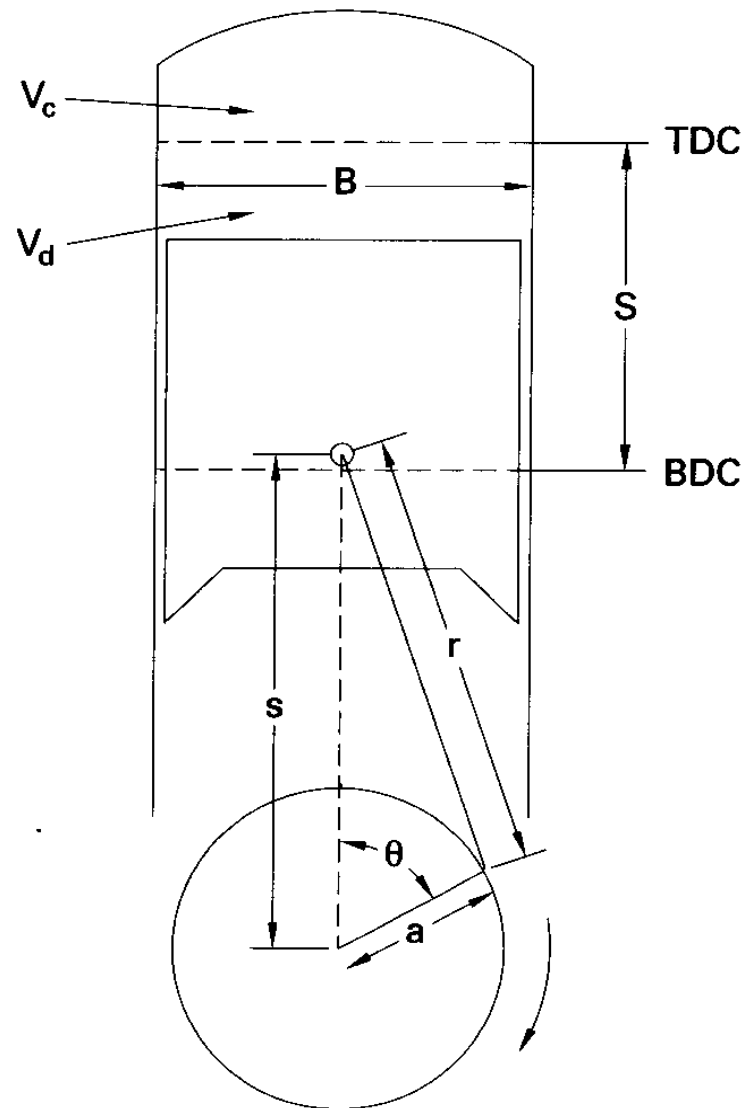


Figure 2-1 Piston and cylinder geometry of reciprocating engine. B = bore; S = stroke; r = connecting rod length; a = crank offset; s = piston position; θ = crank angle; V_c = clearance volume; V_d = displacement volume.

Process a → b
Isentropic compression

Process b → c
Constant pressure
heat addition

Process c → d
Isentropic expansion

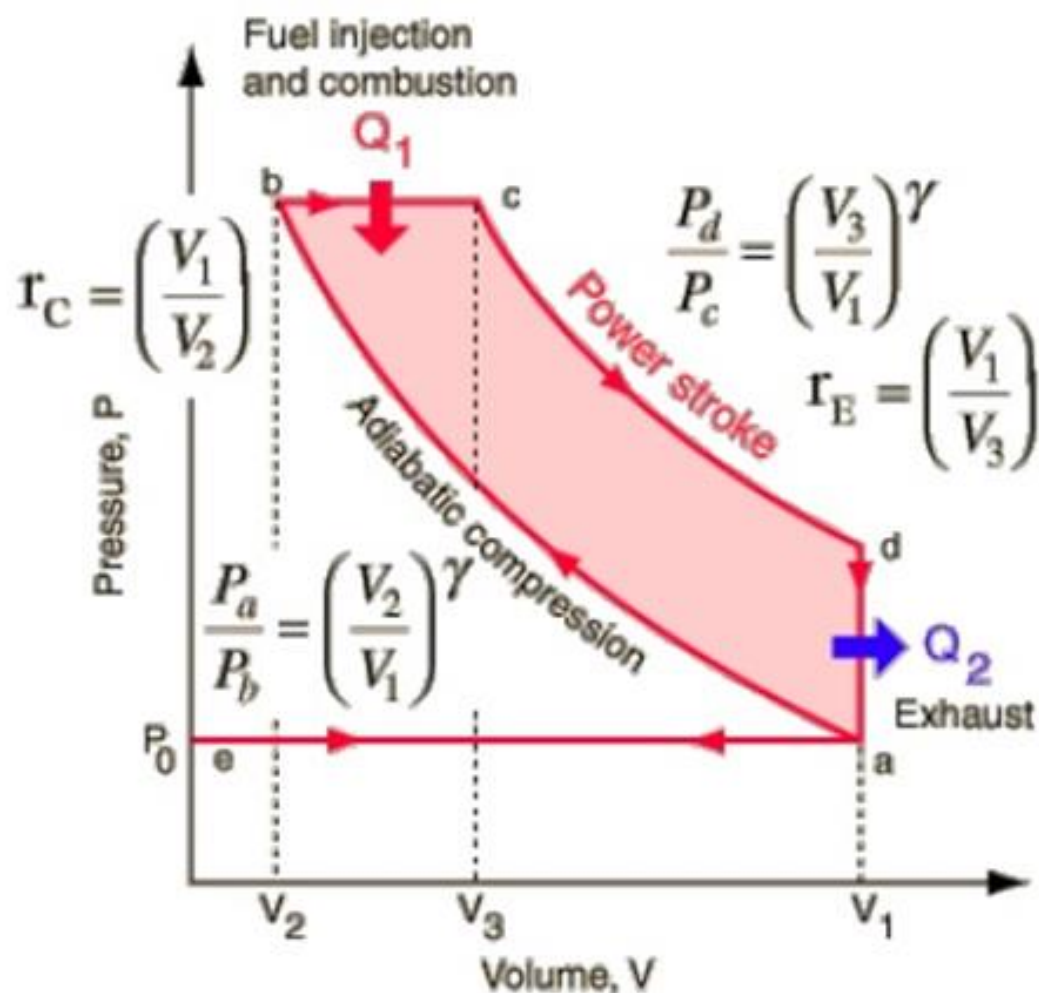
Process d → a
Constant volume heat
rejection

- a=1, b=2, etc...for
book

Air-Standard Diesel cycle

Cut-off ratio:

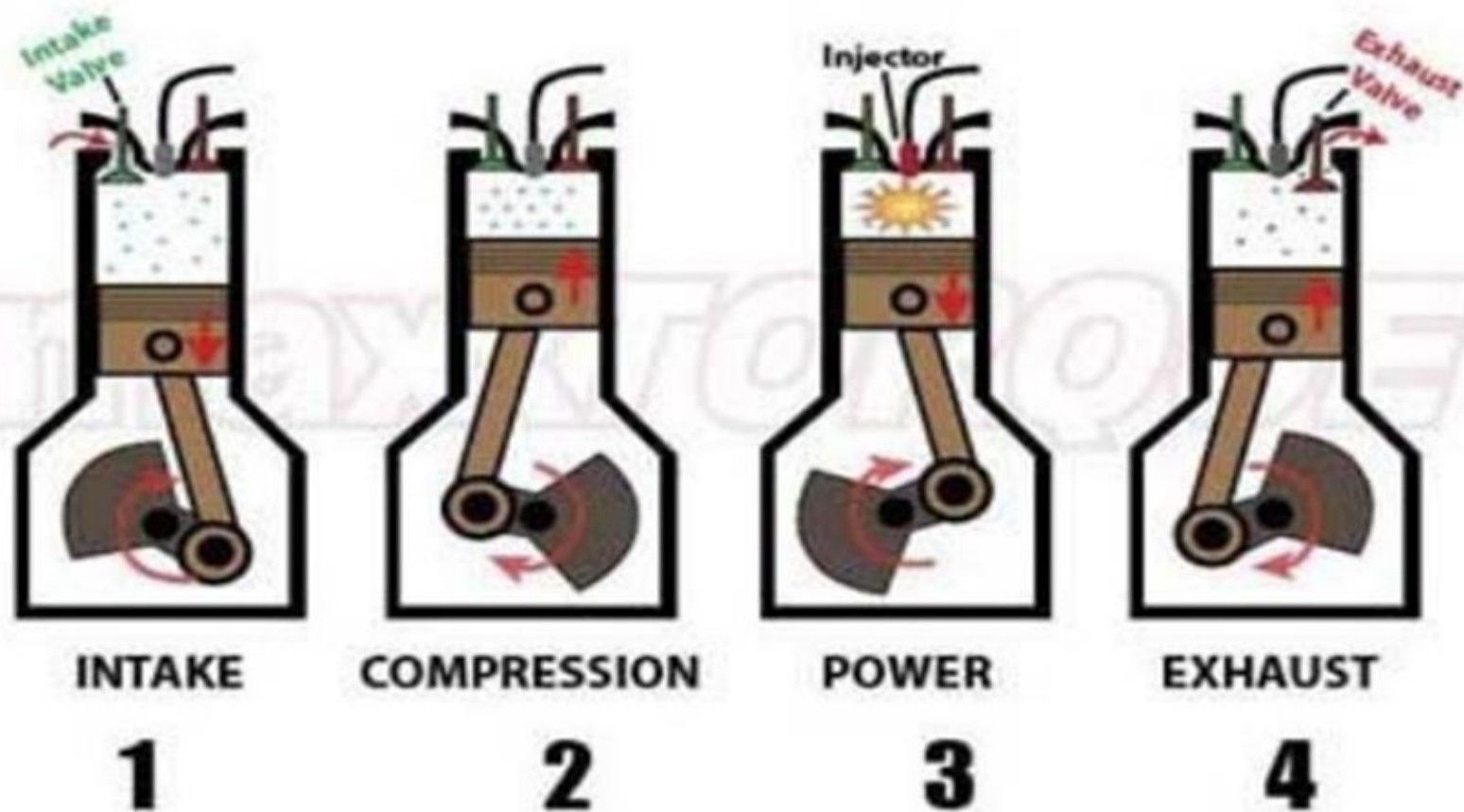
$$r_c = \frac{v_c}{v_b} = \frac{v_3}{v_2} \text{ (BOOK)}$$



موتورهای اشتعال تراکمی

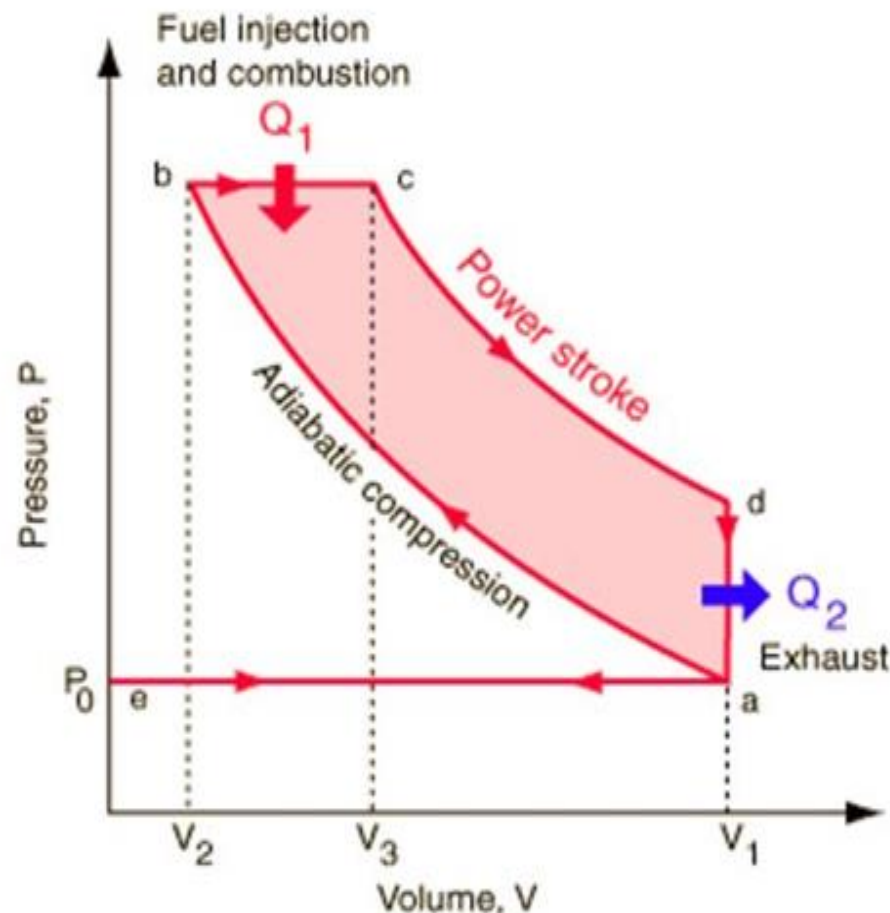
- ❖ اصول عملکرد موتورهای اشتعال تراکمی
- ❖ احتراق در موتورهای اشتعال تراکمی
- ❖ سیستم سوخت رسانی موتورهای اشتعال تراکمی

Four Stroke Diesel Engine

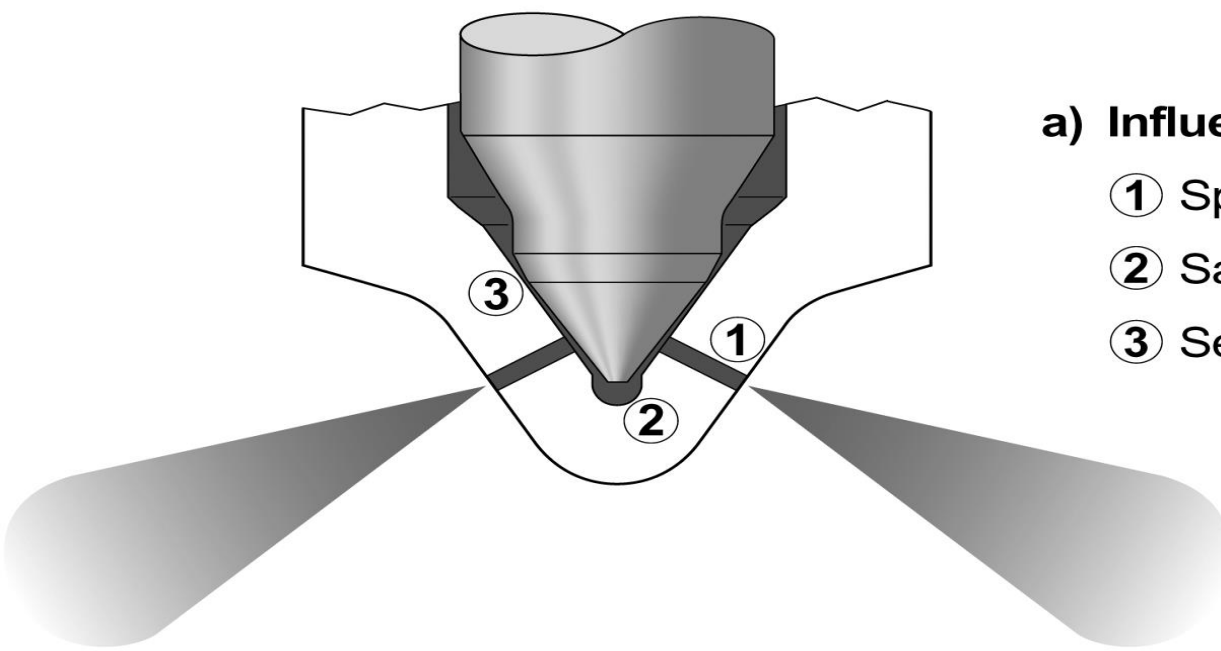


Four-Stroke Diesel Cycle

Four-stroke Diesel cycle

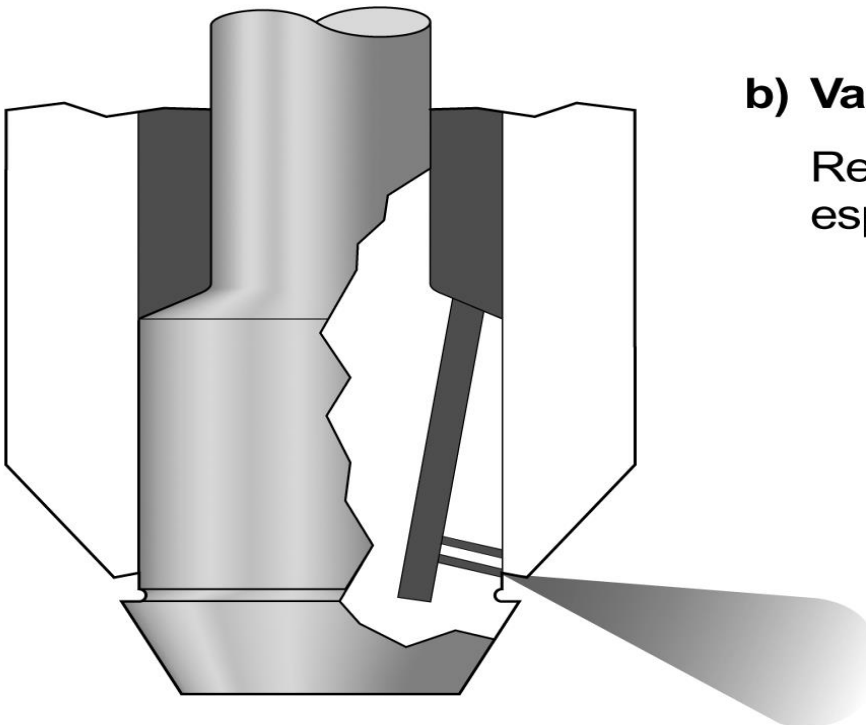


Rudolph Diesel was born in Paris of Bavarian parents in 1858. As a budding mechanical engineer at the Technical University in Munich, he became fascinated by the 2nd law of thermodynamics and the maximum efficiency of a Carnot process and attempted to improve the existing thermal engines of the day on the basis of purely theoretical considerations. His first prototype engine was built in 1893, a year after he applied for his initial patent, but it wasn't until the third prototype was built in 1897 that theory was put into practice with the first 'Diesel' engine.



a) Influence of nozzle geometry

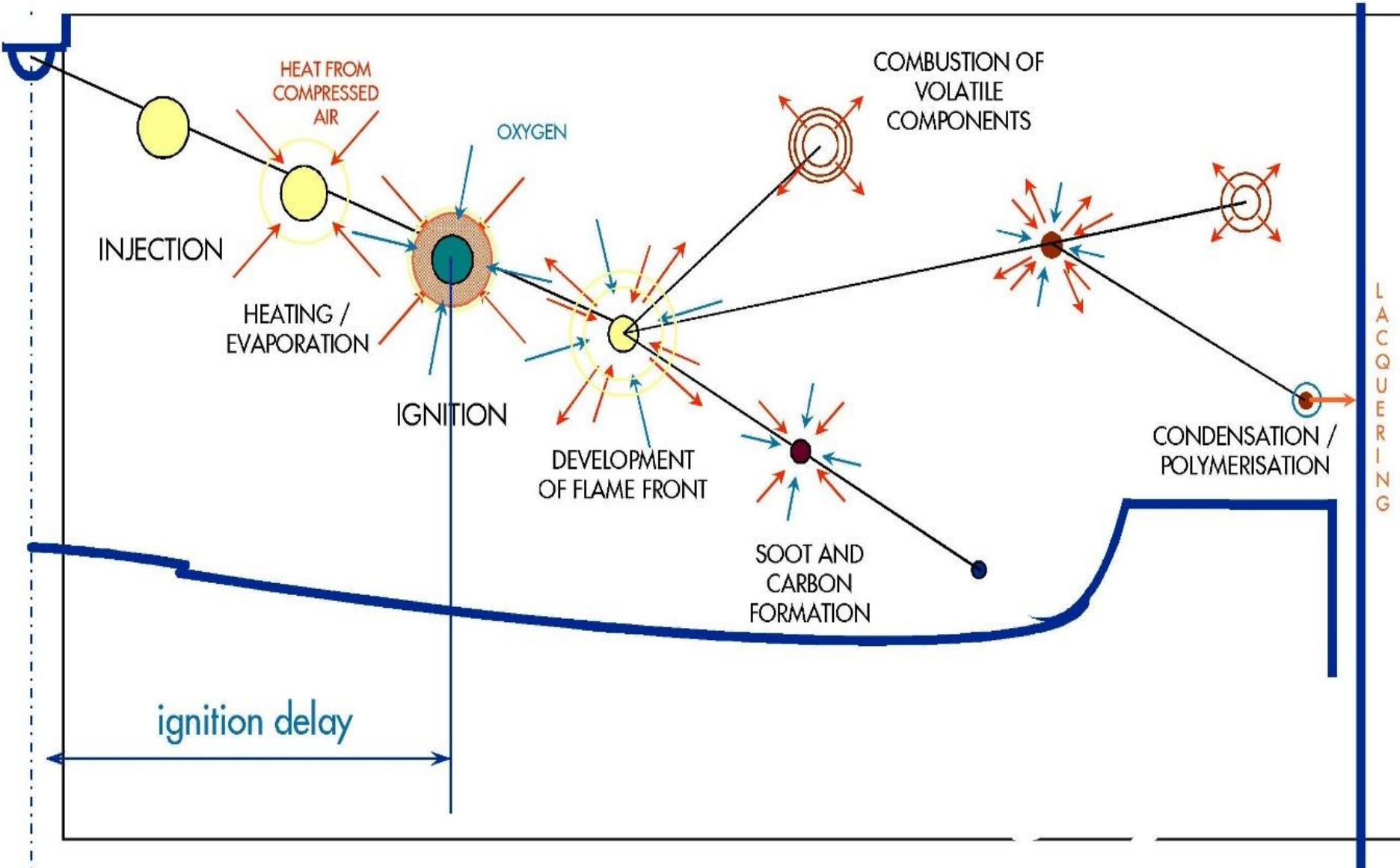
- ① Spray-hole geometry: Soot + NO_x
- ② Sac-hole geometry: HC
- ③ Seat geometry: Noise



b) Vario nozzle or two phase nozzle

Reduction of soot emission
especially in part load

Diesel Combustion Process



Di*sel
it's no longer a dirty word.

موتورهای اشتعال جرقه ای

اصول عملکرد موتورهای اشتعال جرقه ای

پدیده خودسوزی

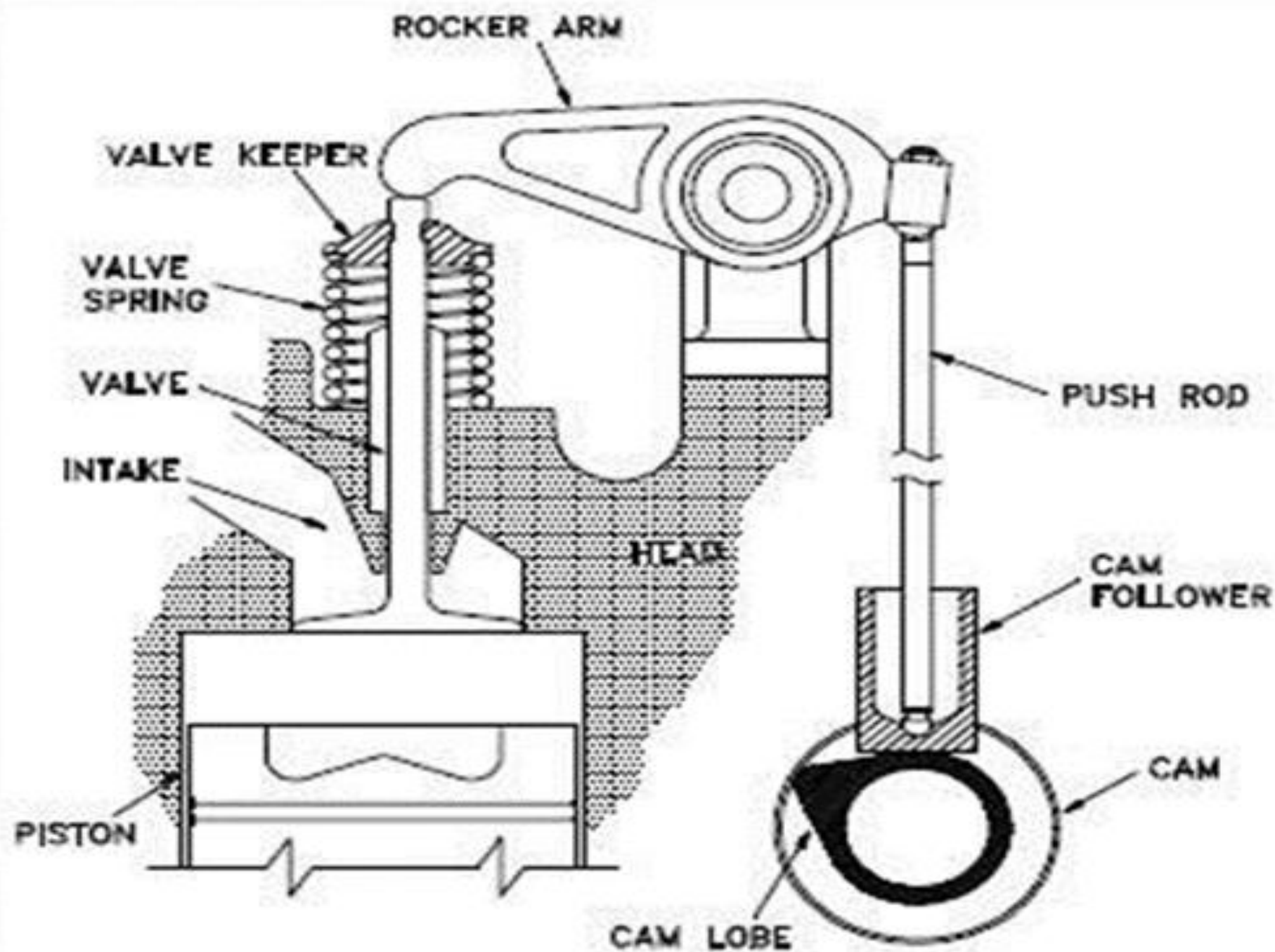
احتراق در موتورهای اشتعال جرقه ای

سیستم سوخت رسانی موتورهای اشتعال جرقه ای

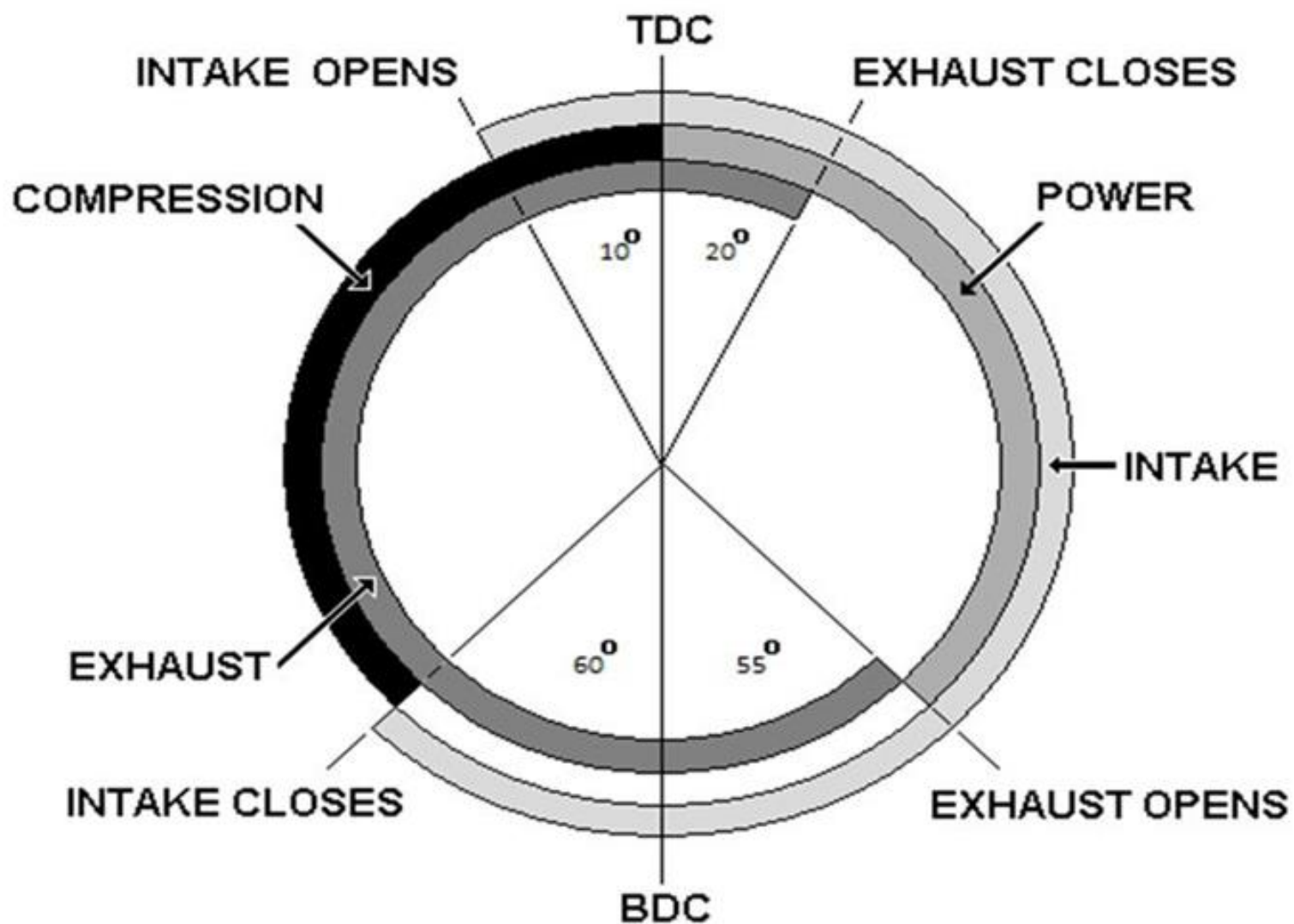
موتورهای گاز سوز

اصول طراحی و عملکرد موتور

- ❖ جهت چرخش موتور و شماره گذاری سیلندرها
- ❖ ترتیب احتراق
- ❖ زمان بندی سوپاپ ها
- ❖ زمان بندی سوپاپ متغیر
- ❖ روشهای تقویت موتور
- ❖ موتور با نسبت تراکم متغیر و تعداد سیلندر متغیر
- ❖ عوامل موثر در میزان مصرف سوخت
- ❖ میزان آلایندگی موتور و استانداردهای یورو



VALVE TIMING DIAGRAM OF A HIGH SPEED 4 STROKE ENGINE



Actual Valve Timing For 4-Stroke Diesel Engine

I.V.O. $\rightarrow 25^\circ$ Before T.D.C.

I.V.C. $\rightarrow 30^\circ$ After B.D.C.

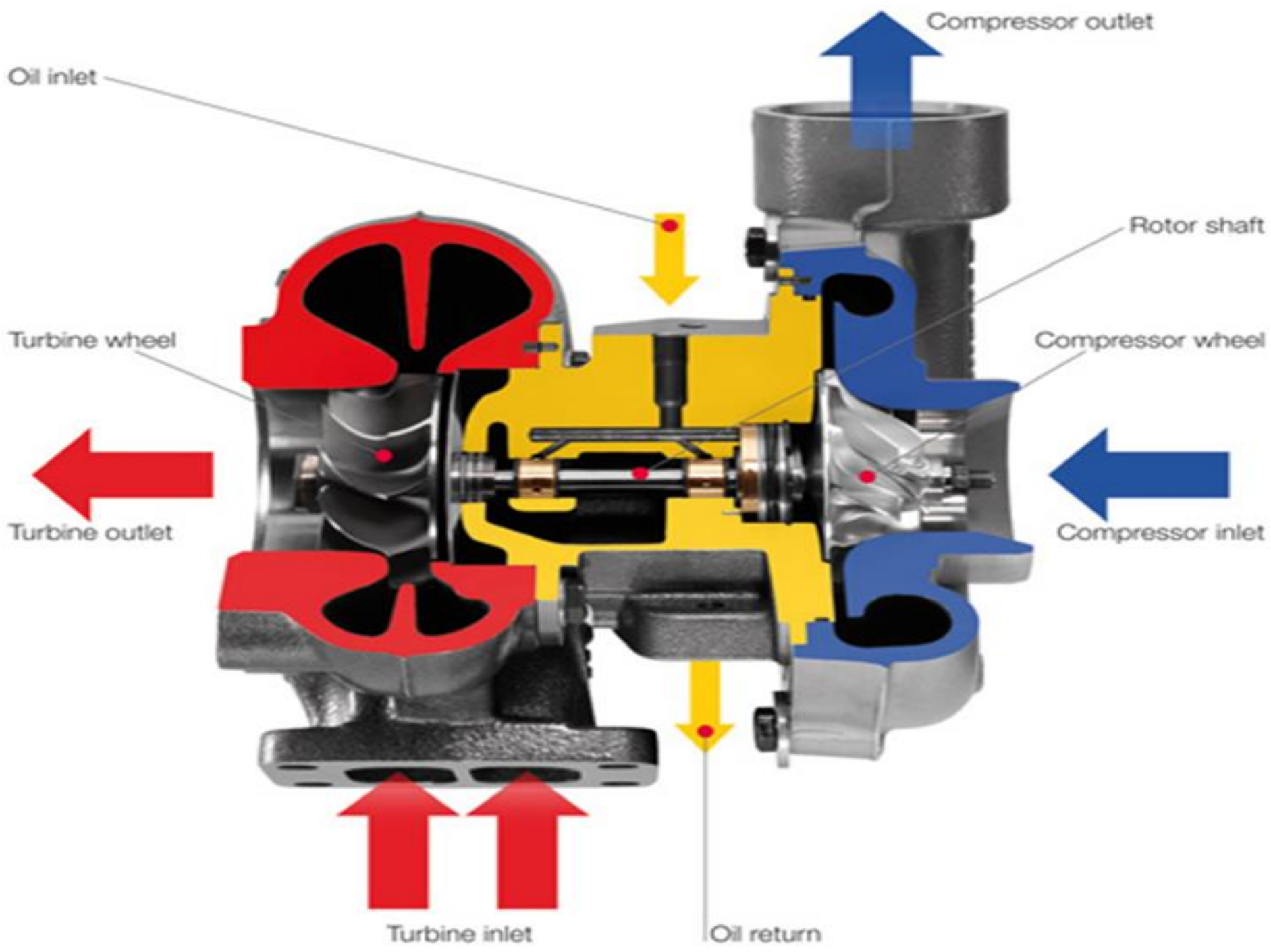
F.V.O. $\rightarrow 5^\circ$ Before T.D.C.

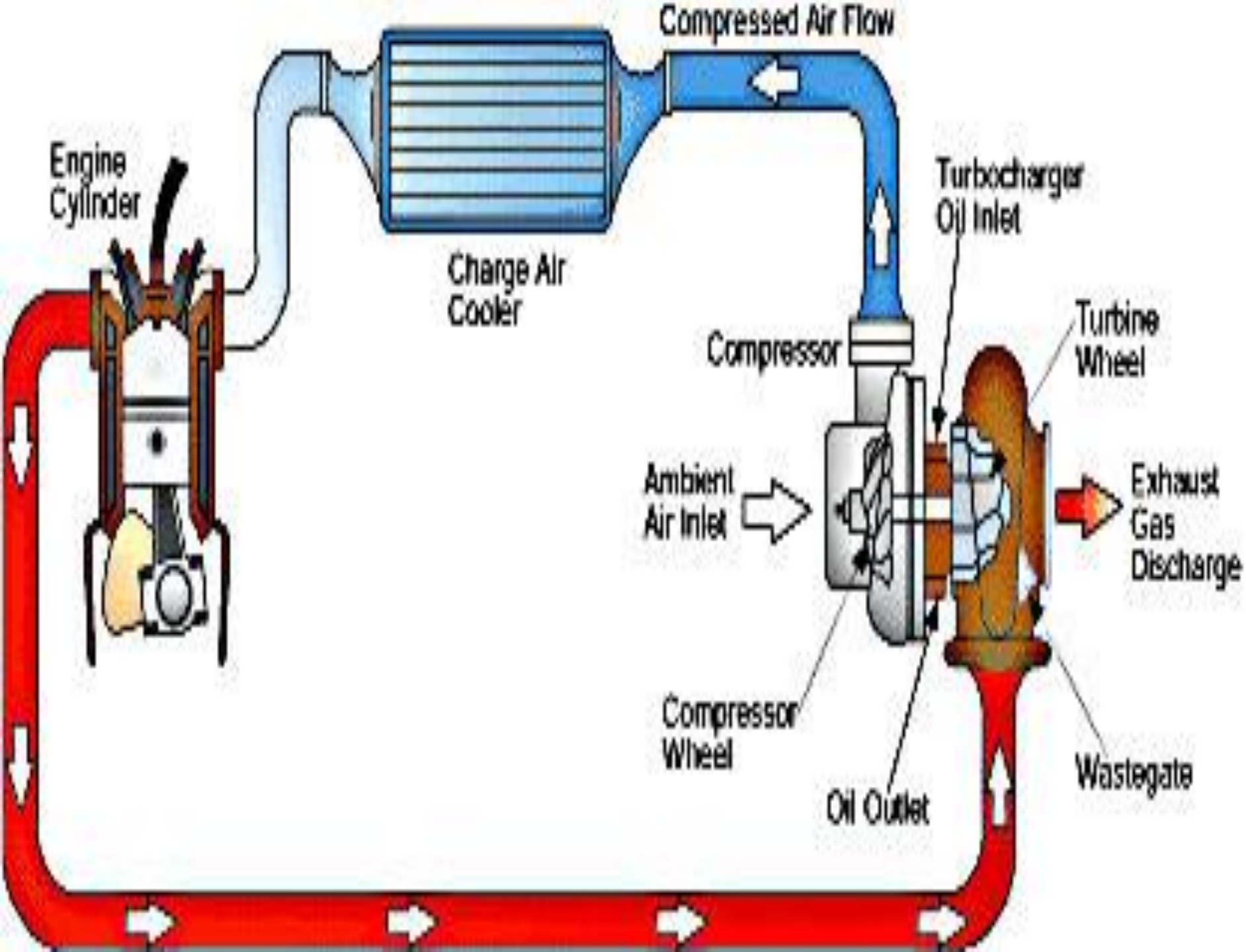
F.V.C. $\rightarrow 25^\circ$ After T.D.C.

E.V.O. $\rightarrow 45^\circ$ Before B.D.C.

E.V.C. $\rightarrow 15^\circ$ After T.D.C.

Valve Overlap $\rightarrow 30^\circ$





موتورهای هیبریدی

- ❖ مقدمه
- ❖ اساس کار موتورهای هیبریدی
- ❖ اساس کار سلول سوختی
- ❖ انواع خودروهای هیبریدی
- ❖ اجزای خودروهای هیبریدی

با سپاس نوجه شمس

