



유압기술강연회

제1장 유압의 기초



油研工業(株)
한국유켄공업(주)



일이란 ?

제1장 유압의 기초

속도에 힘을 곱한 것이 일 Watt[W]이라함.

$$L = F \times v \quad [W]$$

힘 F; N(Newton) [$1N = 0.102kg \cdot m / s^2$] 속도 v; m/sec

(1N은 1kg의 질량에 $1m / s^2$ 의 가속도를 가한 힘)

(1kgf는 1kg의 질량에 $9.8m / s^2$ 의 가속도를 가한 힘)

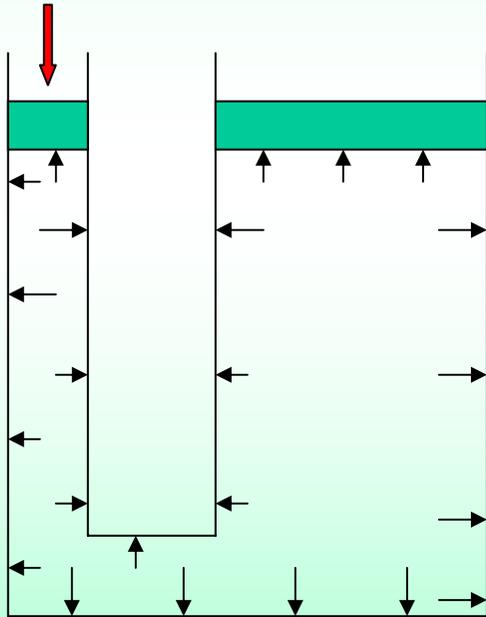
【일의 전달방법】

전동기:엔진:공압:유압:수압등을 사용하여 힘을 전달한다.



파스칼의 원리 I

1. 압력은 면에 직각으로 작용한다.
2. 압력은 모든 방향에 동일하다.
3. 밀폐된 용기내의 액체 일부에 가해지는 압력은, 액체 각 부분에 동시에 동일한 힘으로 전달된다.

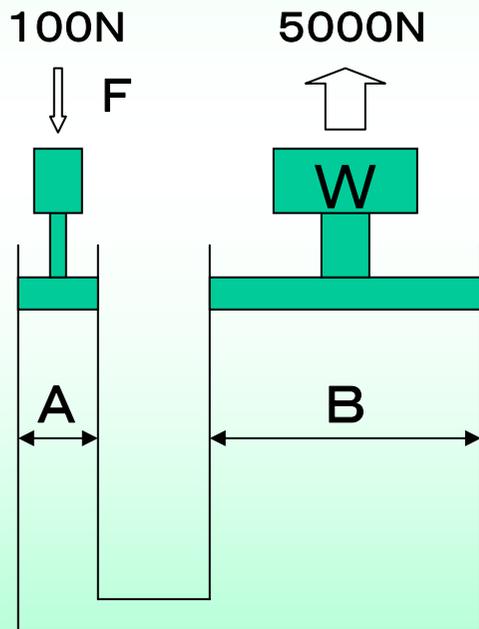




파스칼의 원리 II

예를 들면 단면적 1cm^2 의 피스톤을 100N 의 힘으로 누르면, 액체내에는 1MPa 의 압력이 발생한다.

단면적 50cm^2 의 큰 피스톤은 5000N 의 상승력이 발생한다.



$$A = 1\text{cm}^2 \quad B = 50\text{cm}^2$$

【종래단위[MKS] $100\text{N} = 10.2\text{kgf}$ 】

압력 Pa 파스칼에 대해

1Pa 은 1m^2 면적에 1N 의 힘이 작용하는 경우의 압력.

圧力 $P = 100 \times 100^2 / 1 = 1000000\text{Pa}$ 단위가 너무 크기 때문에 10의 6승배의 M(메가)를 사용한다. [1MPa]

【종래단위[MKS]의 $10\text{kg/cm}^2 = 0.98\text{MPa}$ 】



유압장치의 특징

1. 속도변환이 쉽다 (유량제어)
2. 힘의 무단제어가 쉽다. (압력제어)
3. 운동 방향변환이 쉽다. (방향제어)
4. 안전장치가 간단 (압력제어)
5. 에너지의 축적이 가능 (Accumulator)
6. 전기조작과 간단하게 조합이 가능 (전자변, 비례제어변)
7. 기계설계가 쉽다. (Actuator를 필요한 부분에 설치)



유압장치의 이점

1. 윤희성, 녹방지성에서 유리
2. 고압으로 사용하므로 장치의 소형화가 가능함.
※ $\phi 50$ 의 실린더로 7MPa에서 13.72kN (1401kgf)
21MPa에서 41.16kN (4203kgf)
3. 공기압에 비해 제어성, 안정성이 높아 시간차가 작다

※ 압축량이 작다(0. 1MPa에 대해 7.1×10^{-5} 으로 압축한다.)

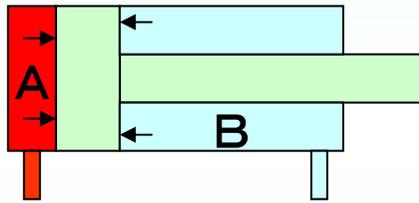


유압의 일에 대해

$$\text{일량 } L = p \times Q / 60 \text{ [Kw]}$$

실린더의 출력 및 속도

압력 p : 실린더 내경 (면적) 에 압력을
 곱하여 힘이 된다



Φ50 × B 로드의 실린더

A측면적 = 19.6cm²

B측면적 = 13.5cm²

유량 10 L/min時

$$F = p \times A \times 100 \text{ [N]}$$

$$7\text{MPa時} = 7 \times 19.6 \times 100 = 13,720\text{N} (1.4\text{ton})$$

유량 Q : 유량을 실린더 내경에 나누어

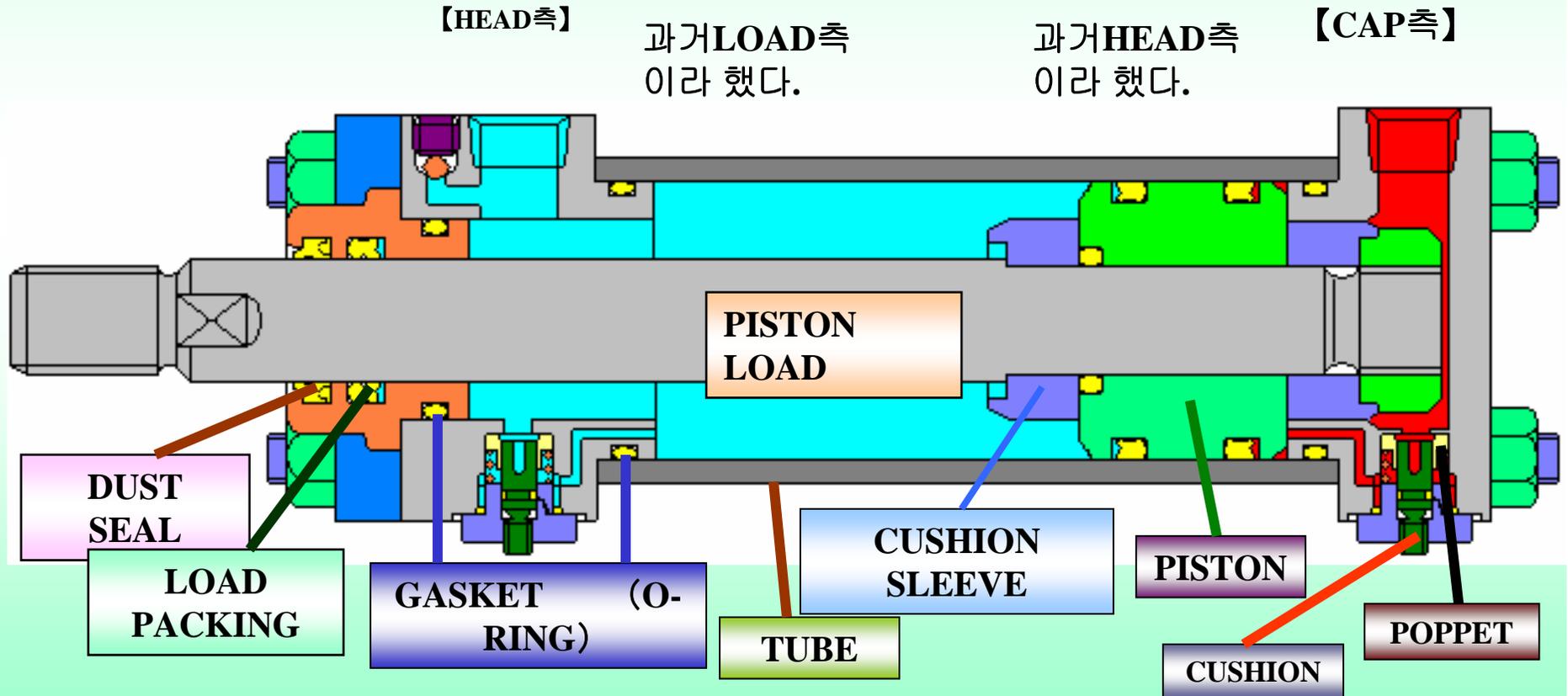
$$\text{속도 } v = Q \times 10^4 / 60A \text{ [mm/s]}$$

$$10\text{L/min時} = 10 \times 10^4 / 60 \times 19.6 = 85\text{mm/s}$$

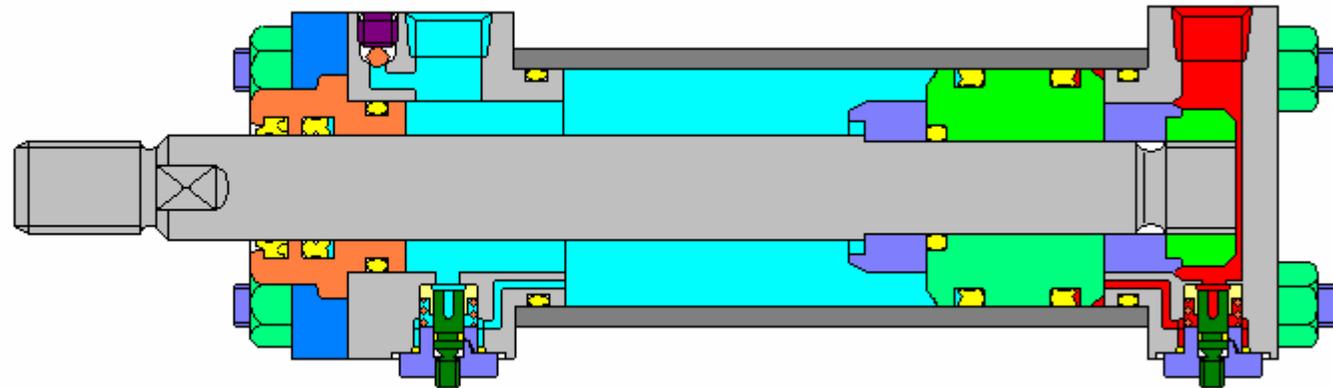
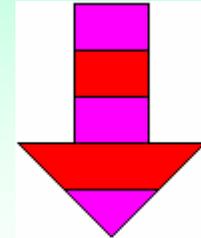


유압의 일에 대해

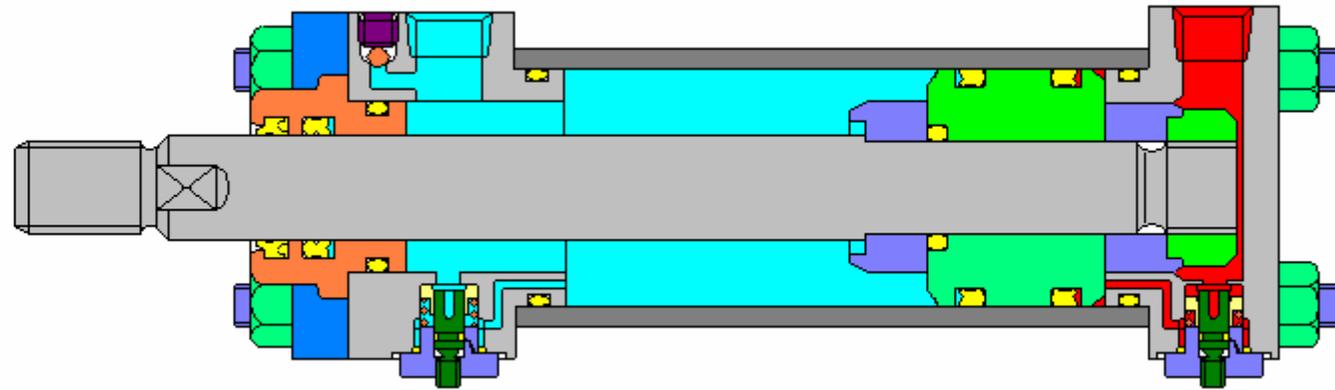
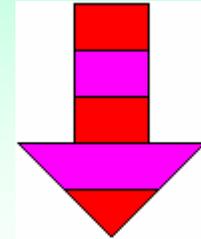
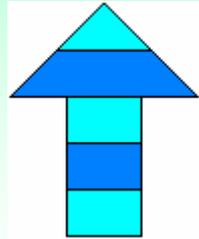
ACTUATOR(유압 실린더)



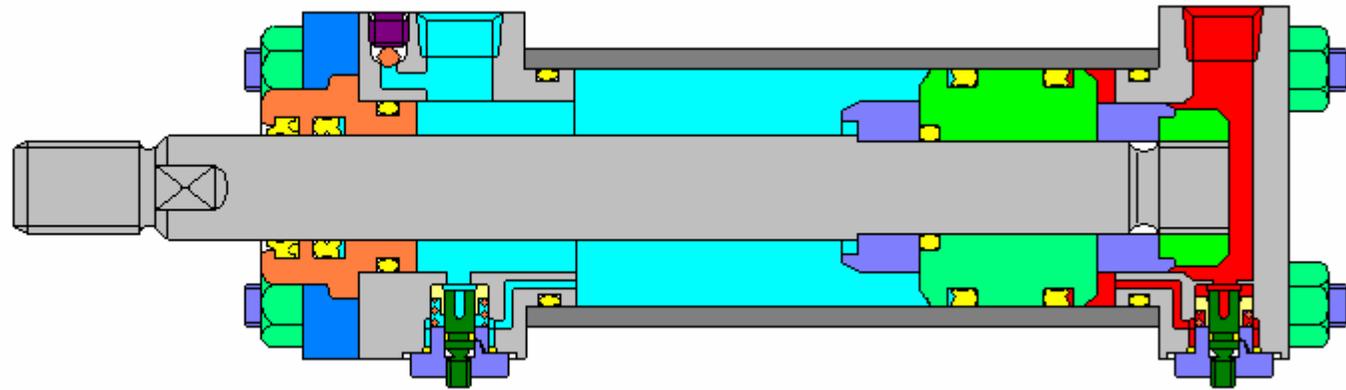
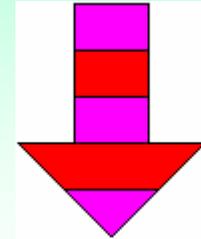
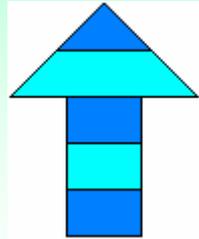
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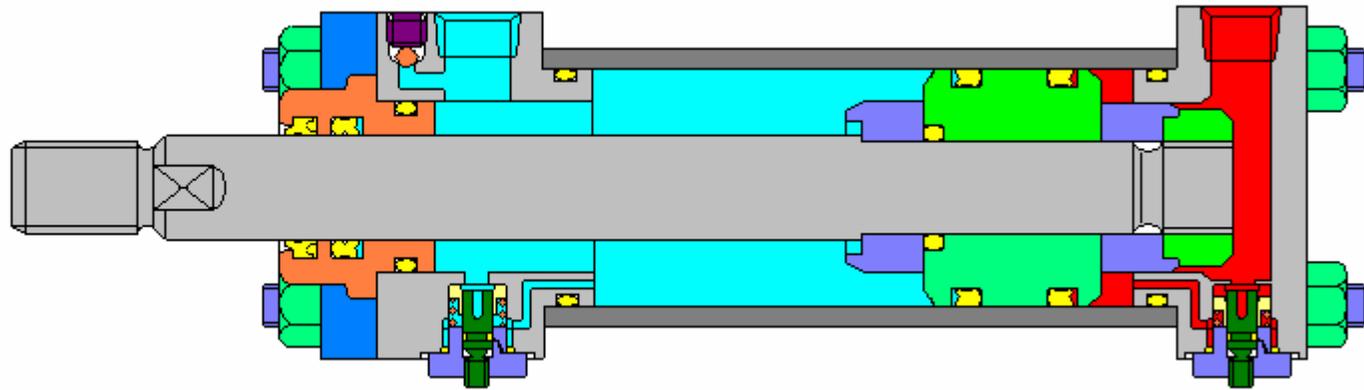
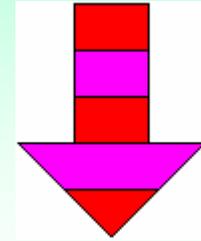
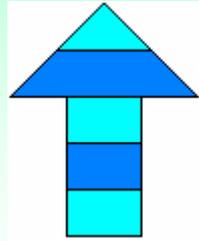
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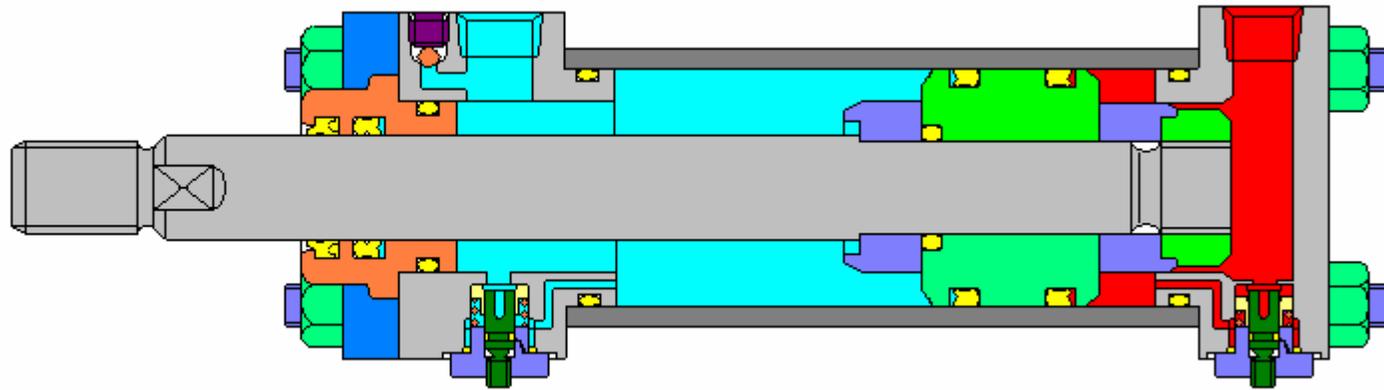
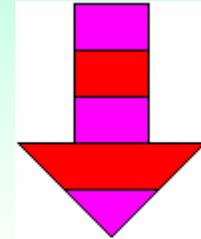
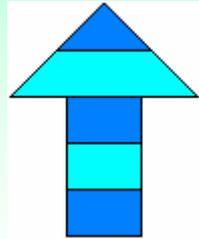
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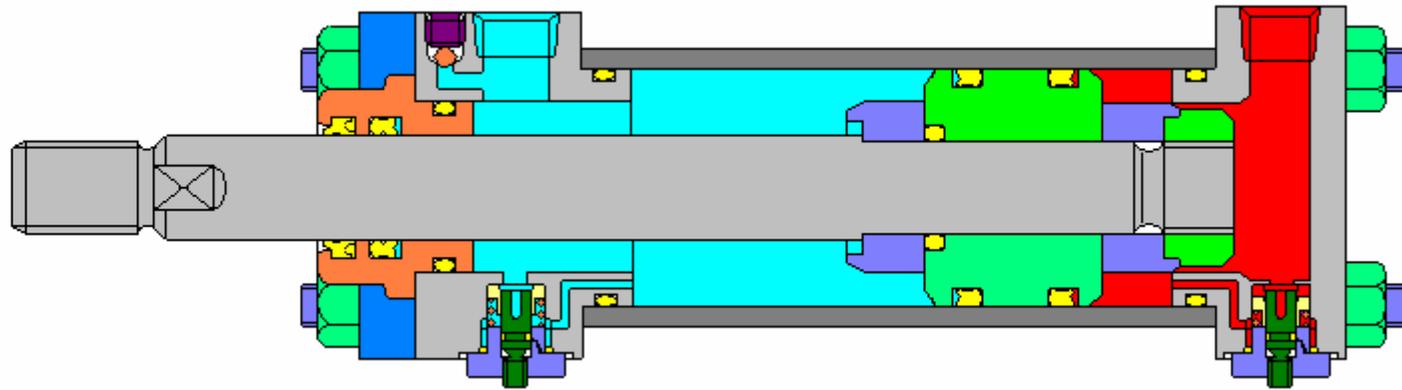
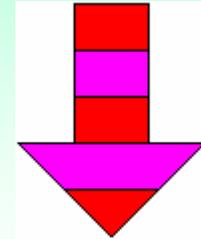
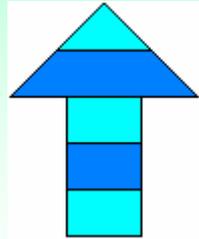
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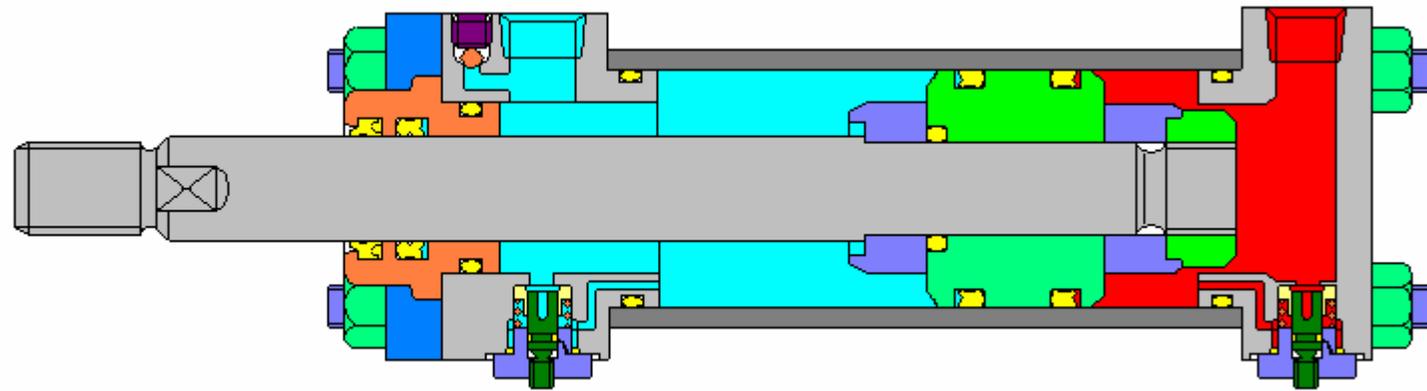
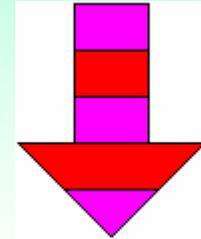
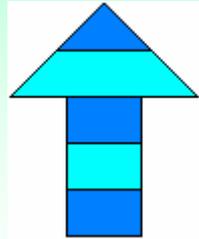
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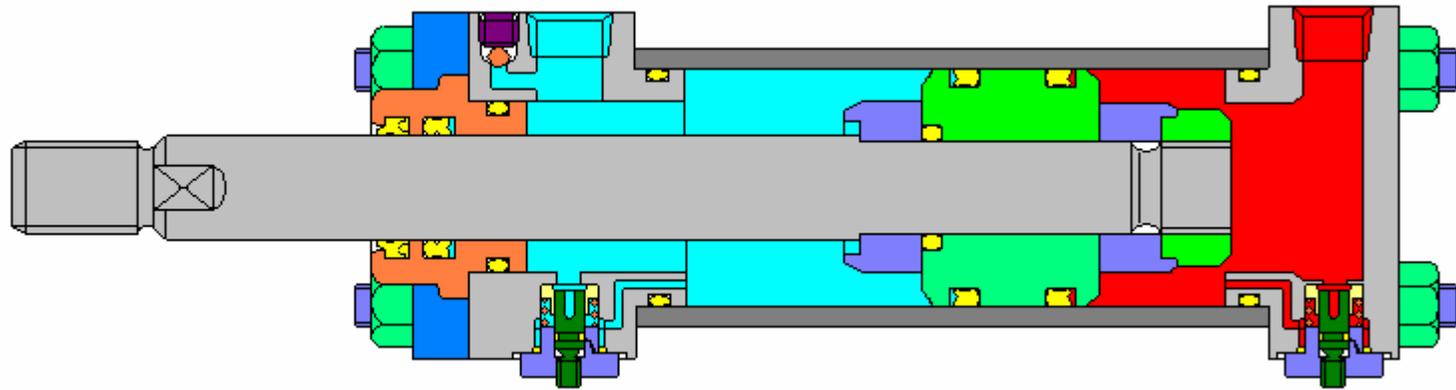
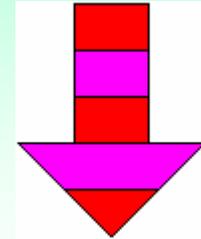
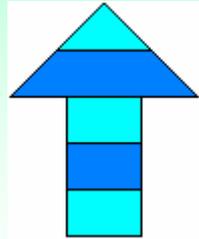
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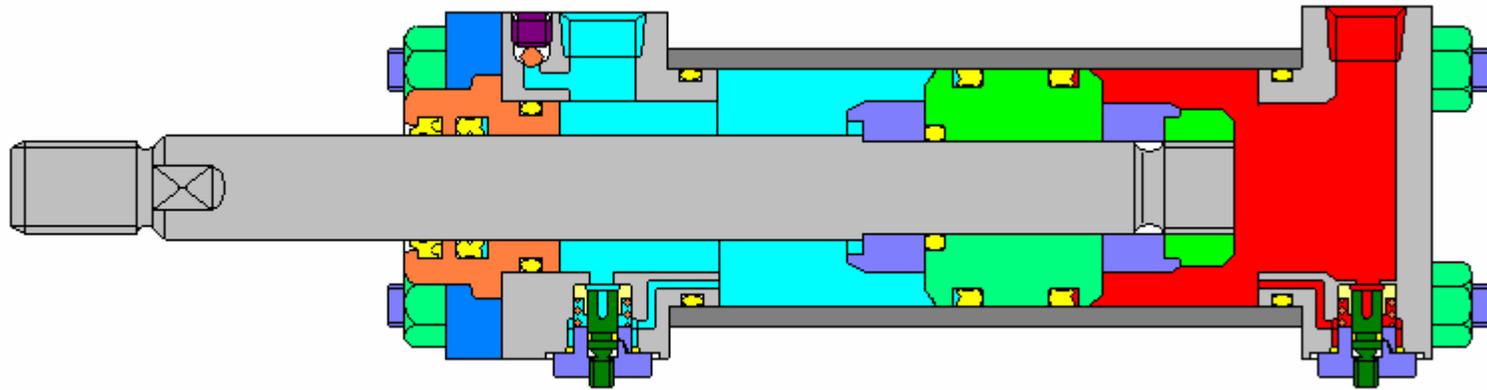
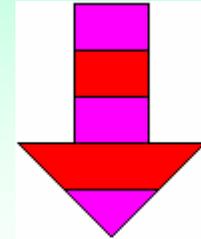
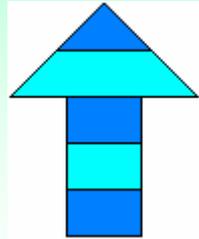
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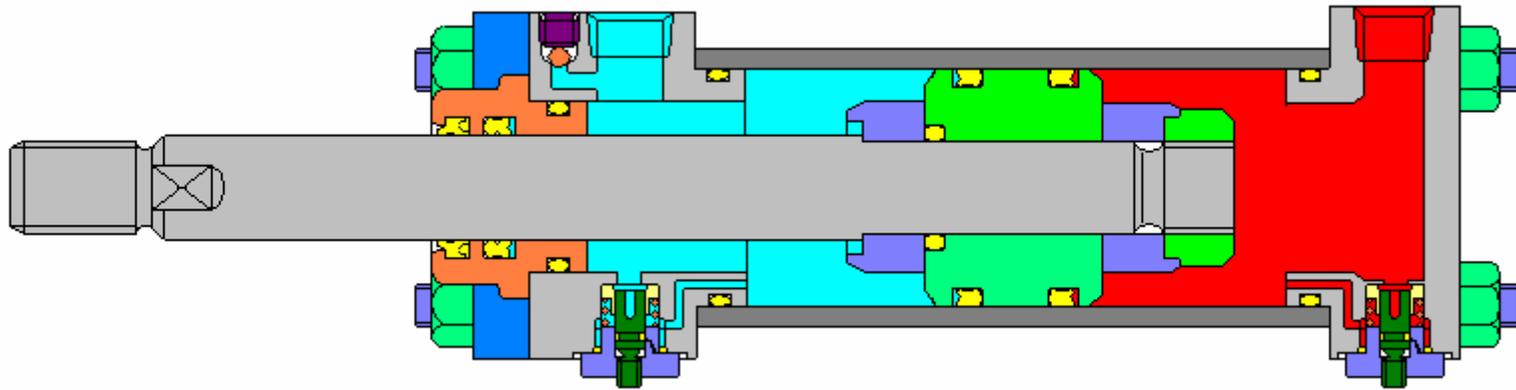
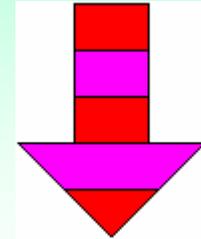
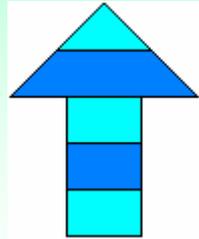
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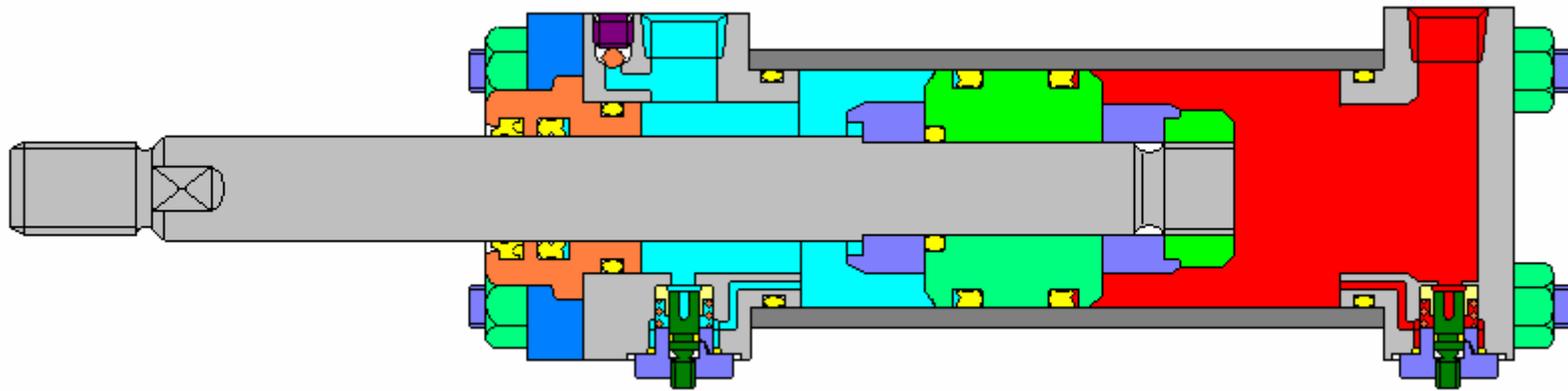
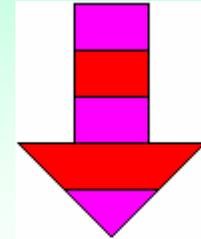
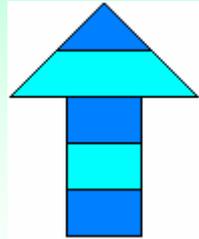
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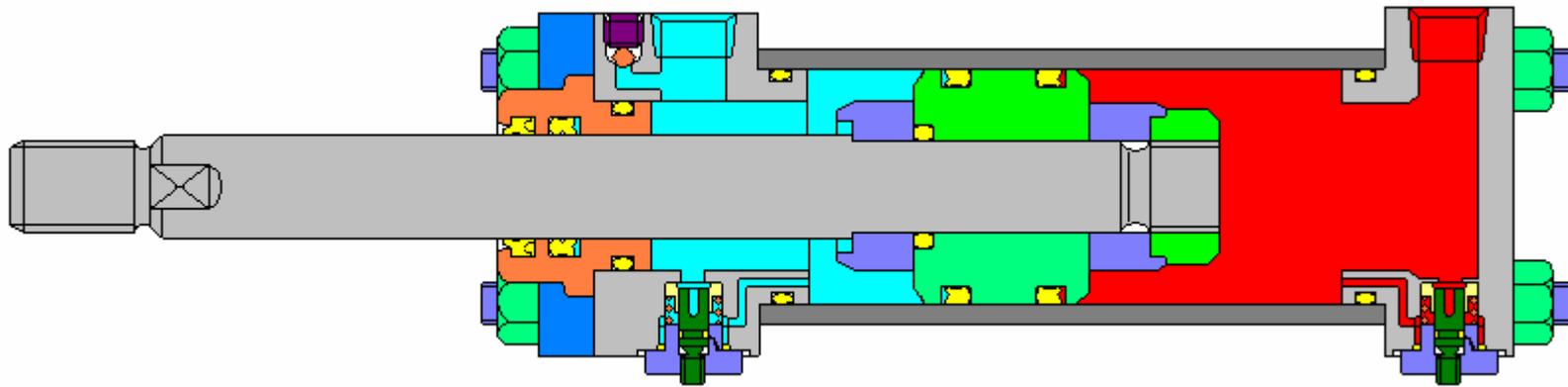
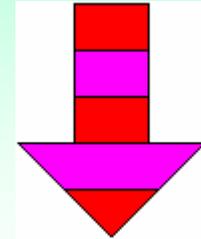
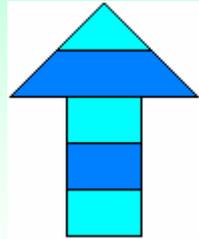
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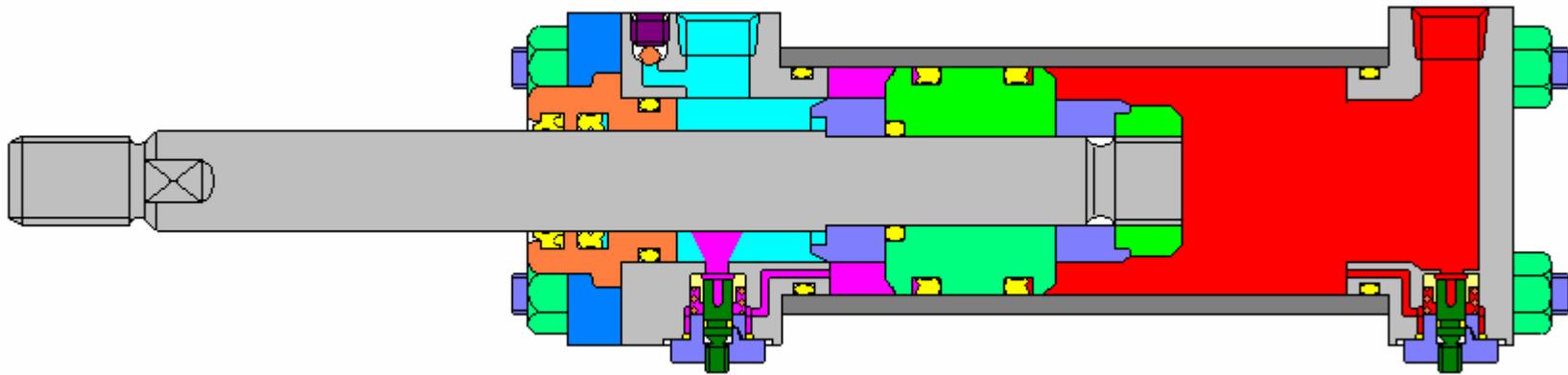
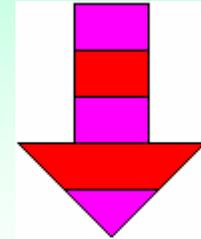
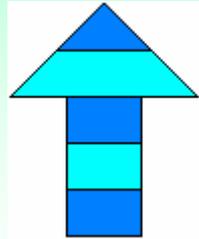
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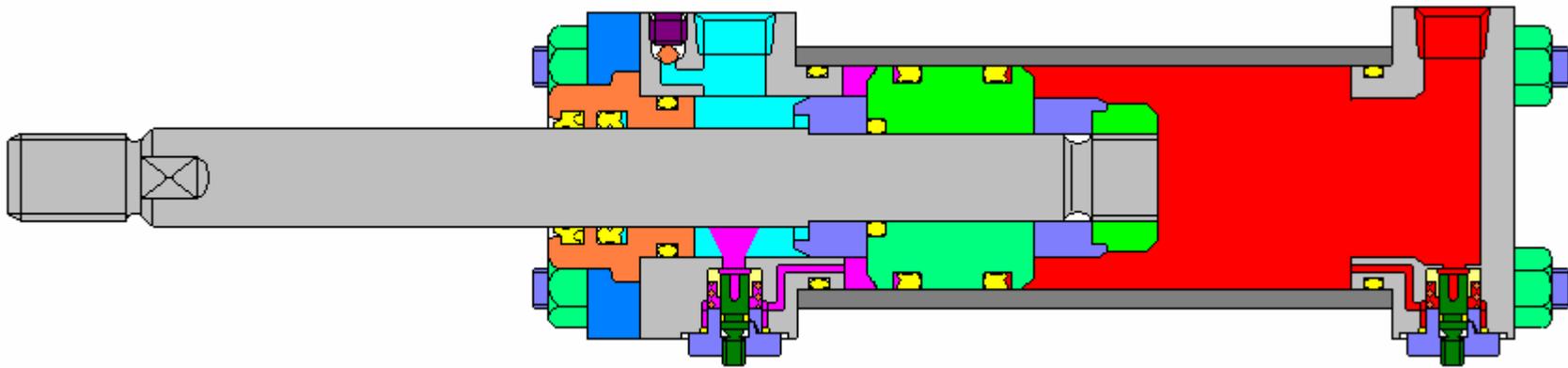
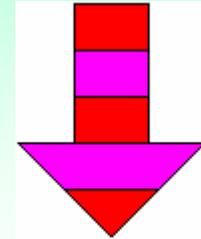
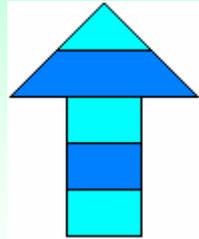
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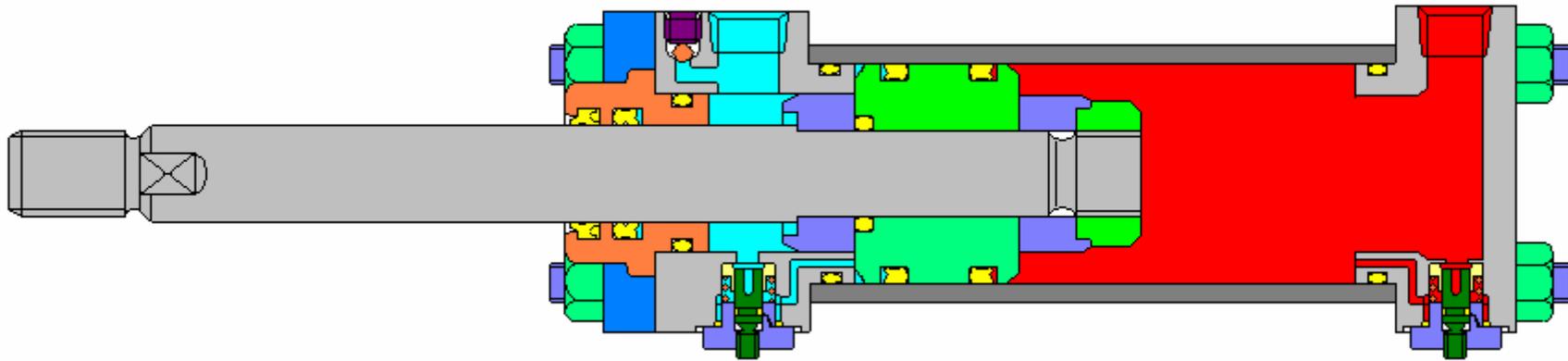
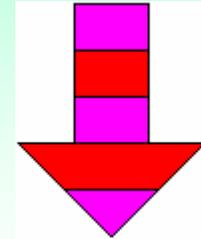
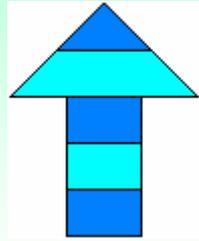
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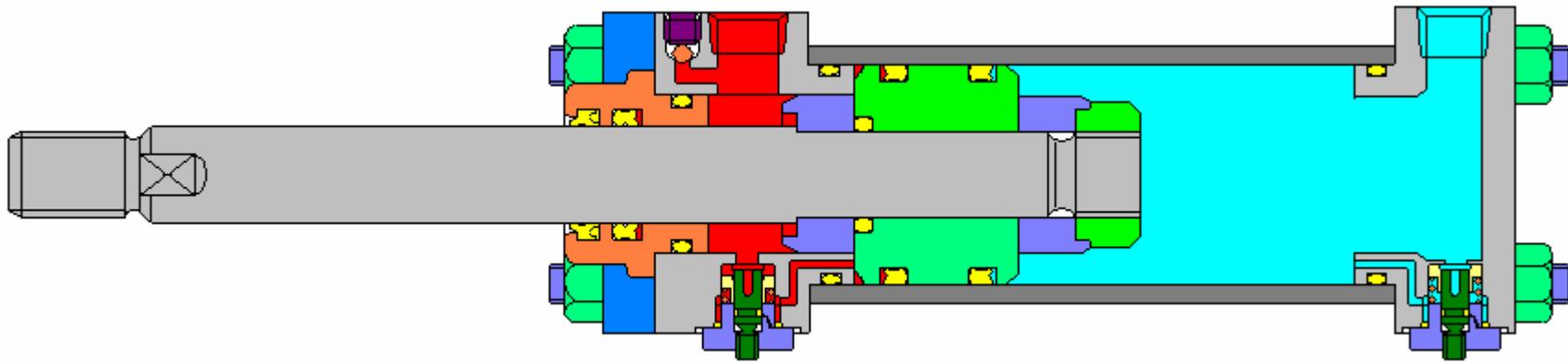
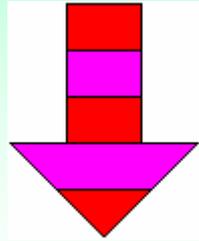
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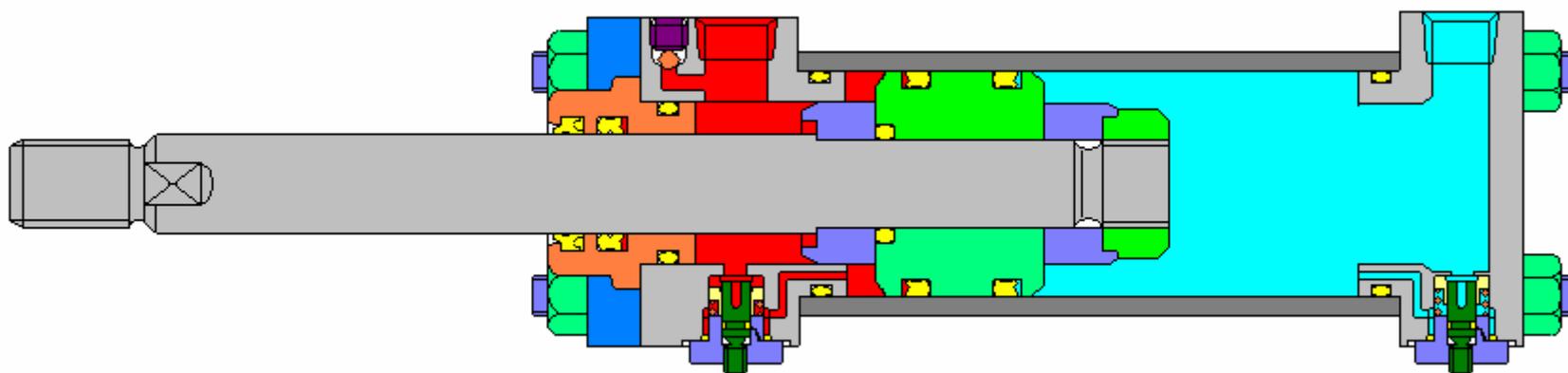
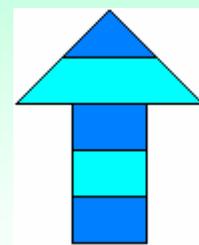
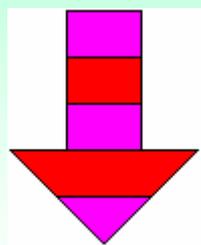
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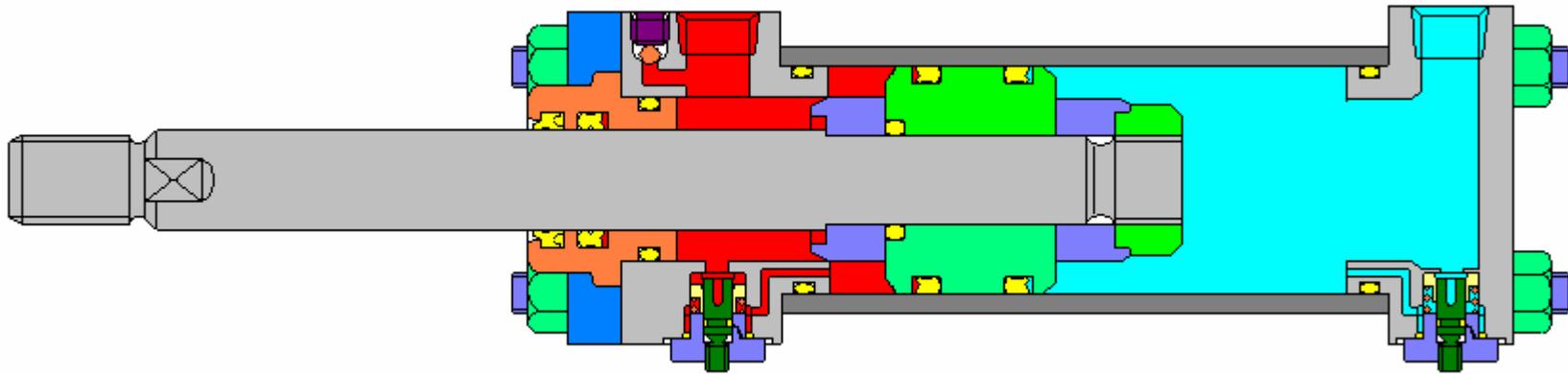
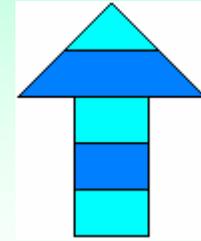
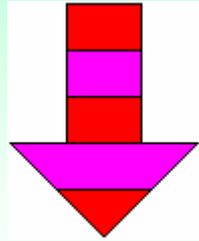
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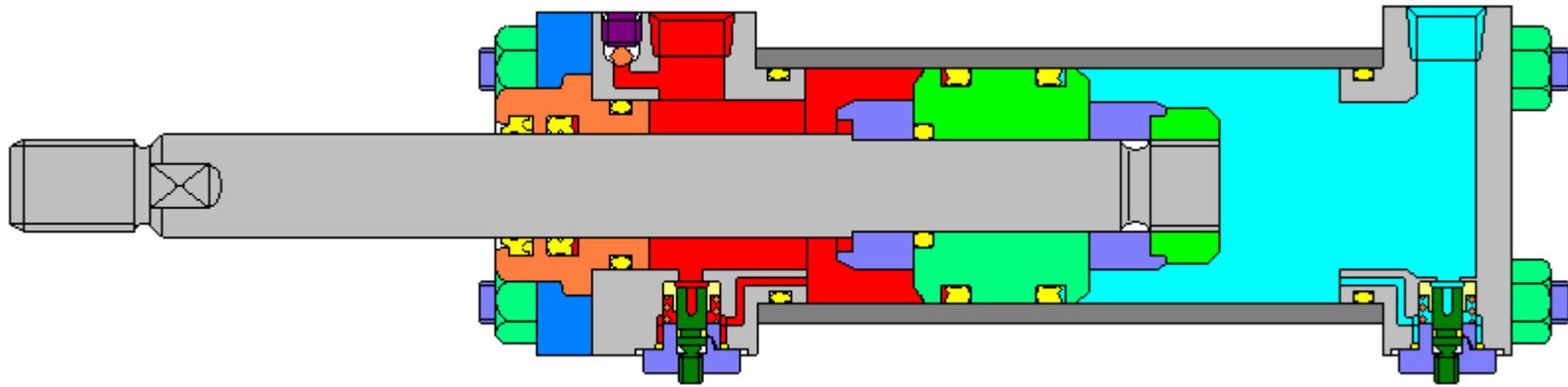
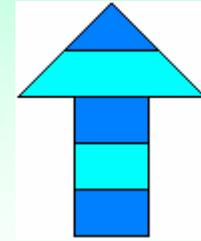
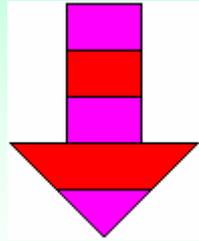
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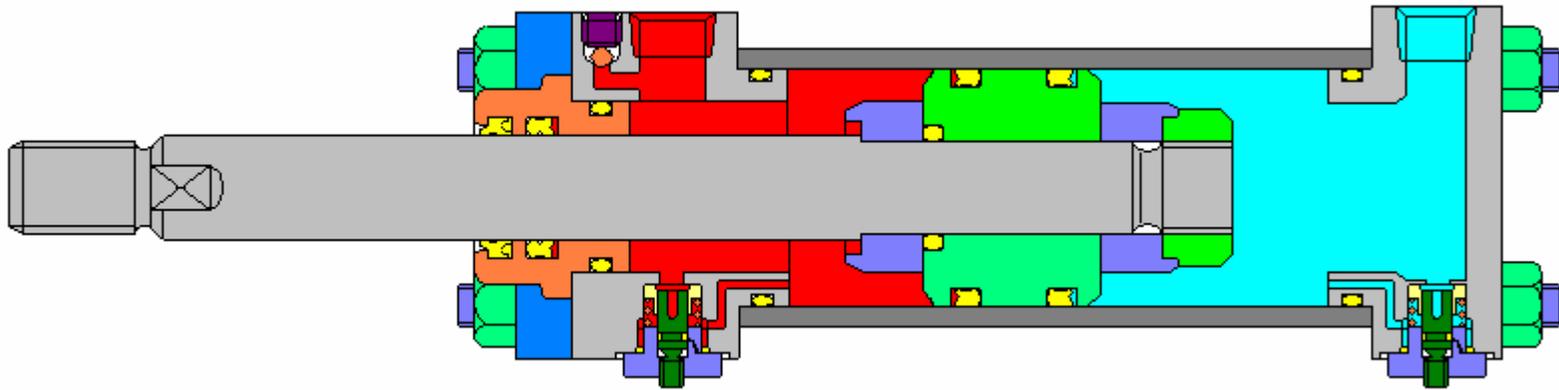
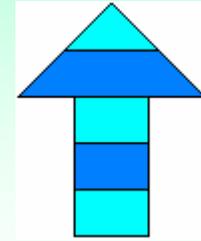
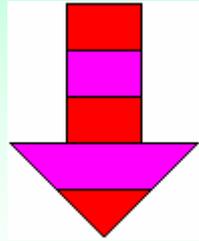
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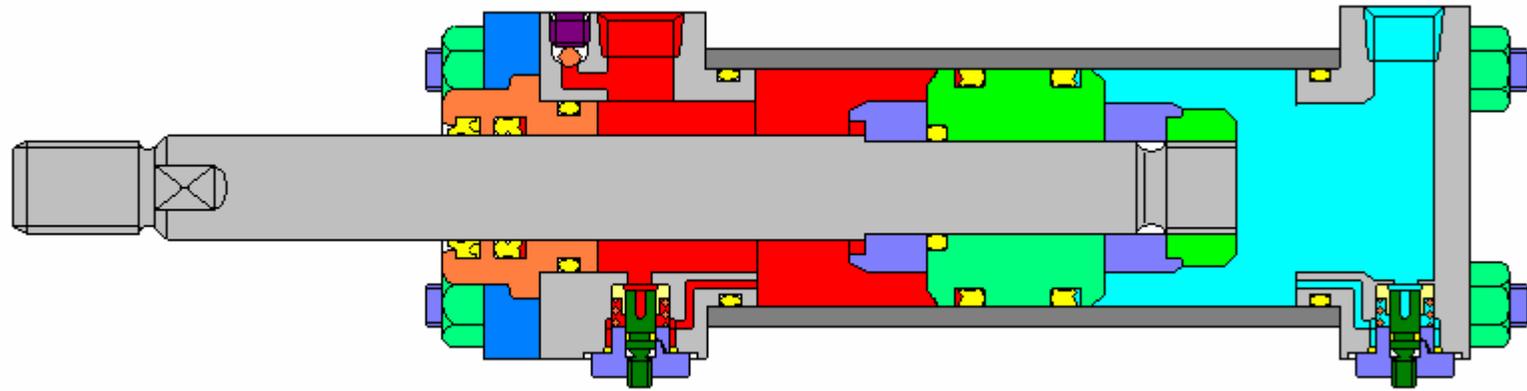
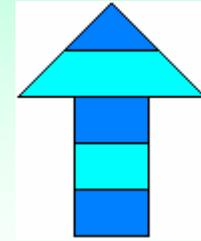
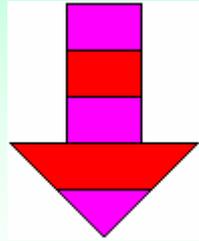
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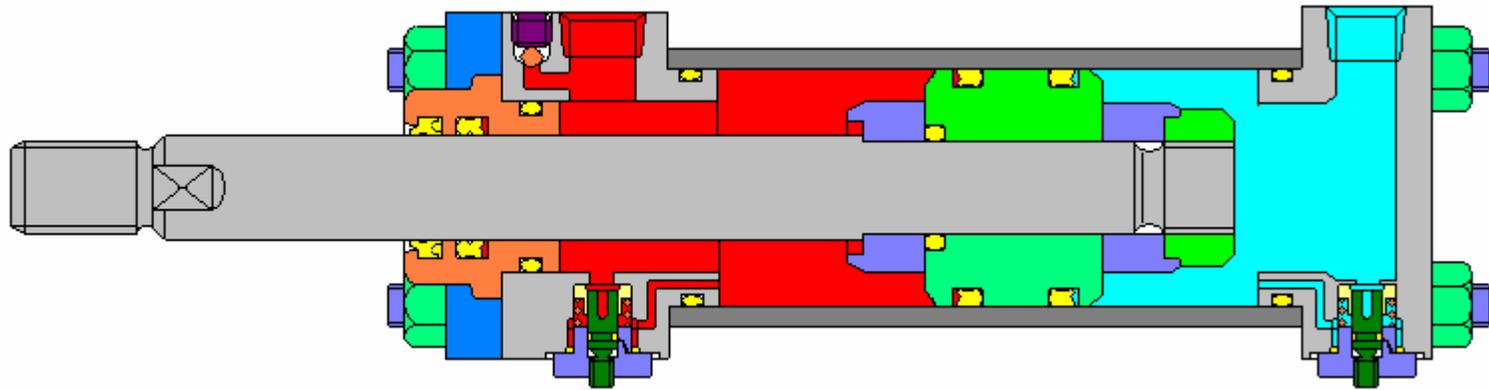
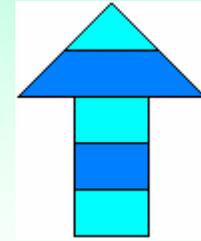
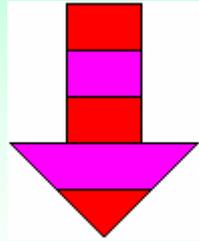
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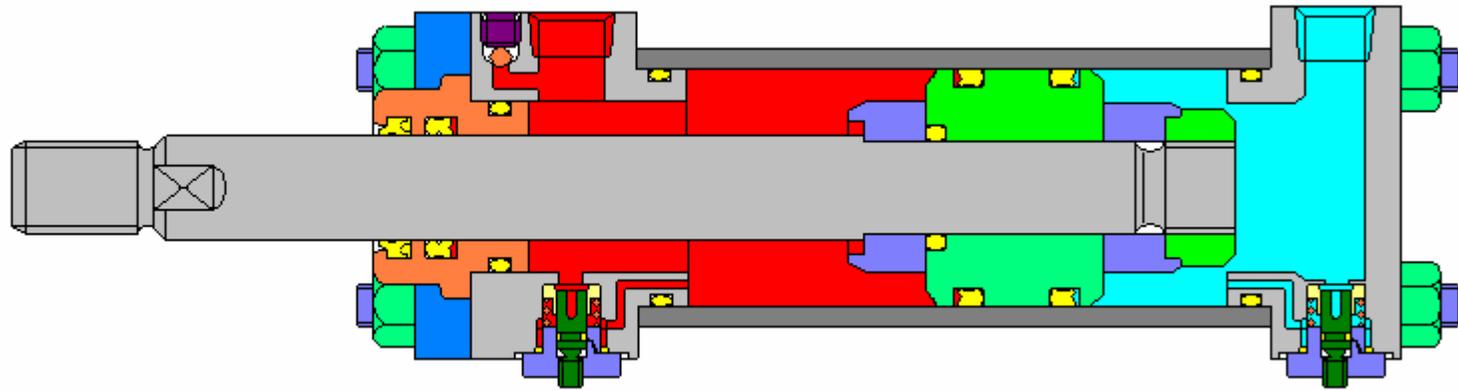
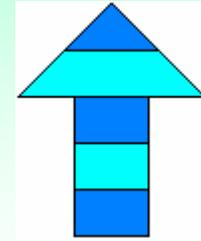
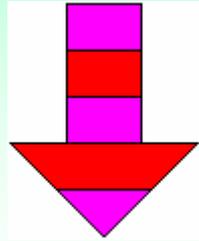
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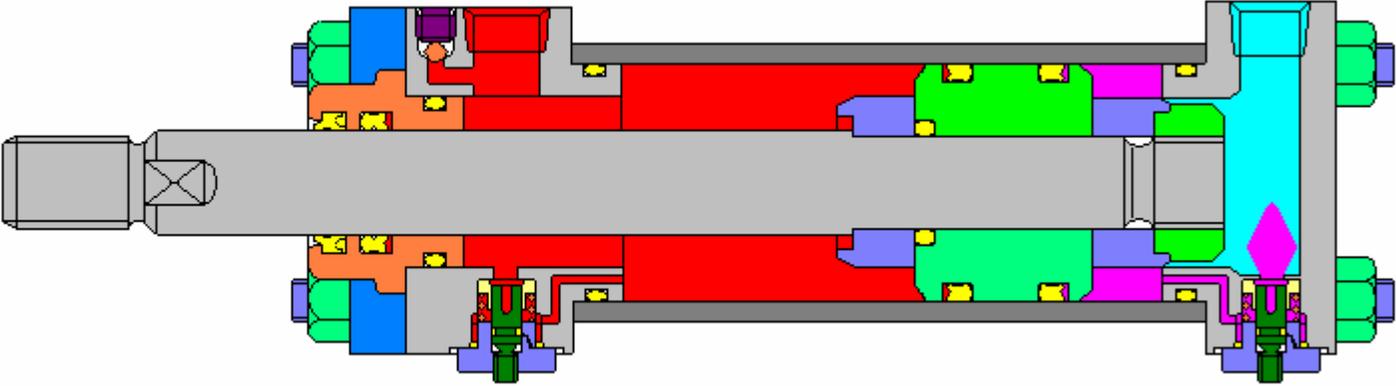
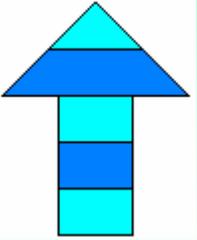
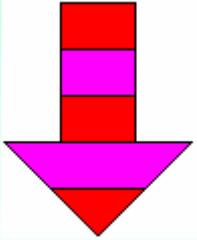
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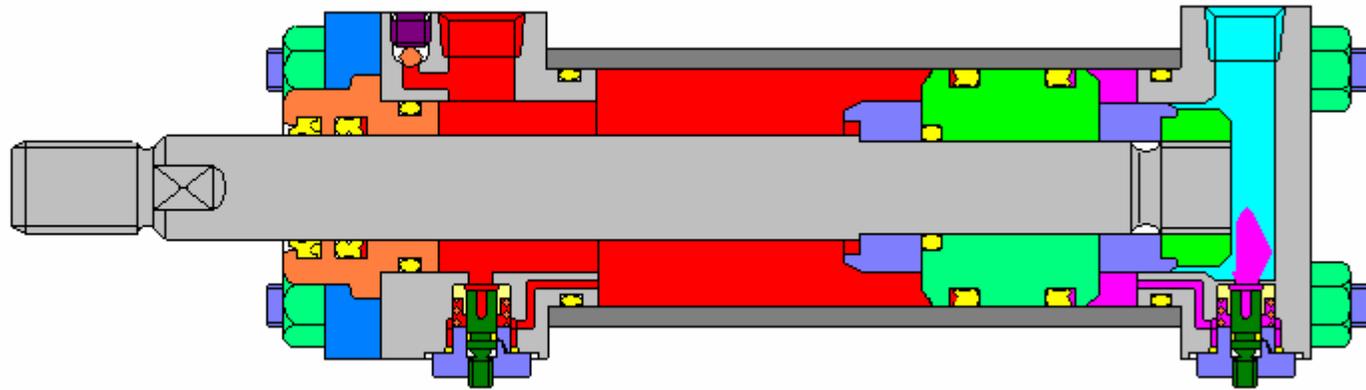
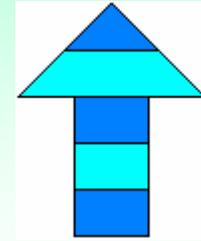
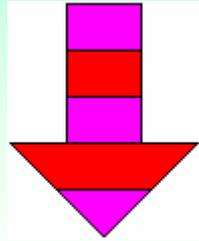
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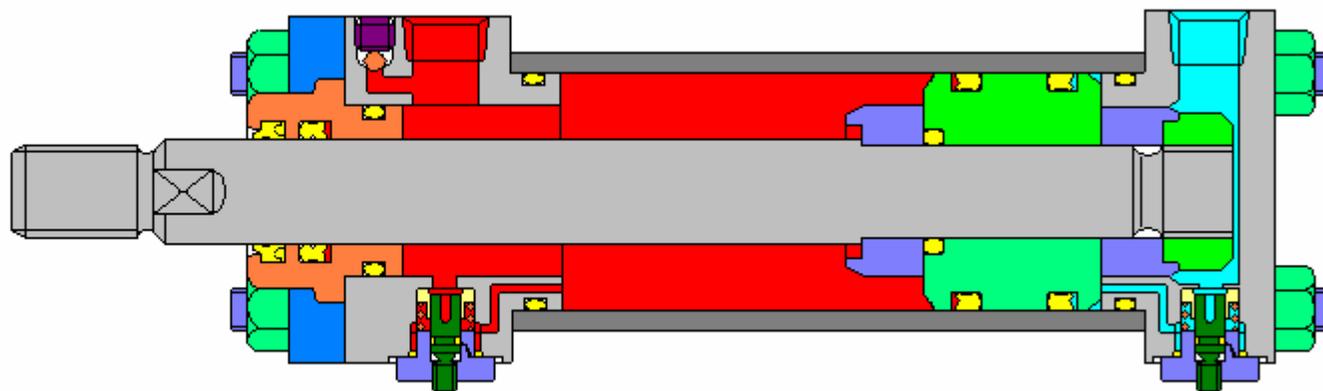
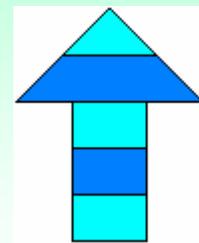
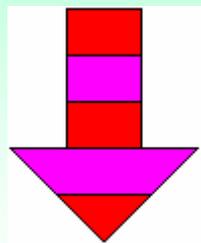
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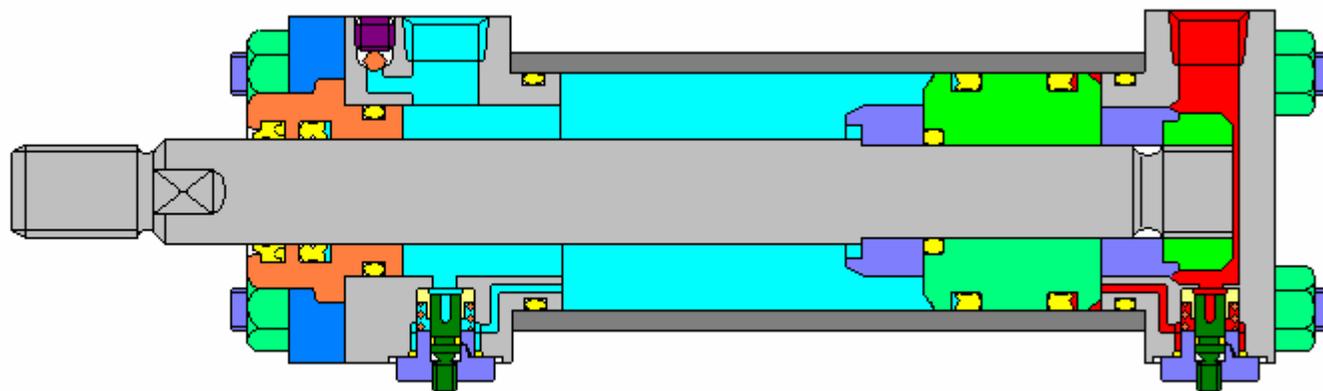
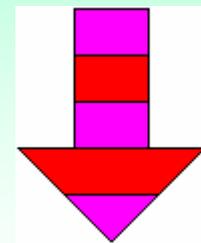
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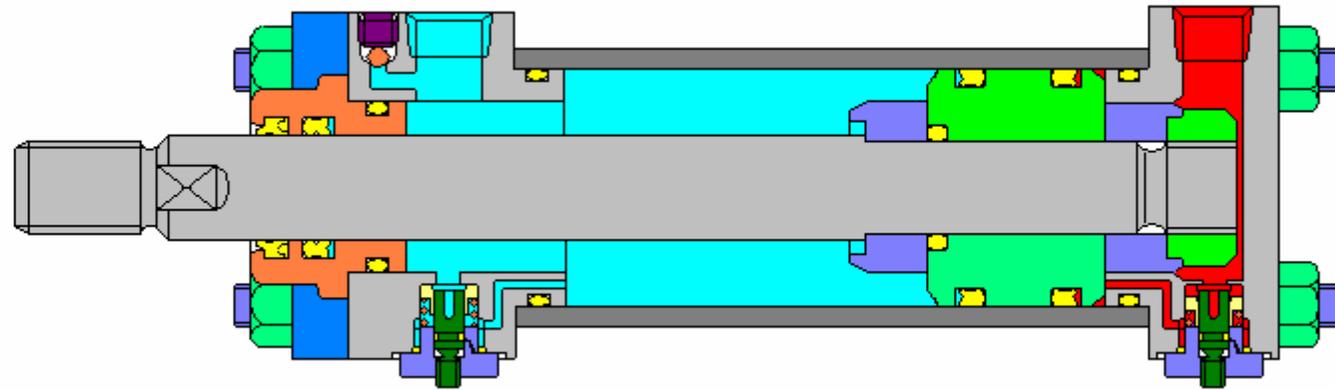
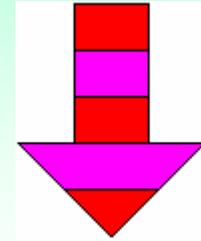
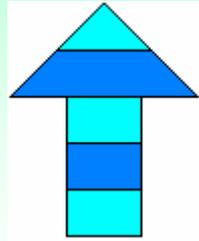
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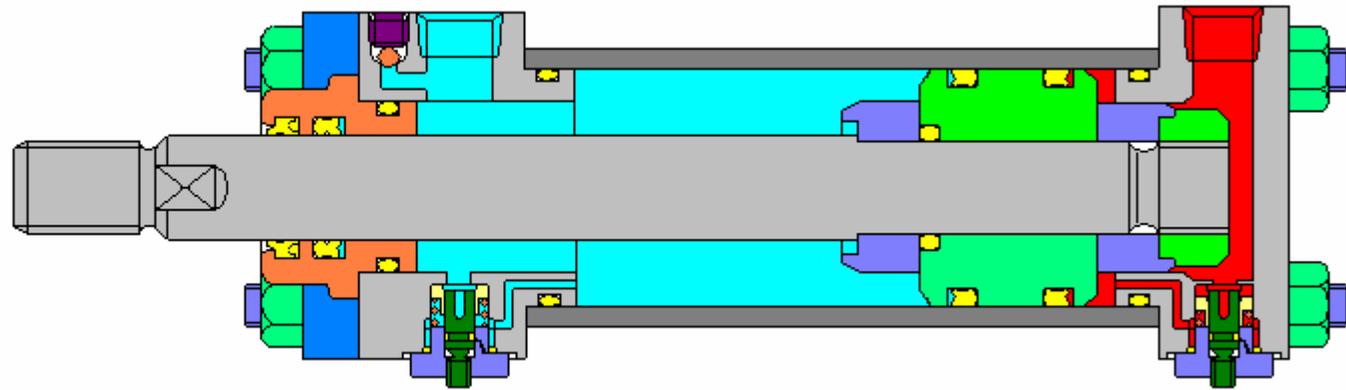
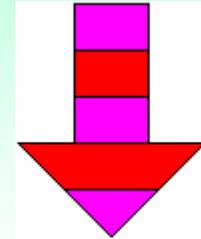
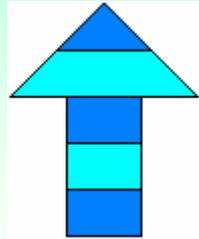
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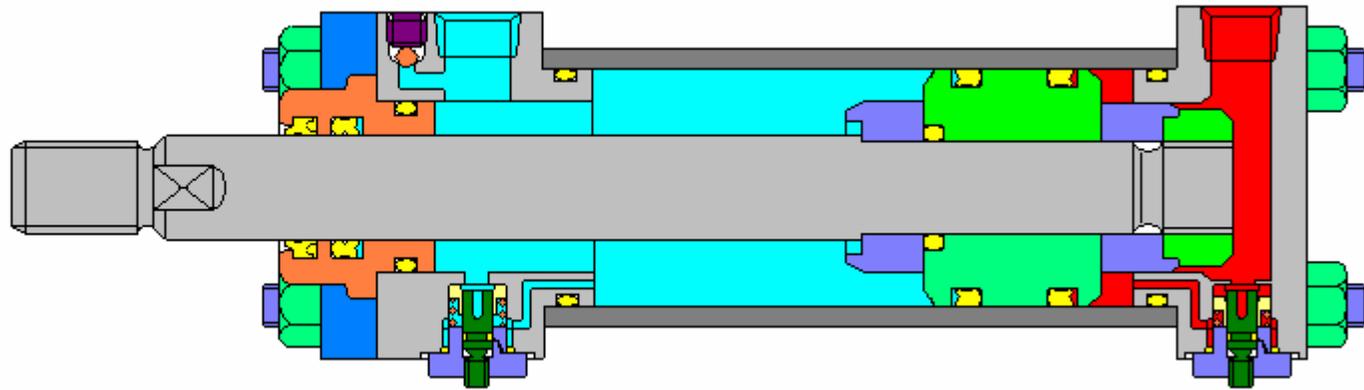
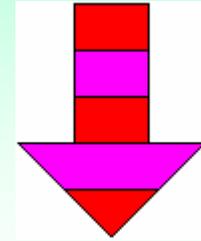
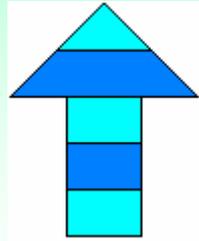
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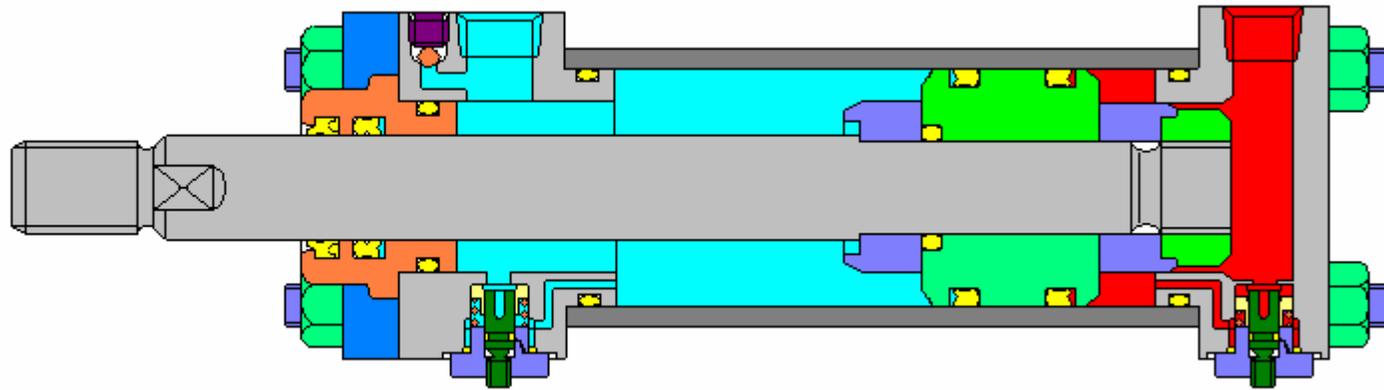
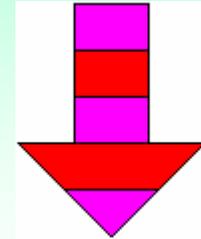
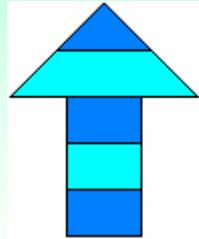
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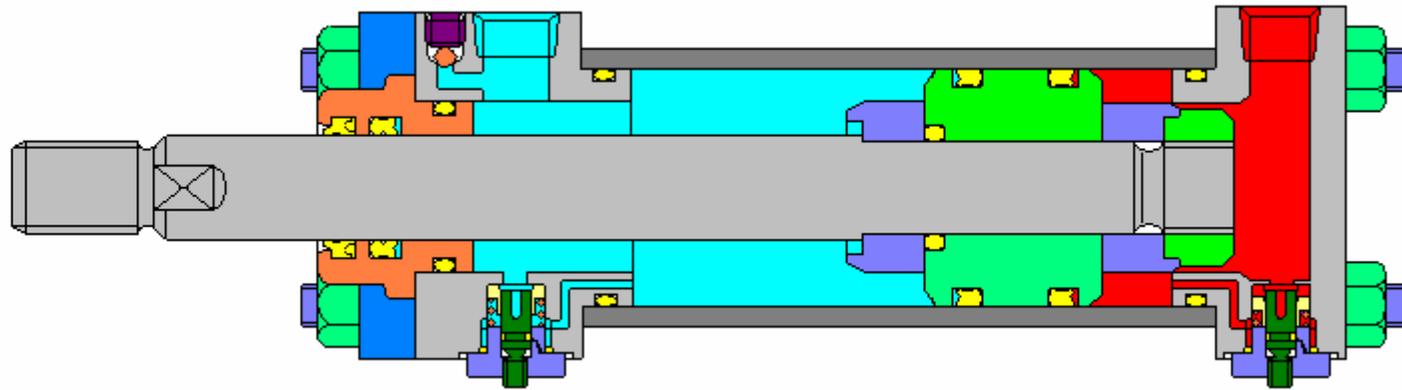
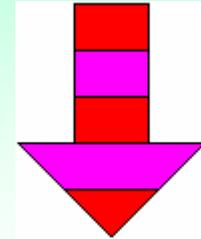
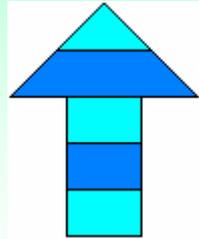
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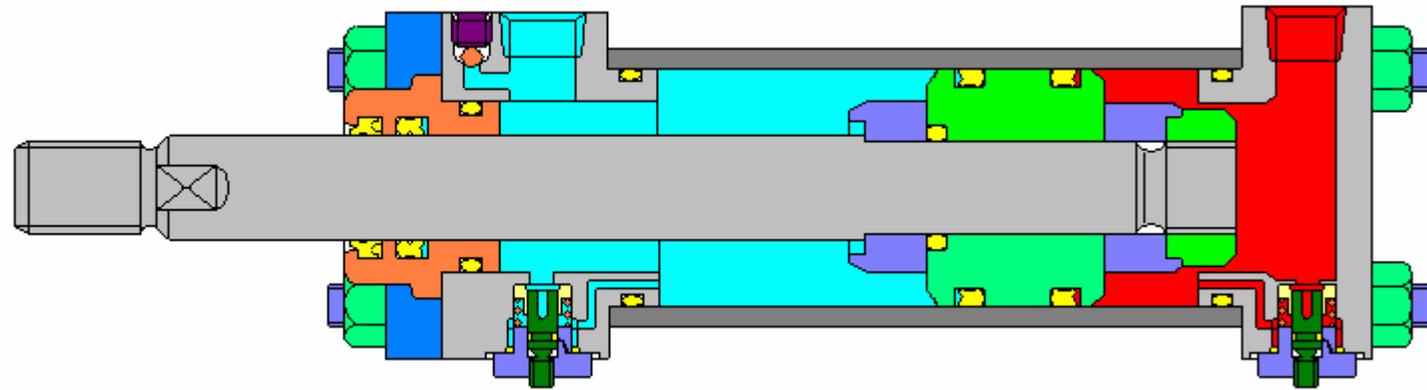
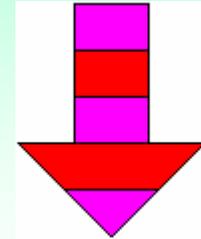
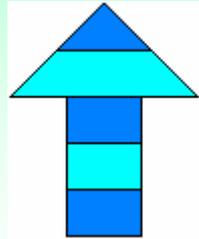
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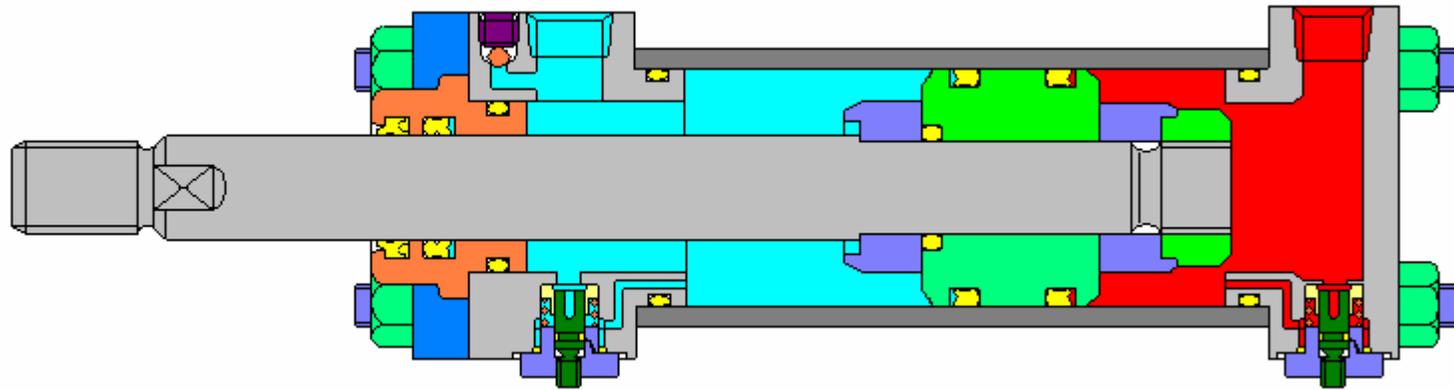
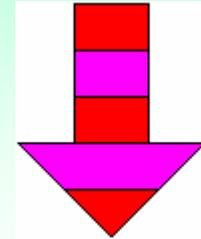
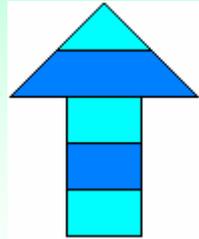
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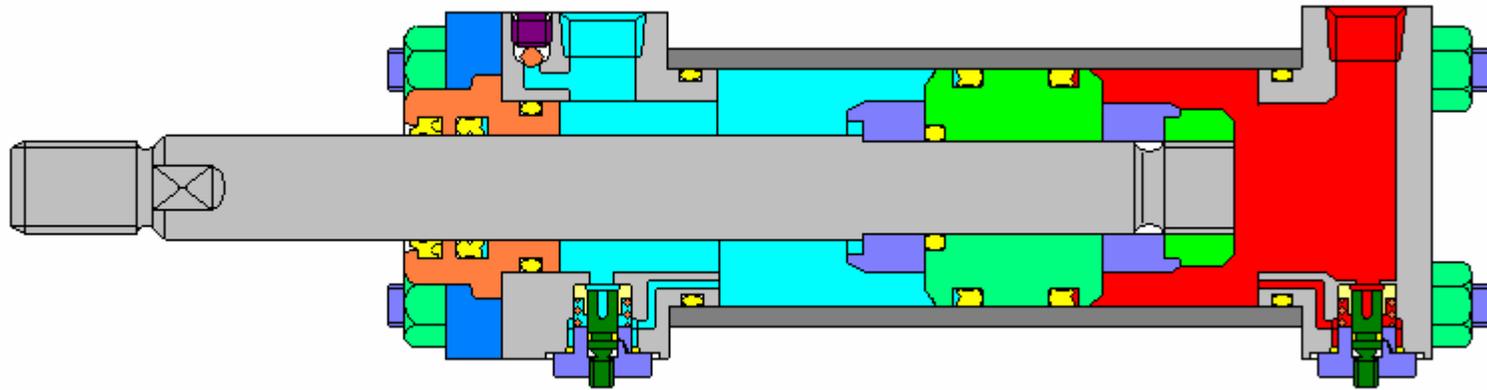
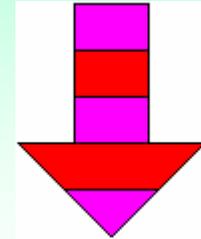
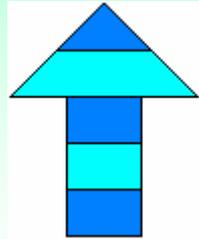
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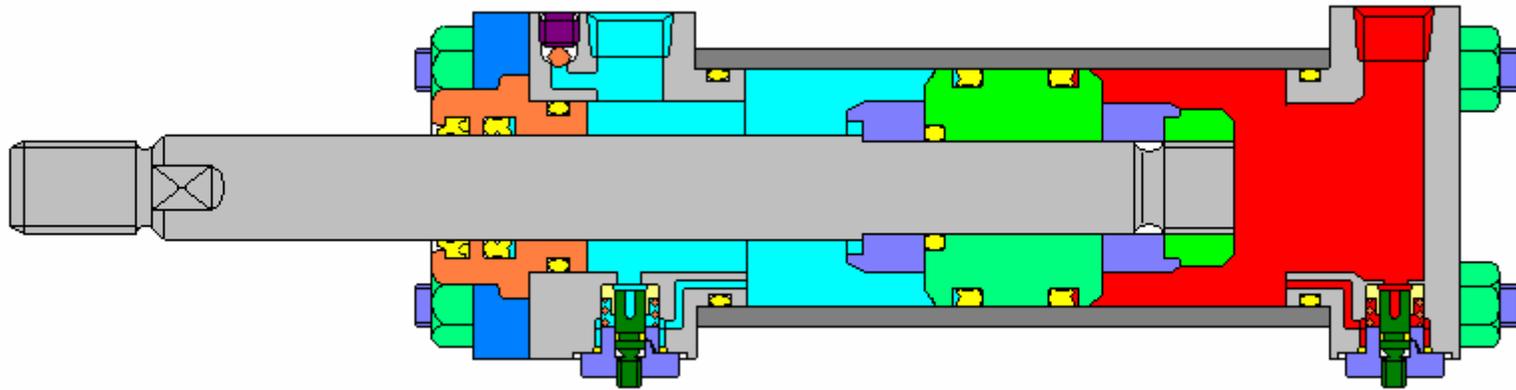
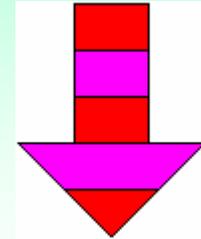
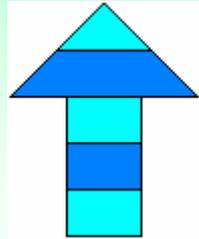
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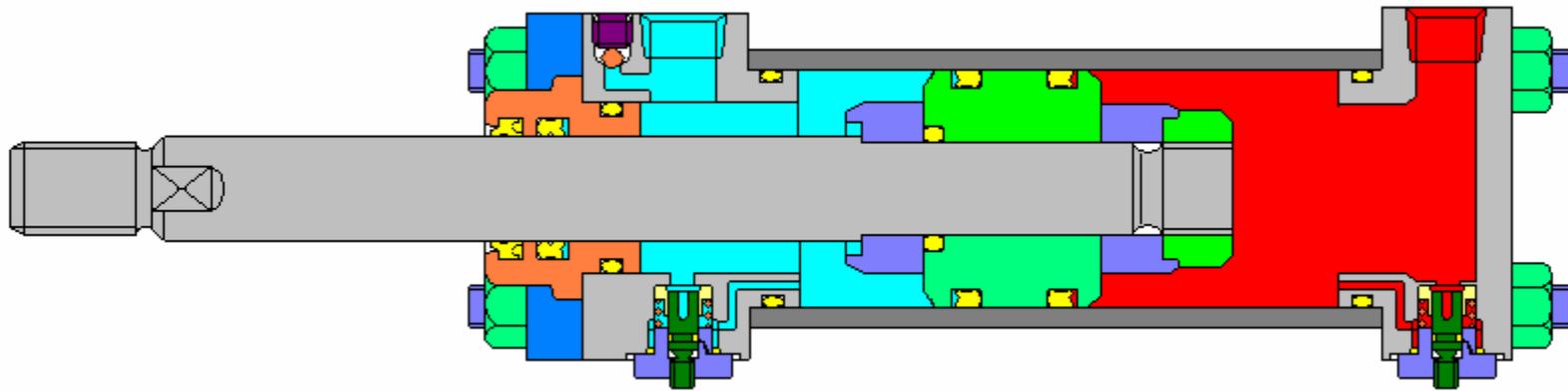
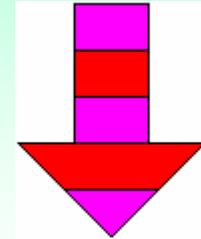
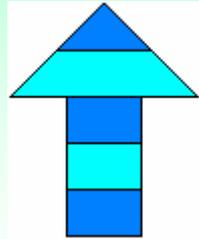
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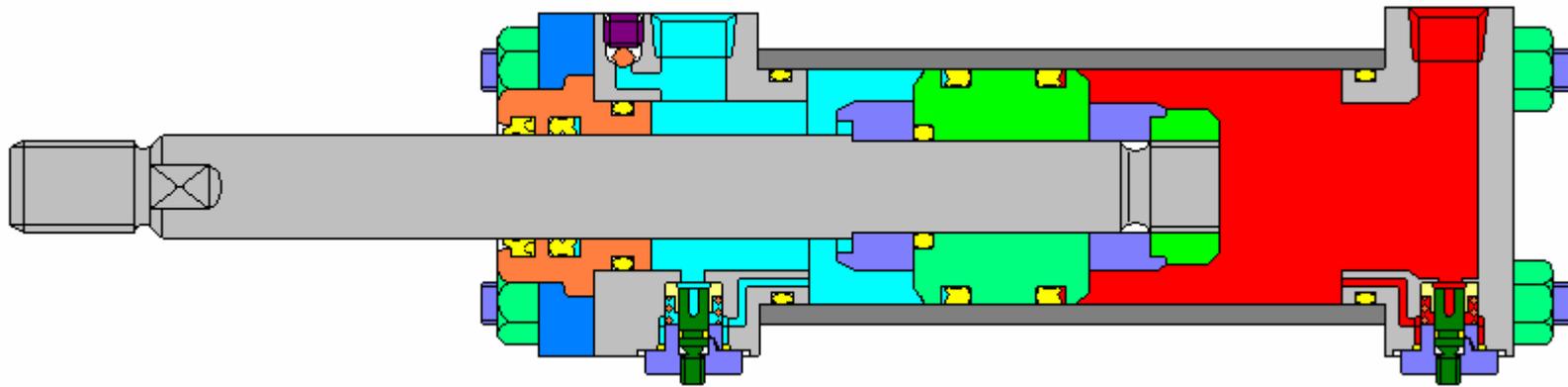
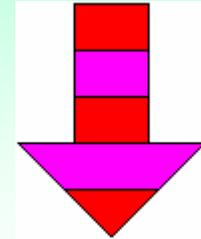
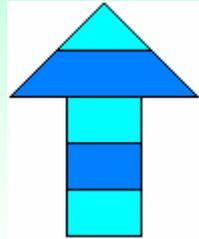
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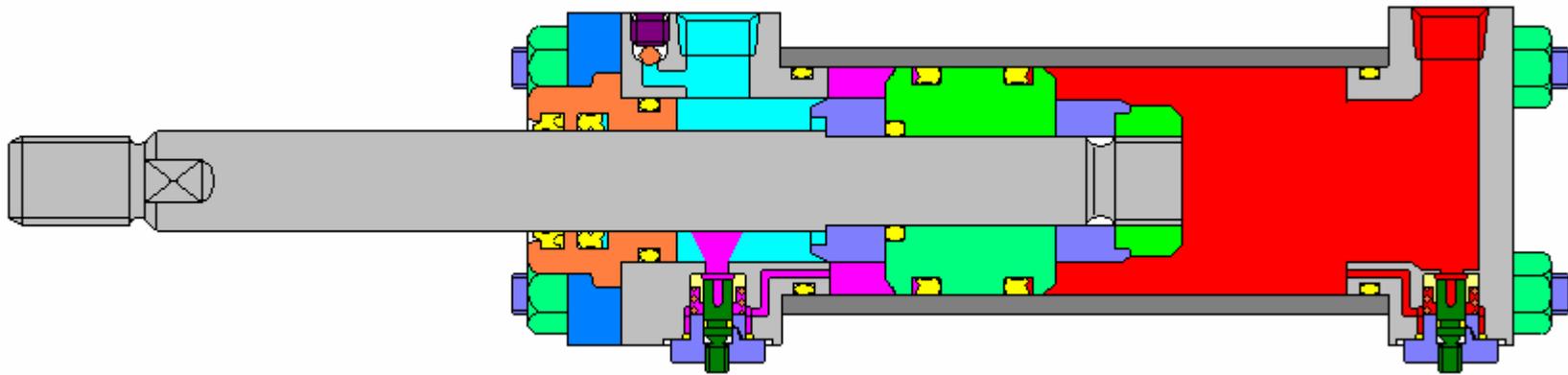
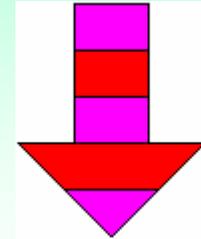
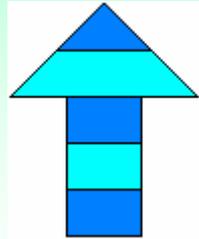
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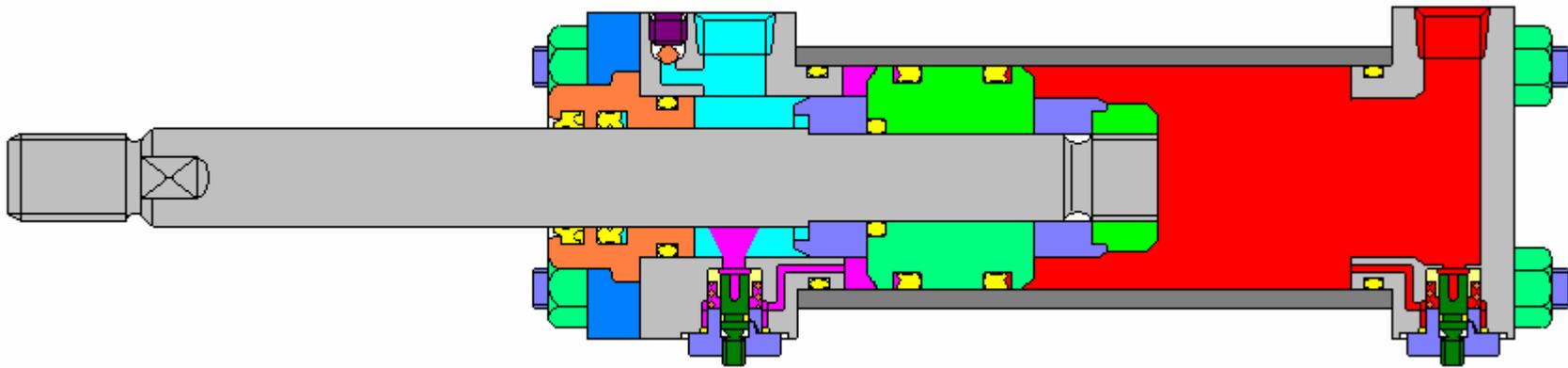
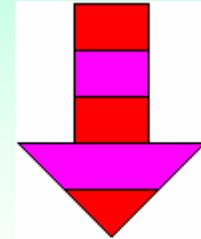
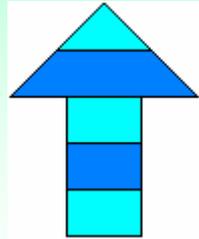
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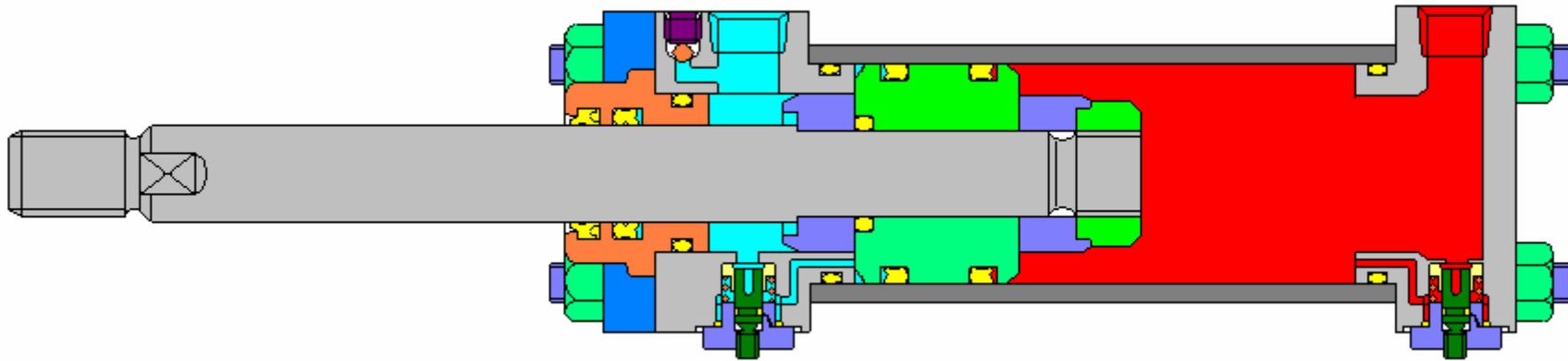
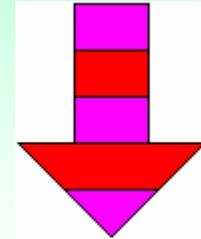
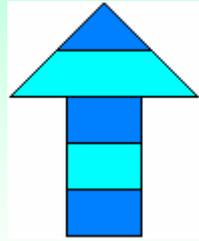
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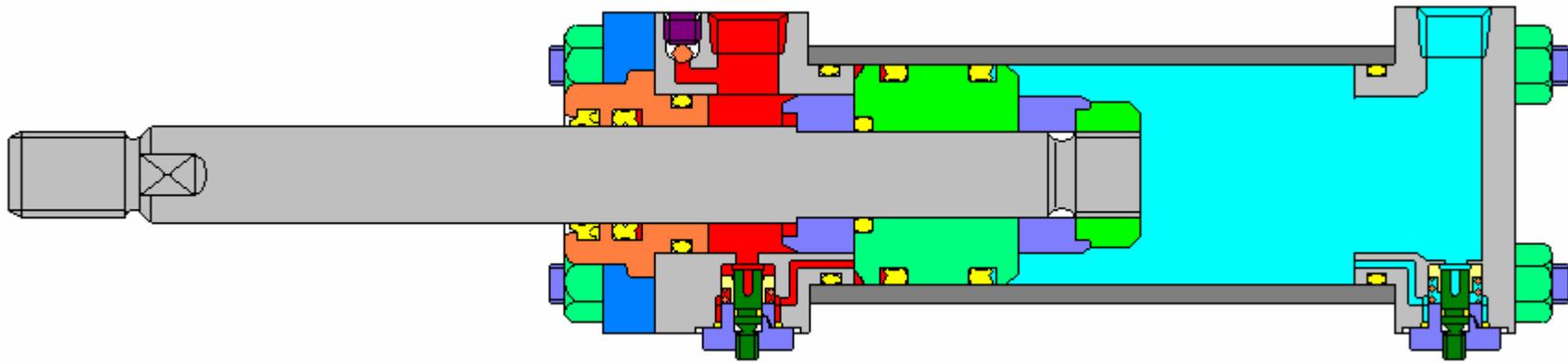
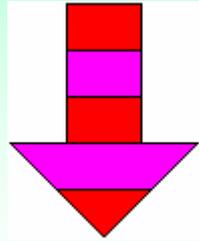
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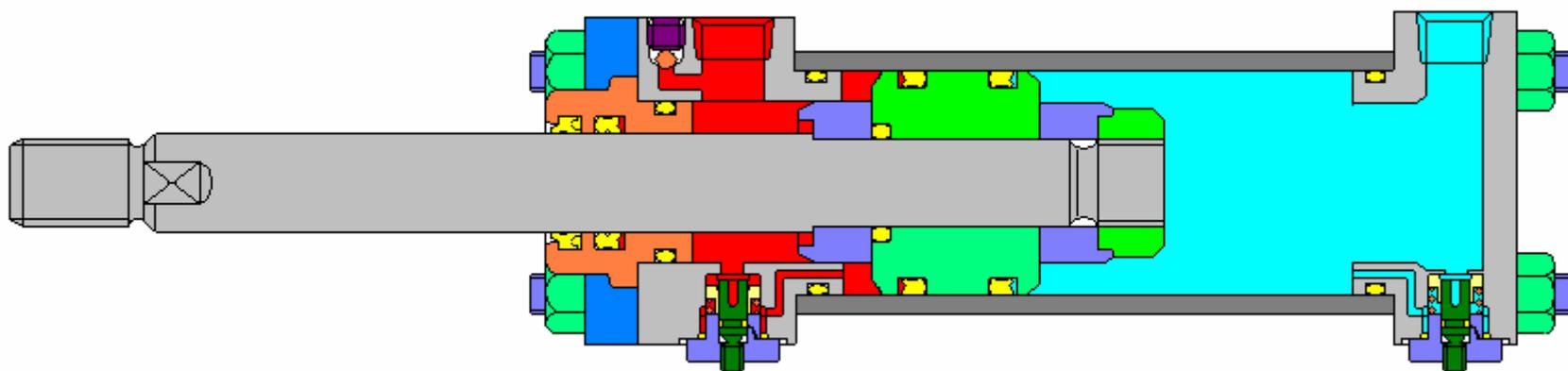
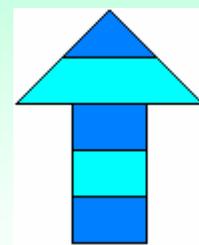
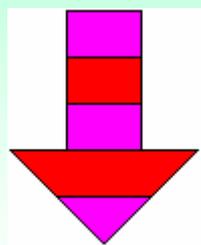
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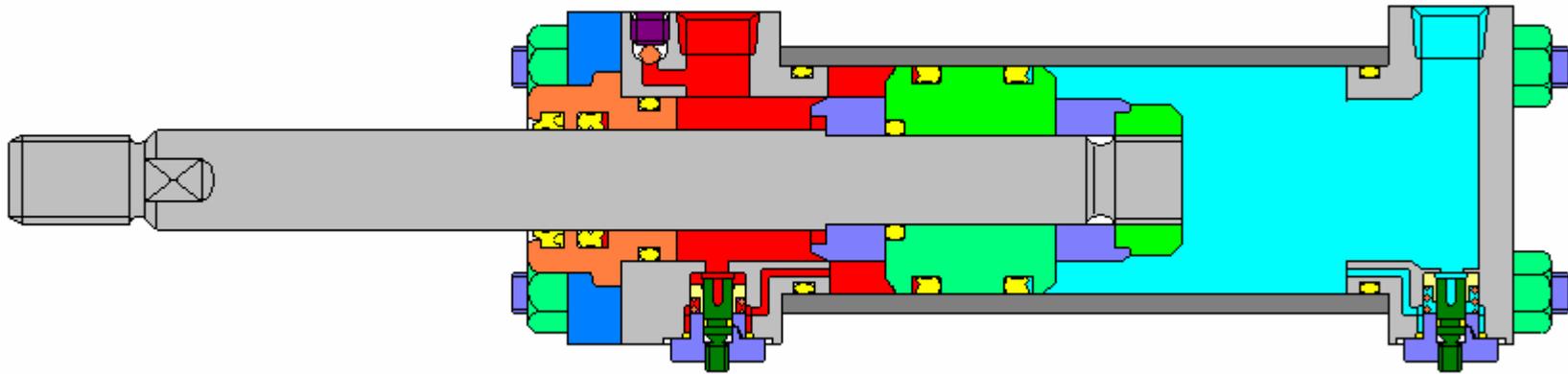
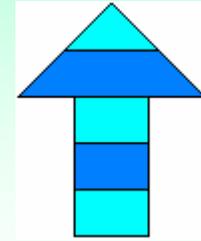
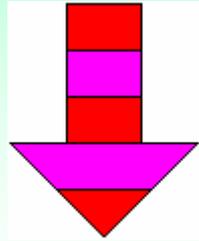
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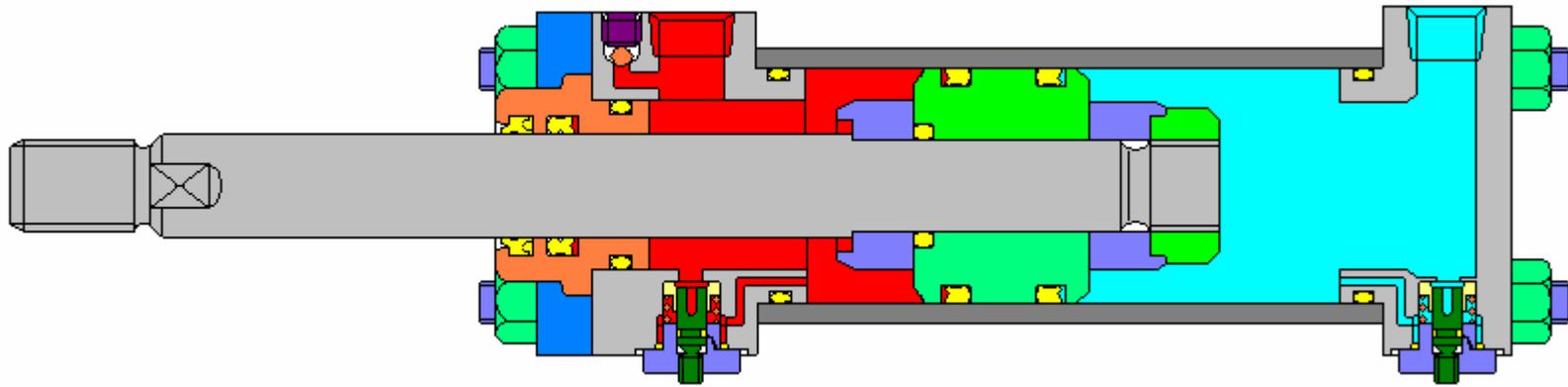
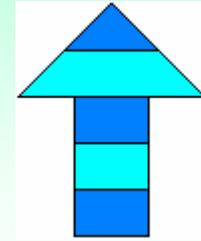
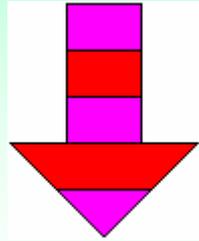
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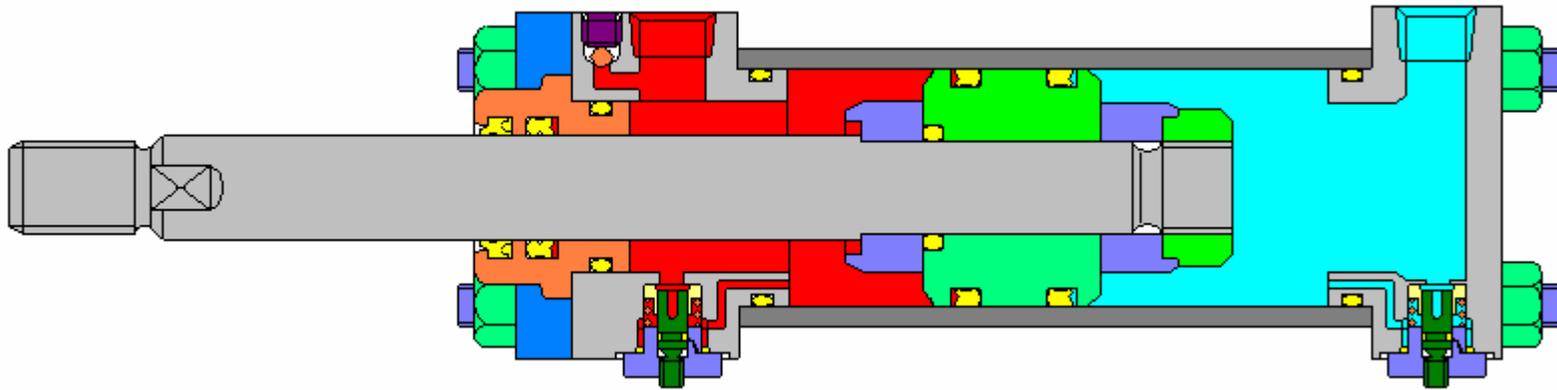
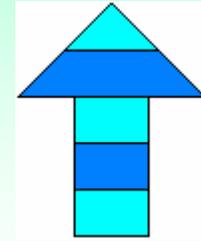
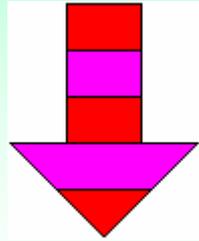
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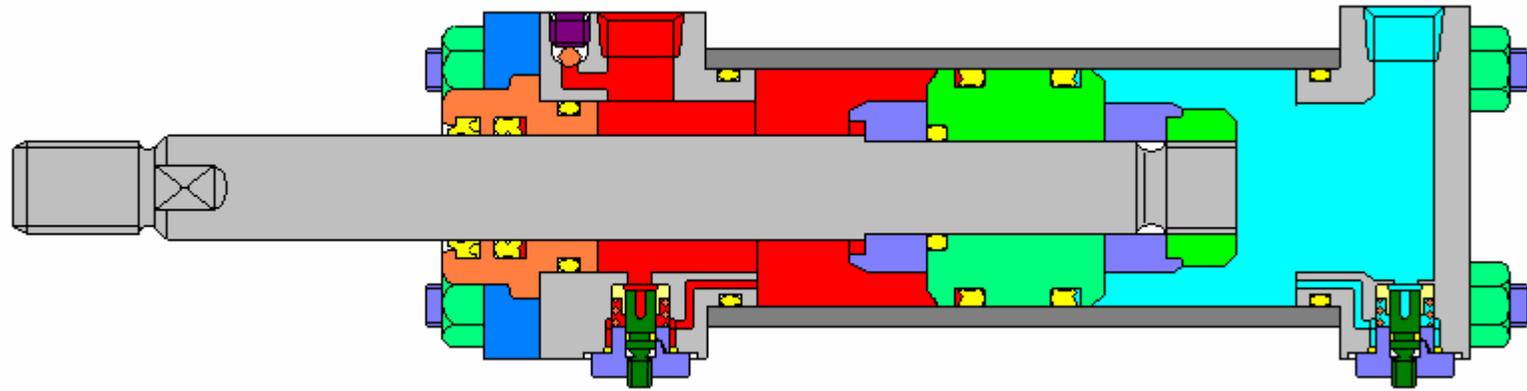
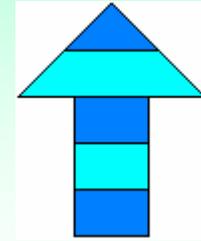
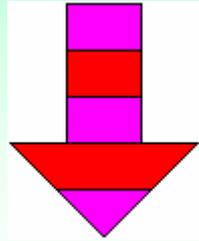
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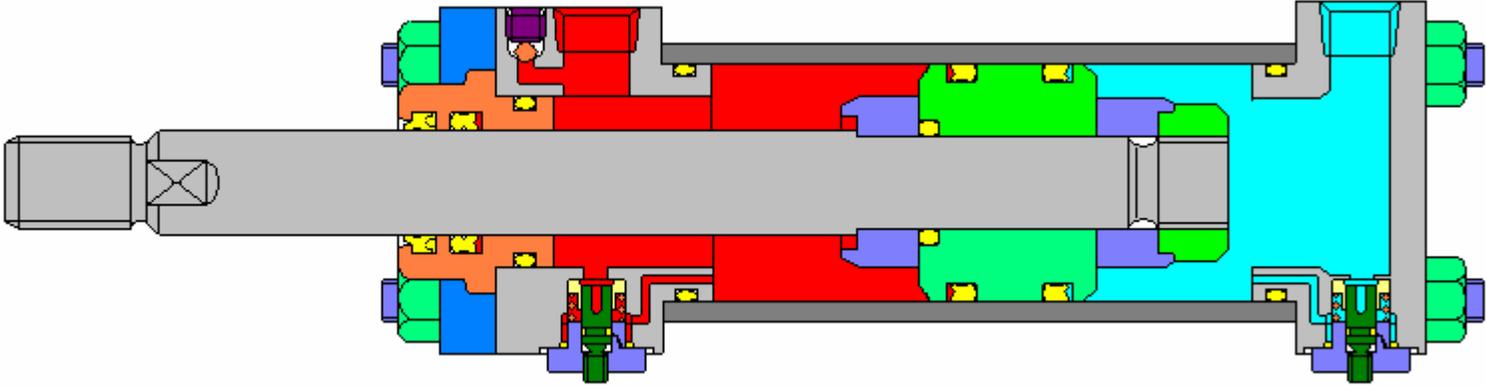
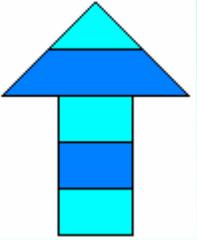
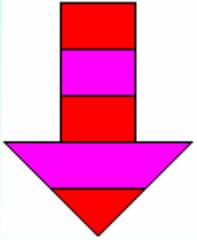
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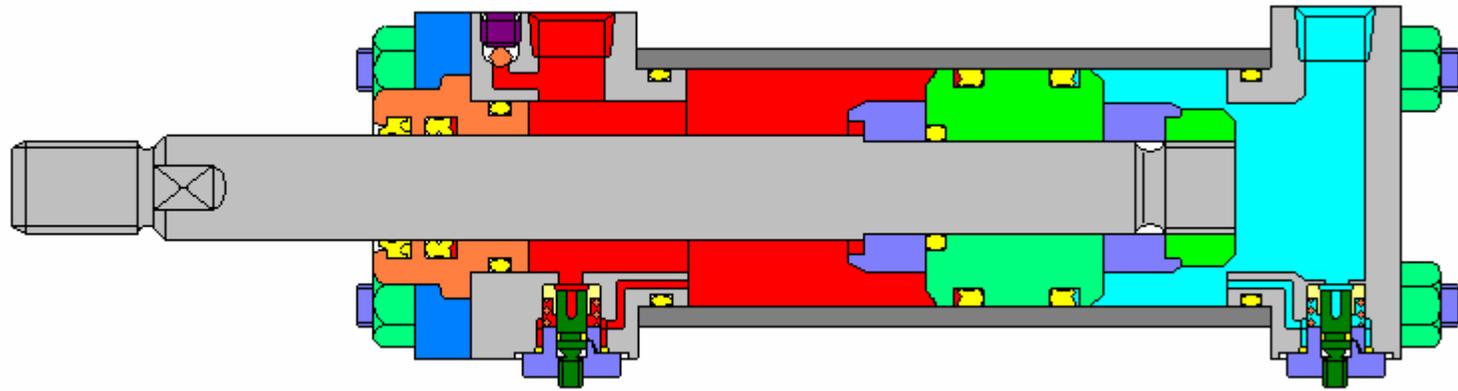
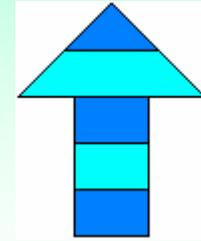
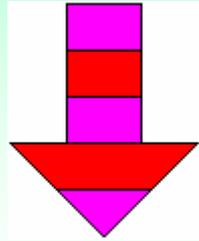
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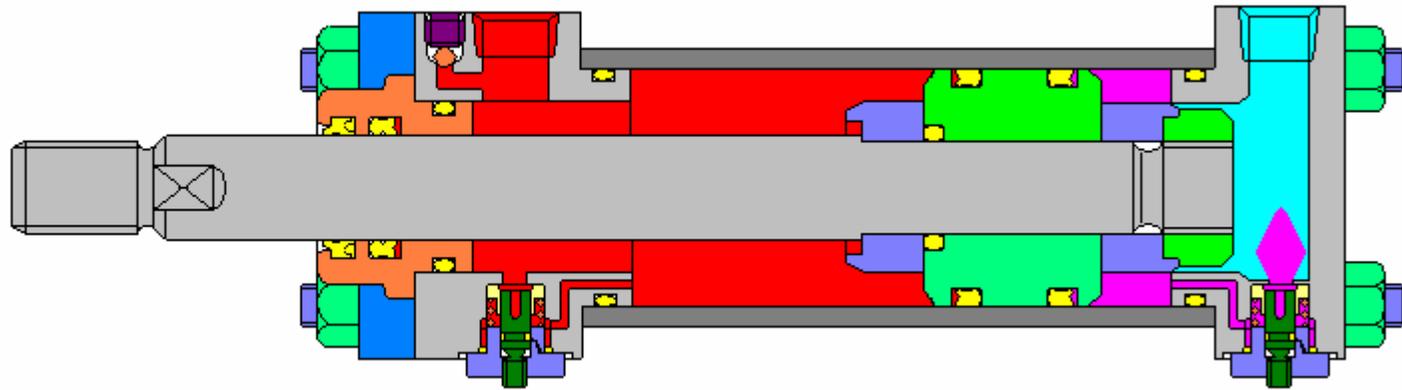
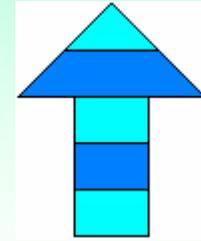
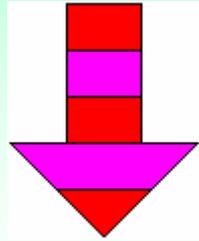
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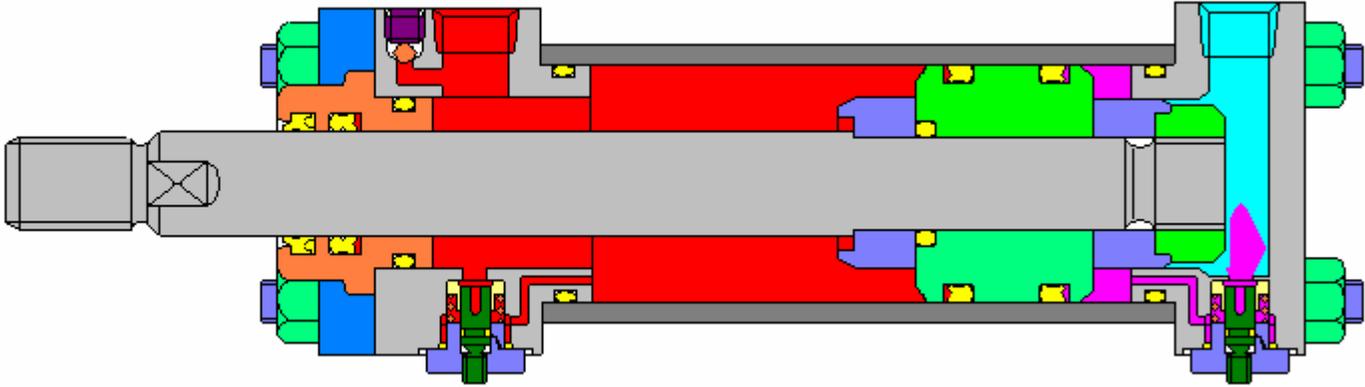
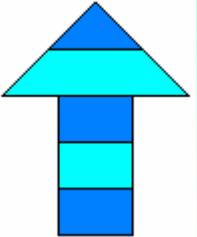
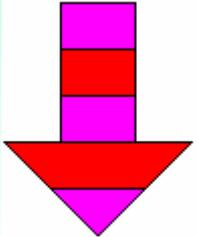
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