

機械系教科書シリーズ28

# CAD/CAM

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コロナ社



# 4

## 機械要素とアセンブリ



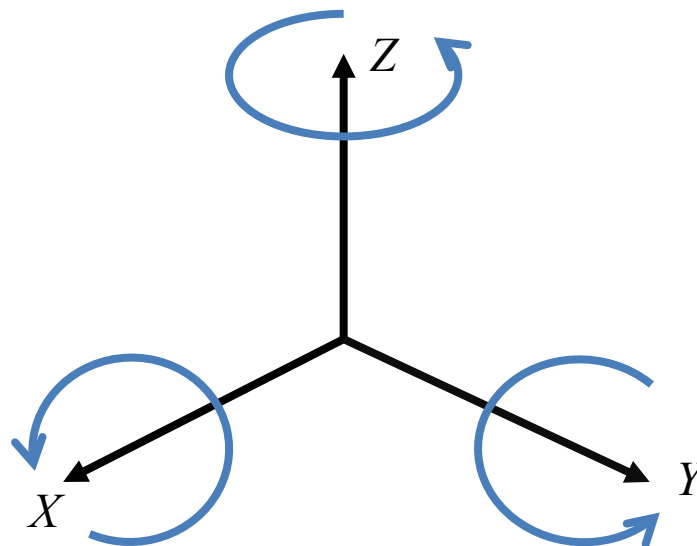


図4.1 自由度



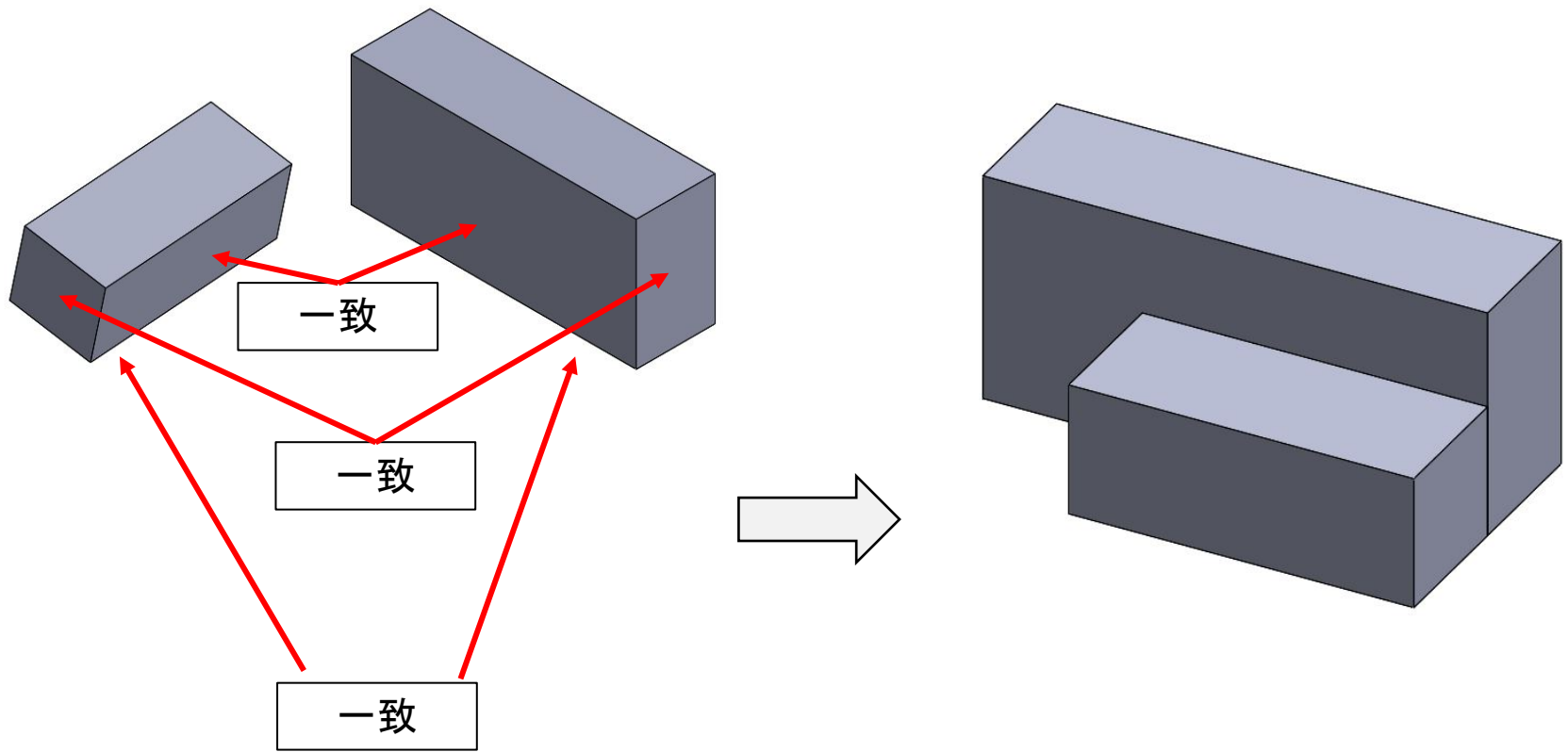


図4.2 合致の拘束(一致)



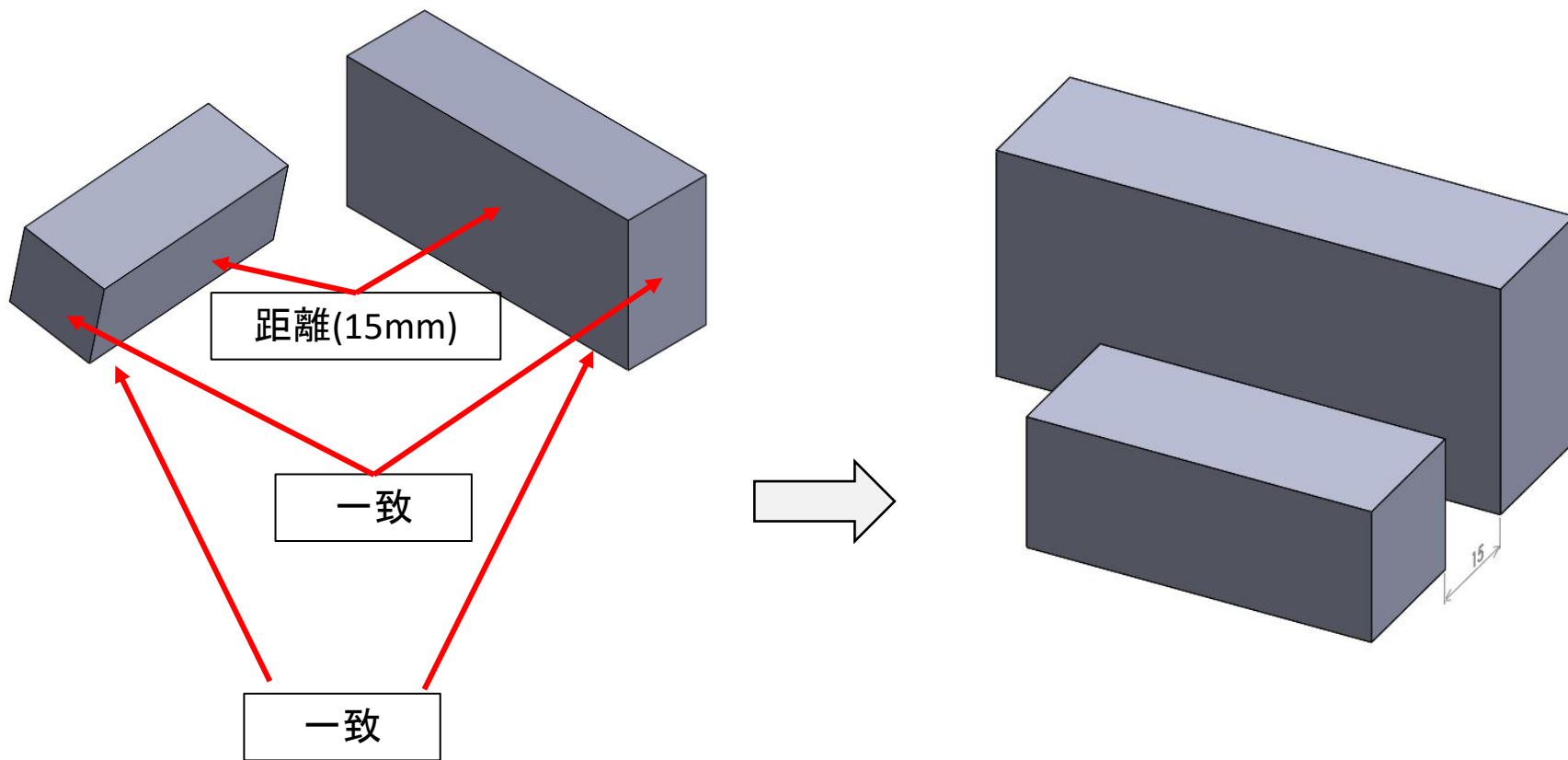


図4.3 合致の拘束(距離)



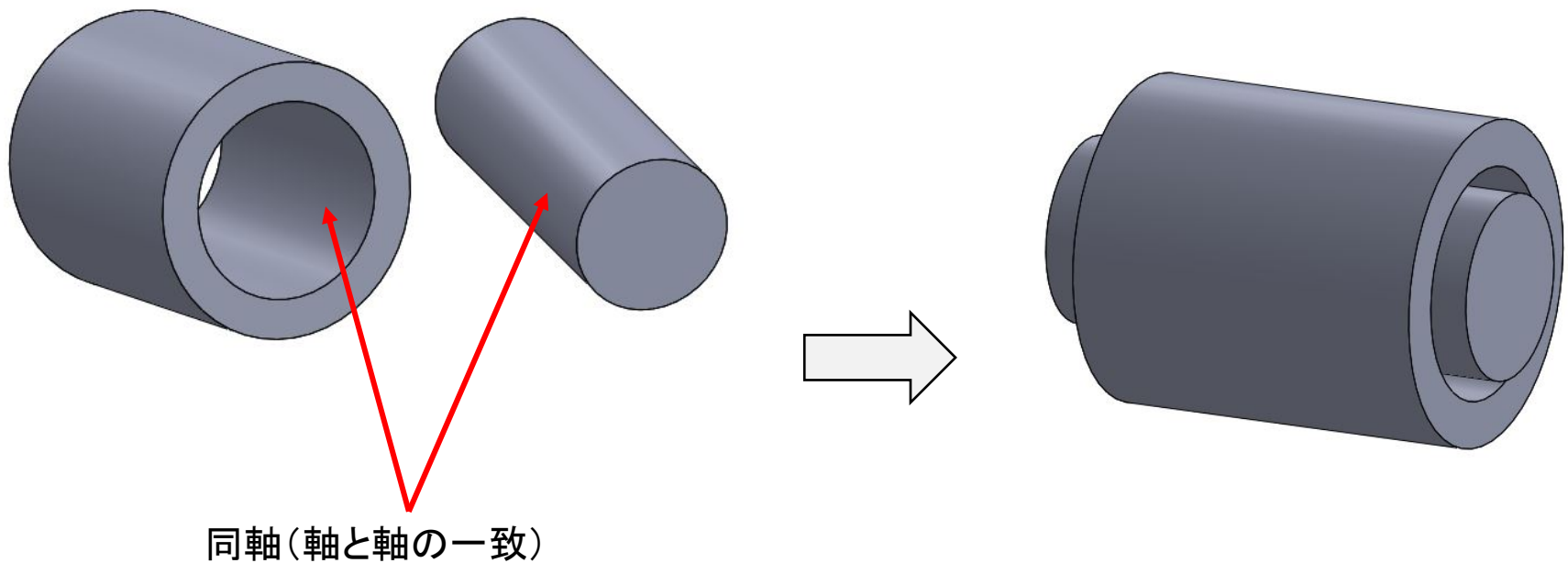


図4.4 合致の拘束(同軸)



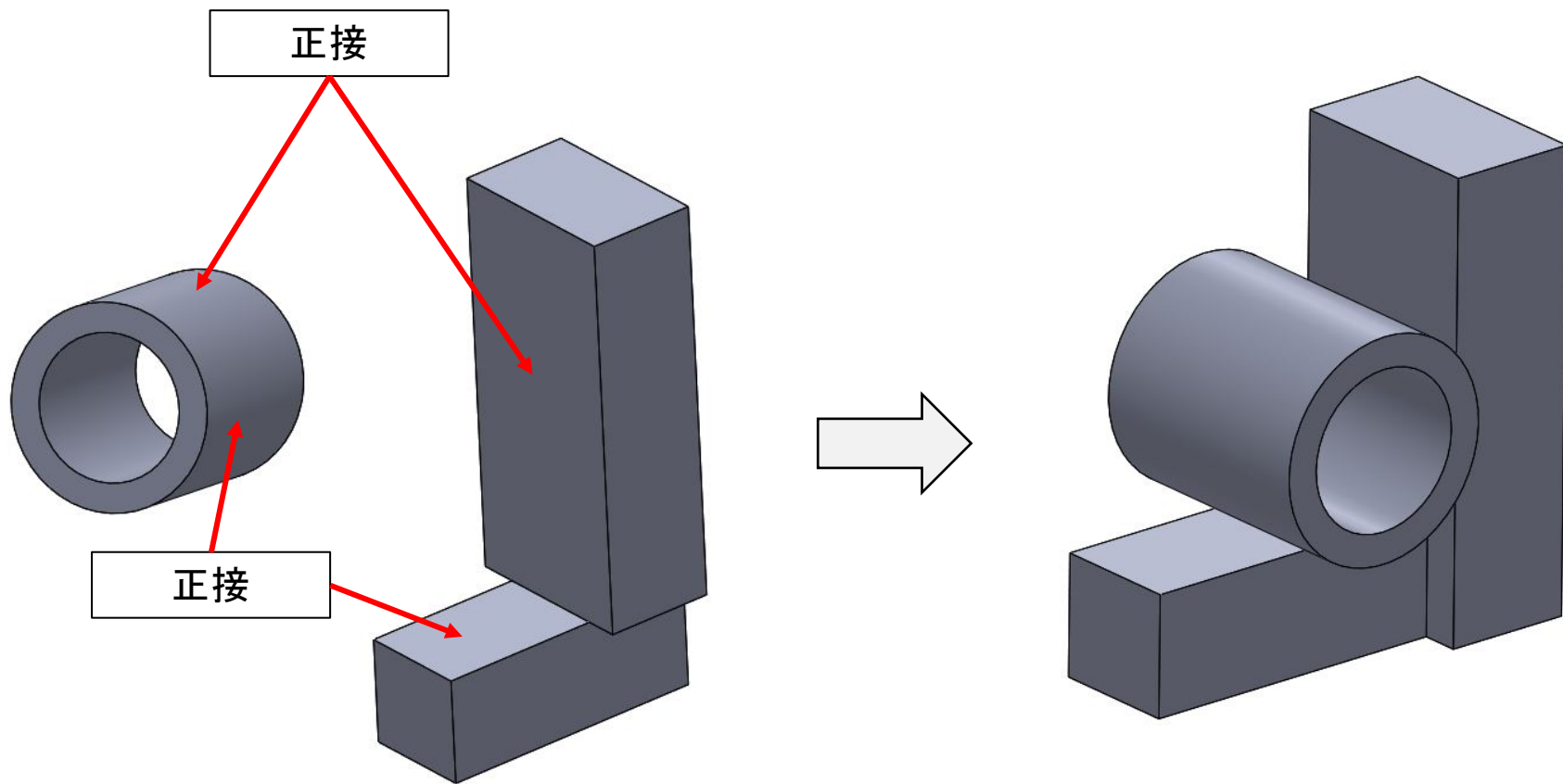


図4.5 合致の拘束(正接)



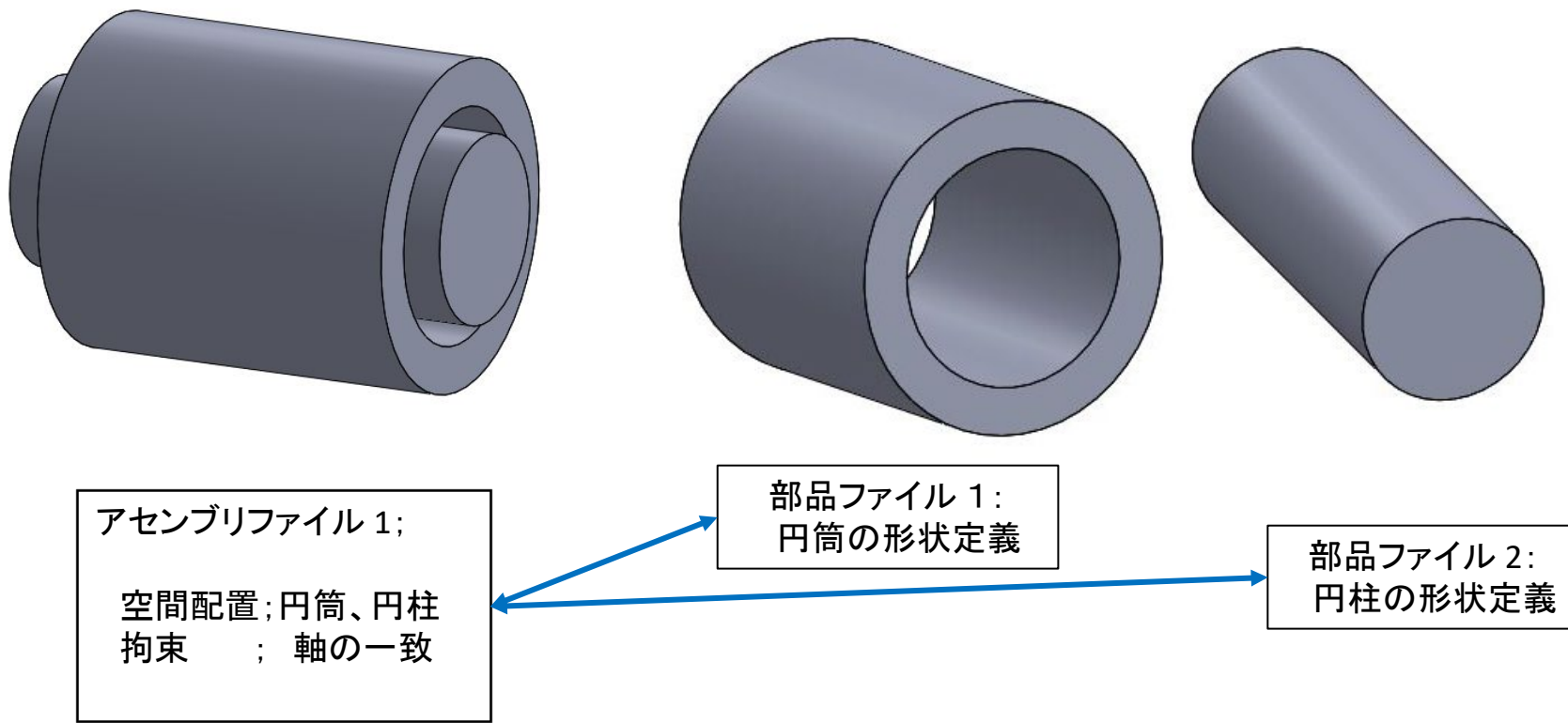
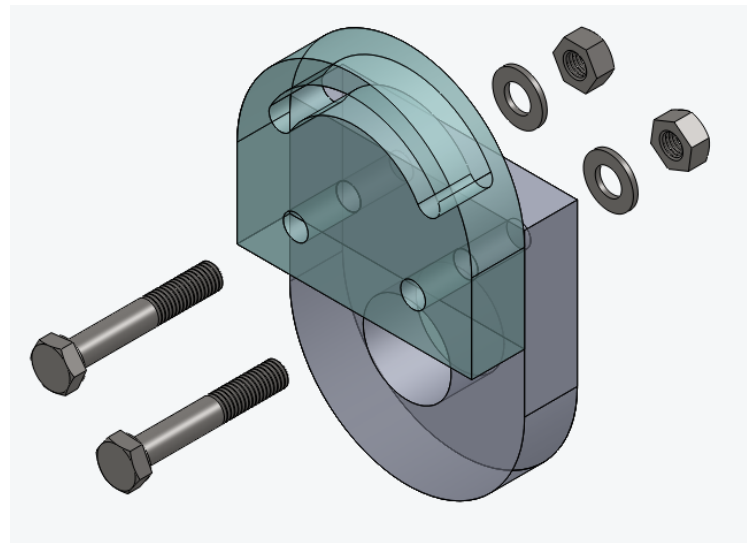
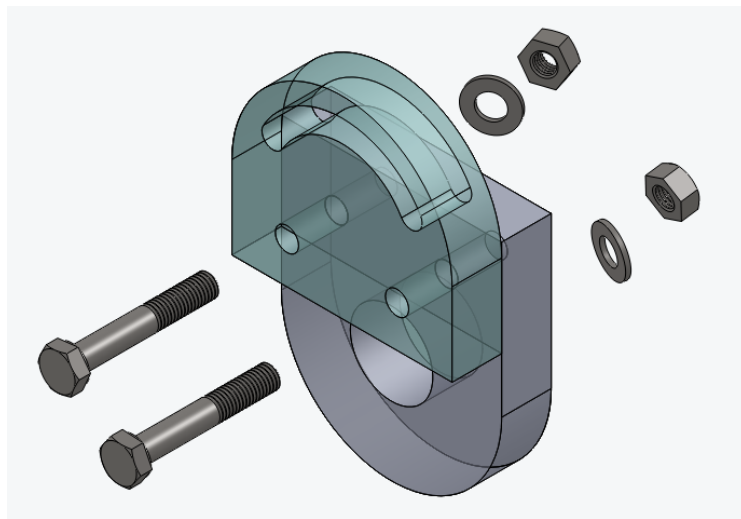
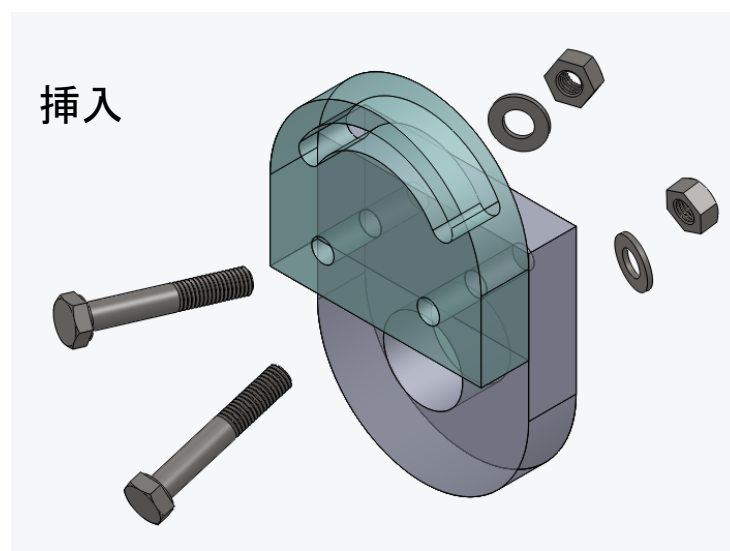


図4.6 アセンブリファイルと部品ファイル





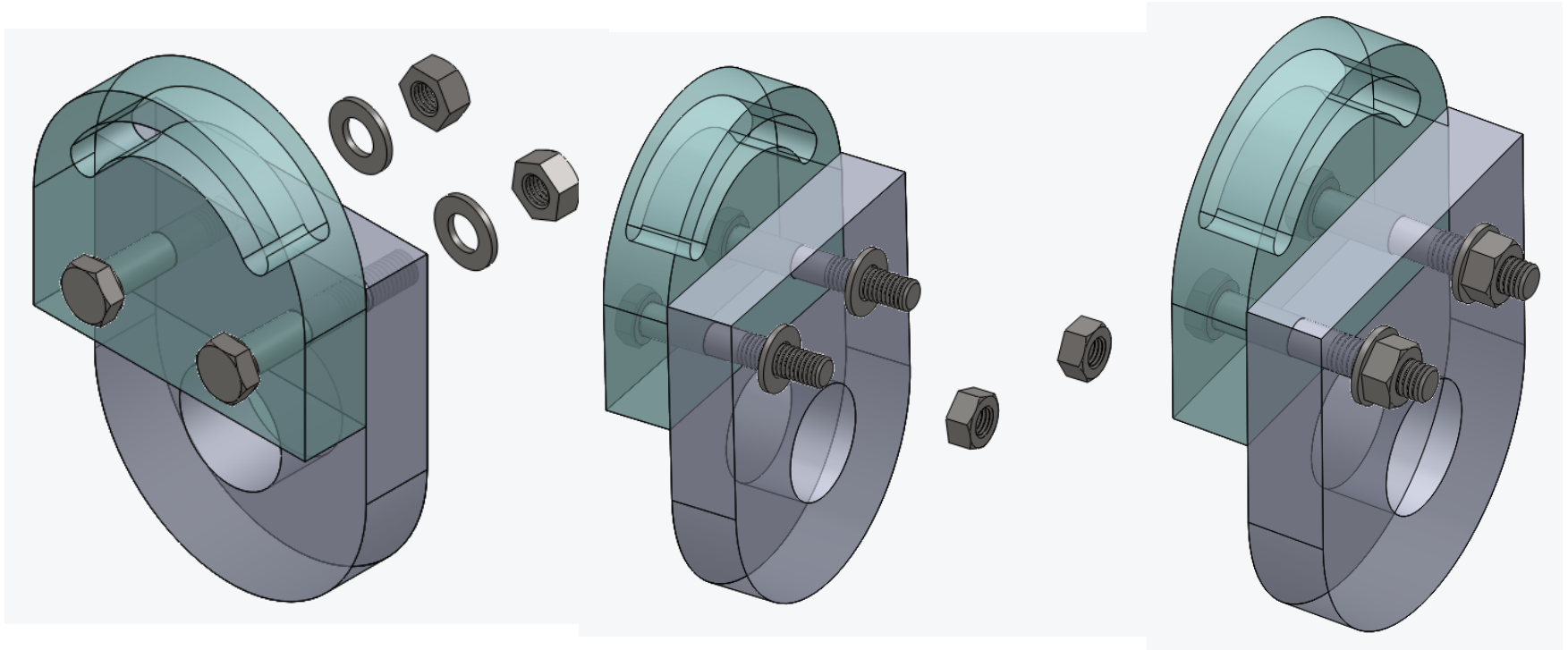
挿入



(a) 拘束(軸の一致)

図4.7 アセンブリ(ボルト, 座金, ナット)(続く)

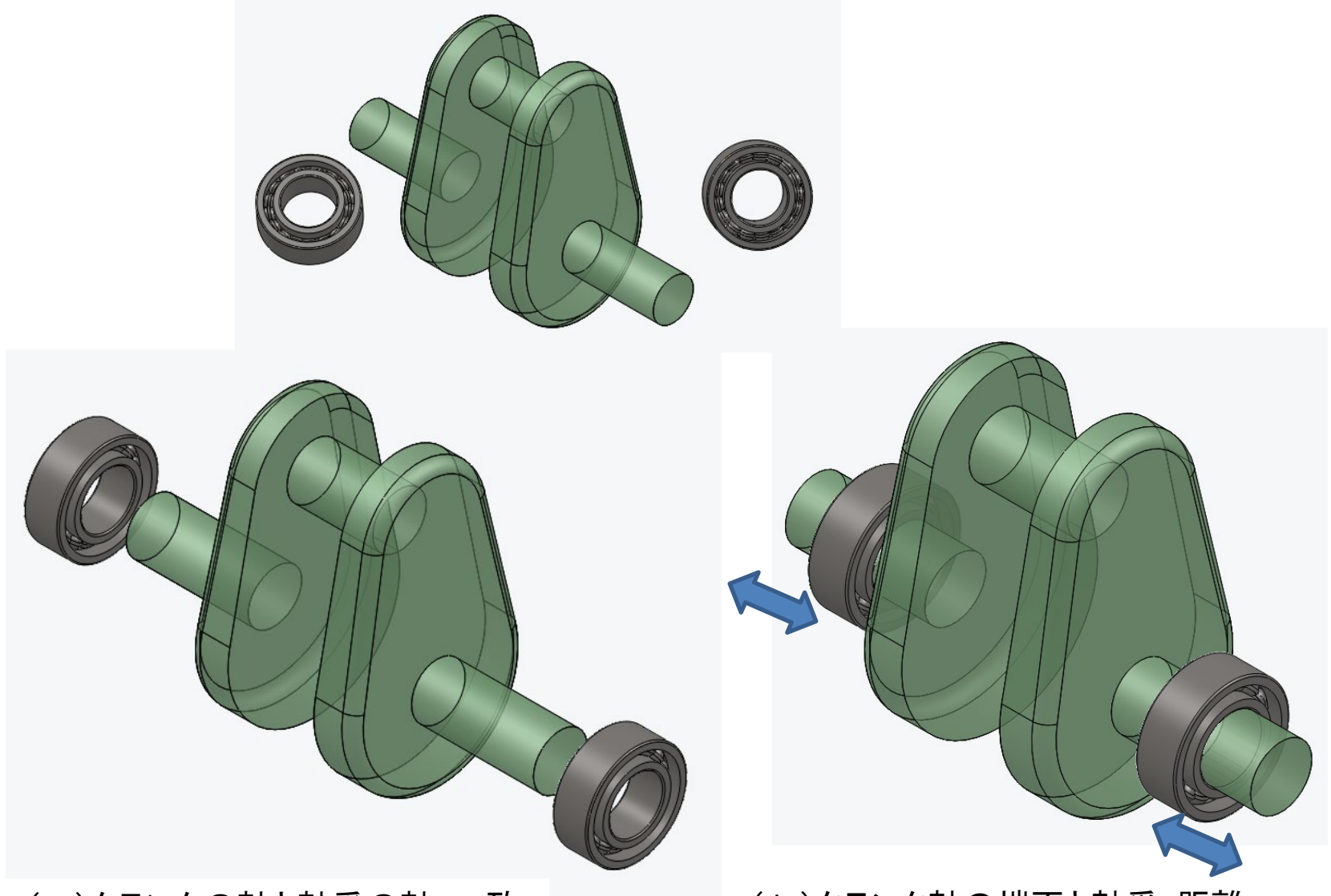




(b) 拘束(面の一致)

図4.7 アセンブリ(ボルト, 座金, ナット)(続き)





(a) クランクの軸と軸受の軸:一致

(b) クランク軸の端面と軸受:距離

図4.8 クランク軸と軸受けのアセンブリ



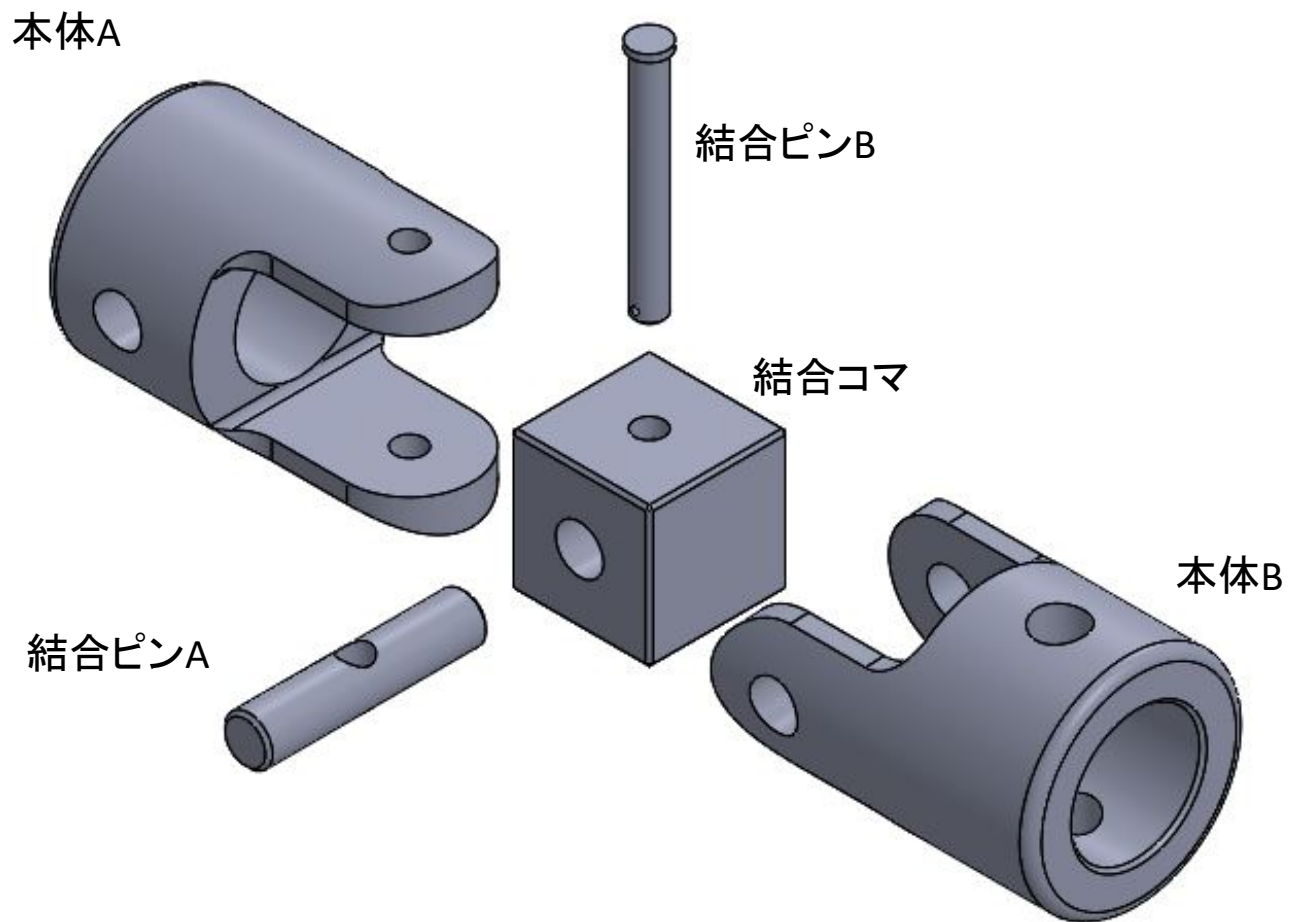
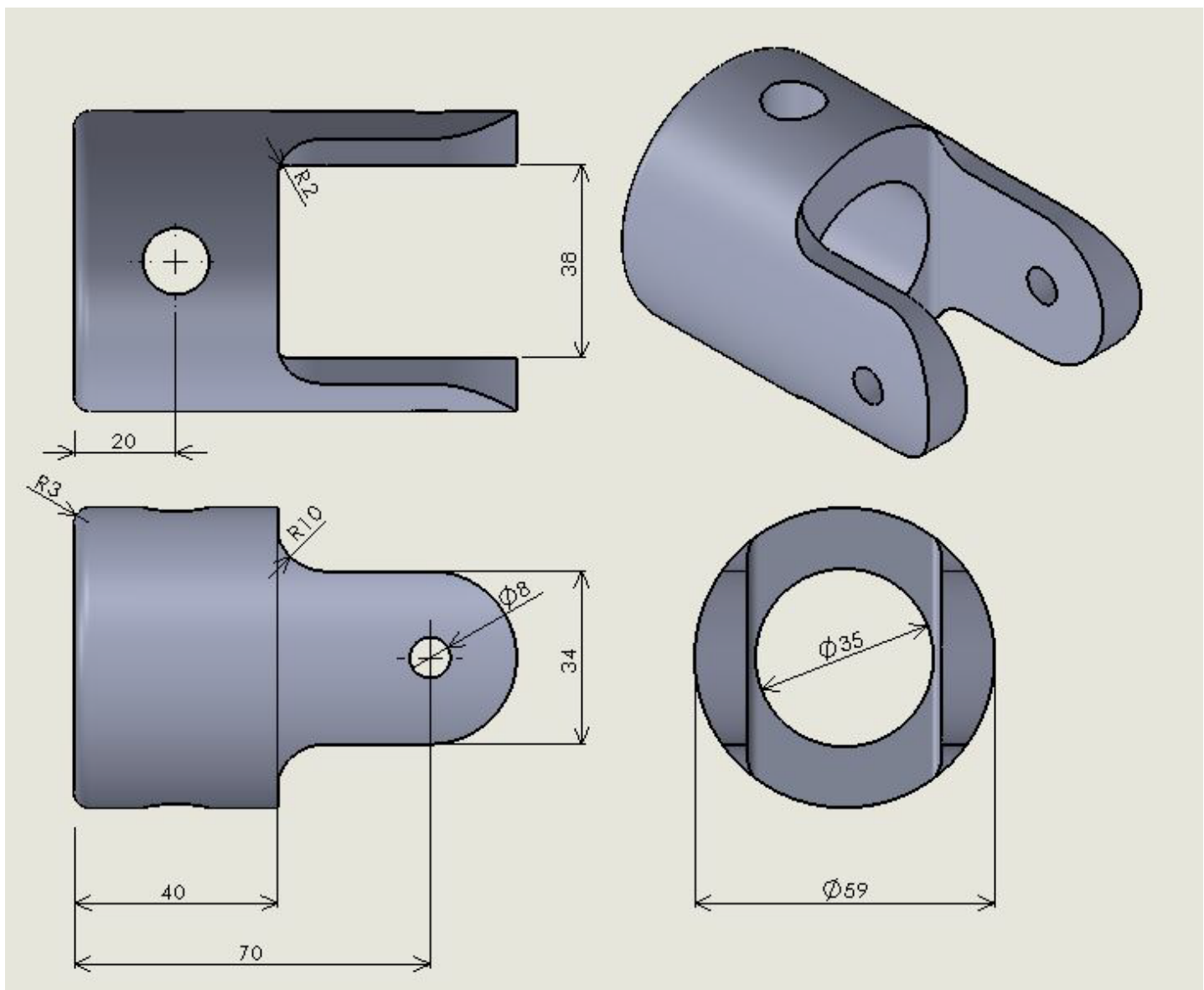


図4.9 こま形自在軸継手の部品(続く)

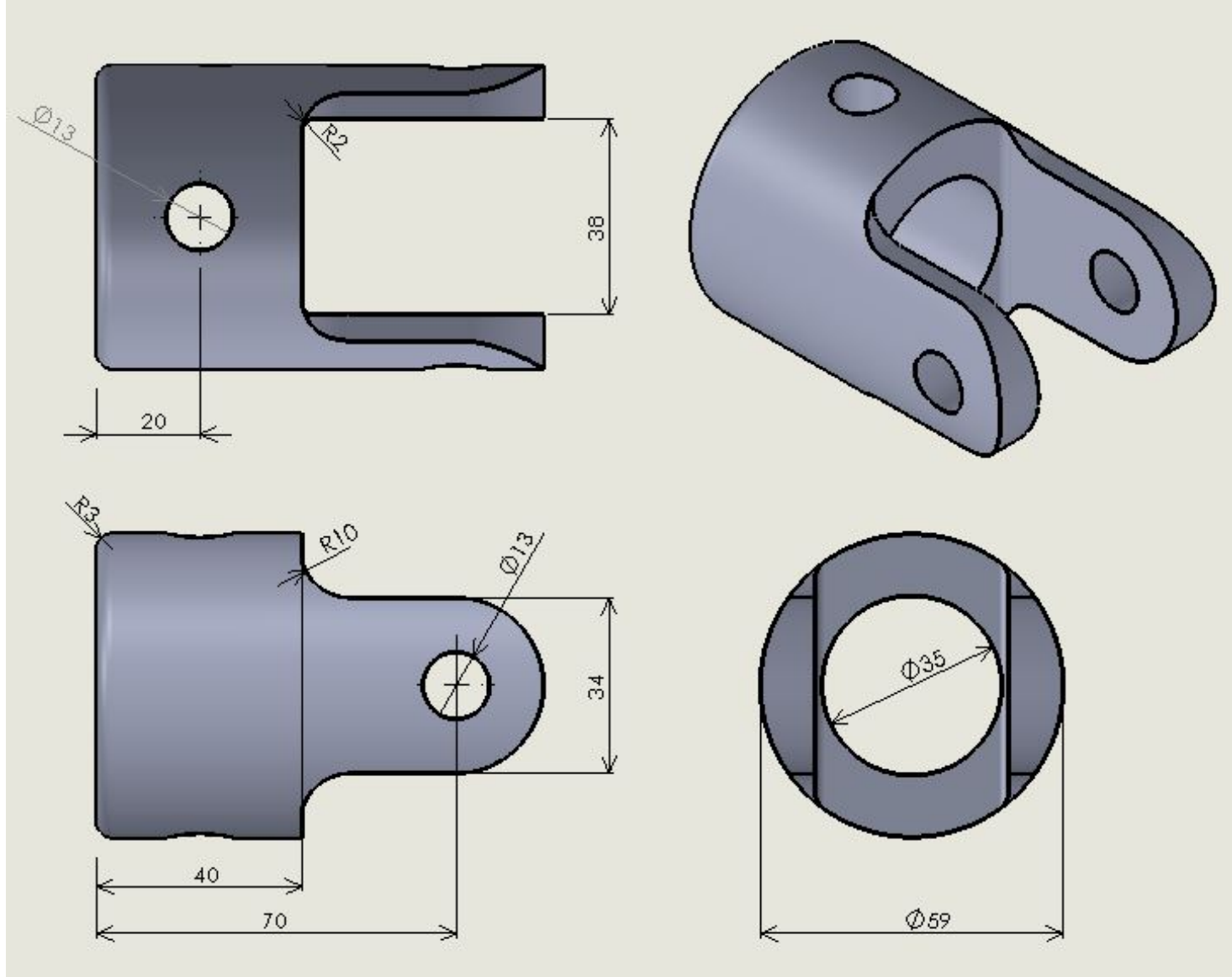




(a) 本体 A

図4.9 こま形自在軸継手の部品(続く)



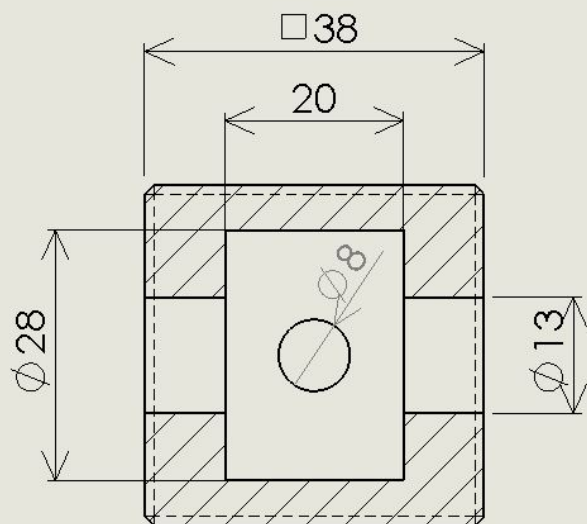


(b) 本体 B

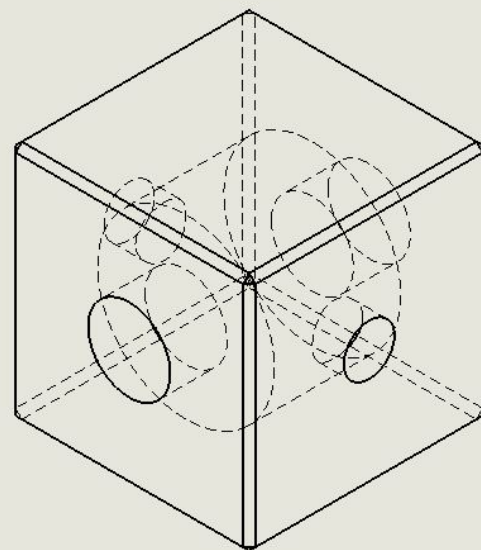
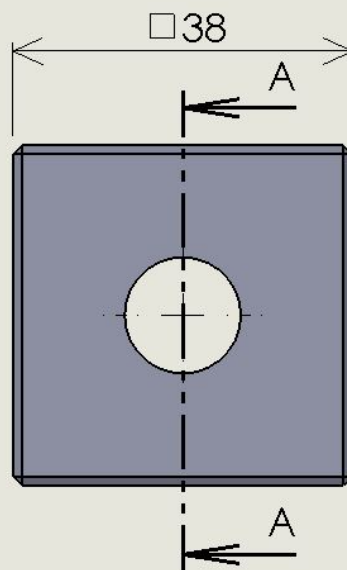
図4.9 こま形自在軸継手の部品(続く)







断面図 A-A



(c) 結合こま

図4.9 こま形自在軸継手の部品(続く)



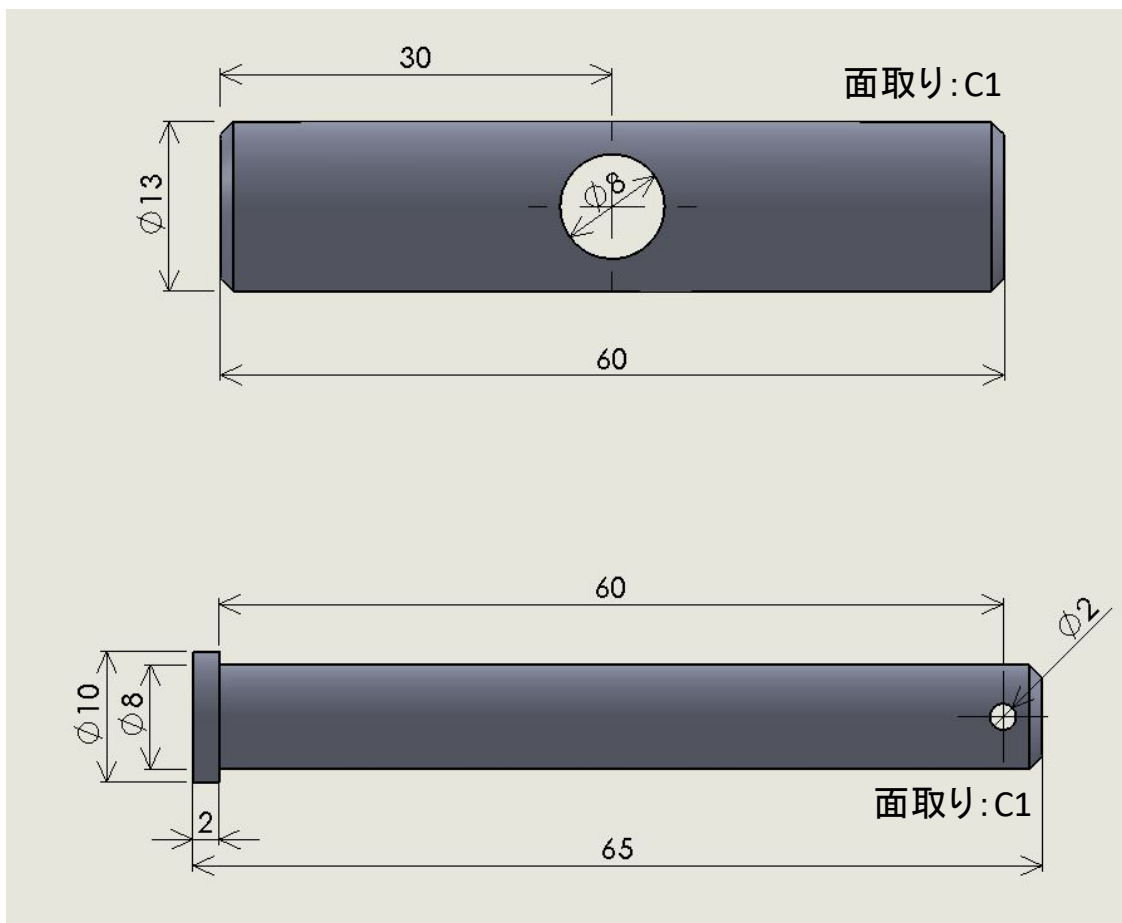


図4.9 こま形自在軸継手の部品(続き)





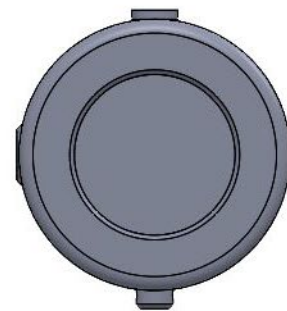
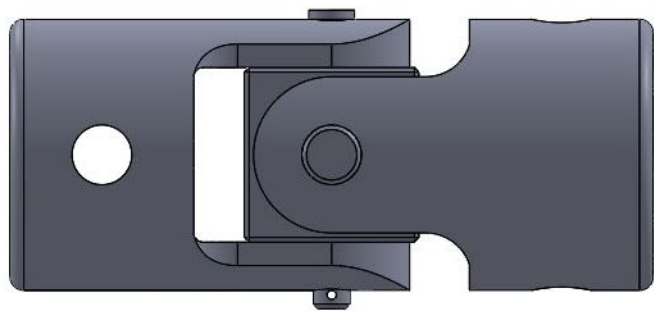
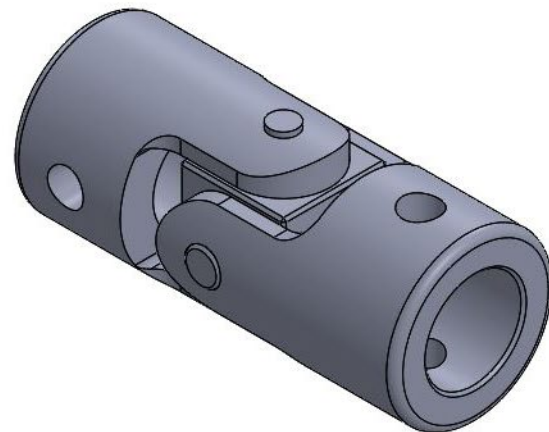
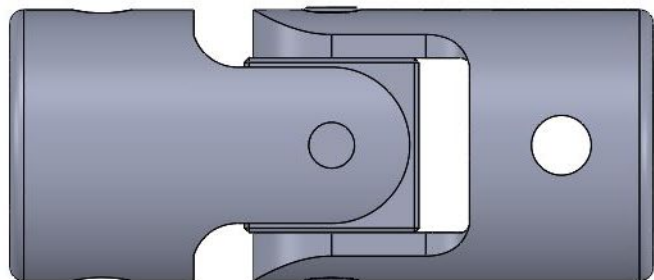


図4.10 こま形自在軸継手のアセンブリ



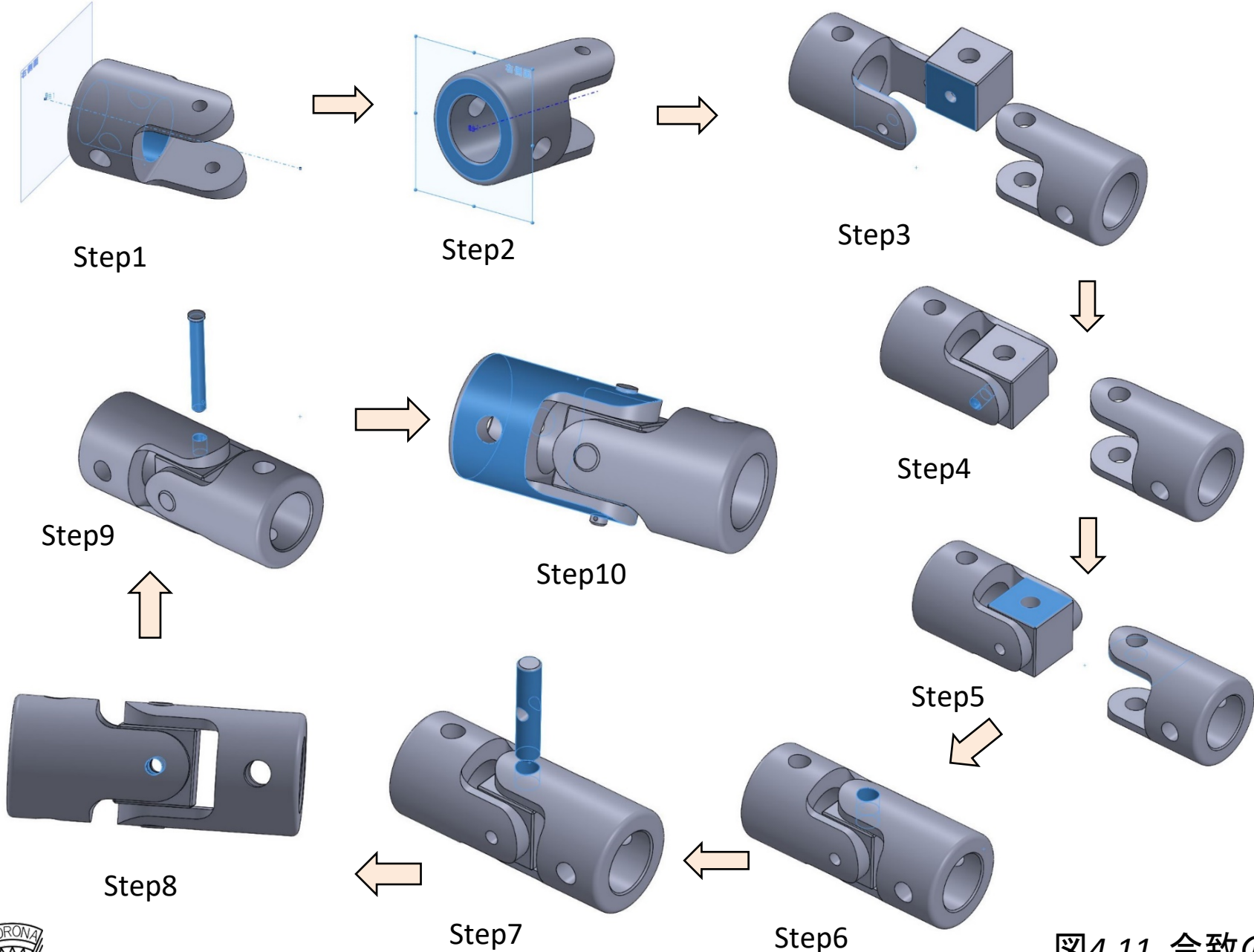


図4.11 合致の拘束



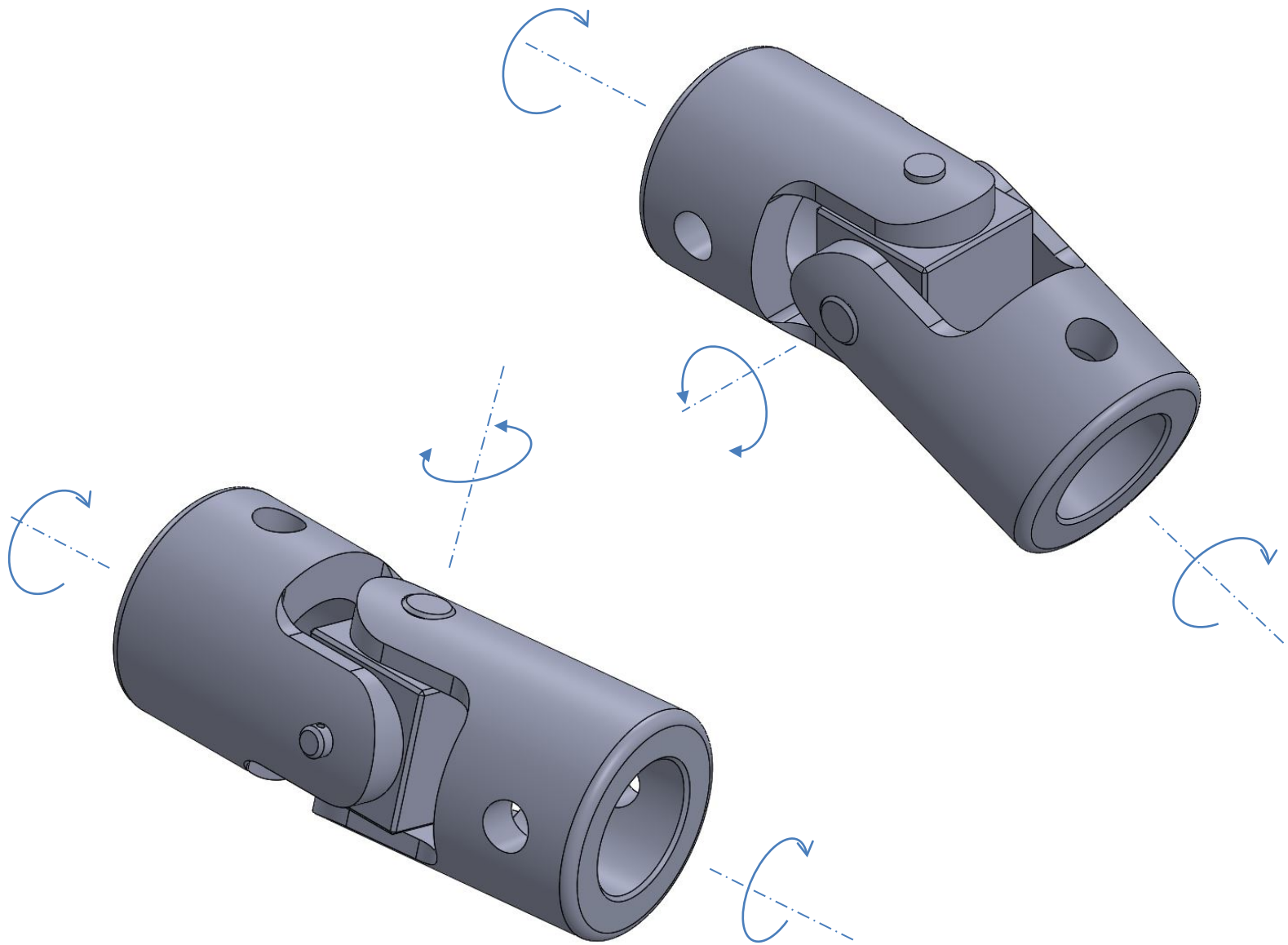


図4.12 こま形自在軸継手の回転



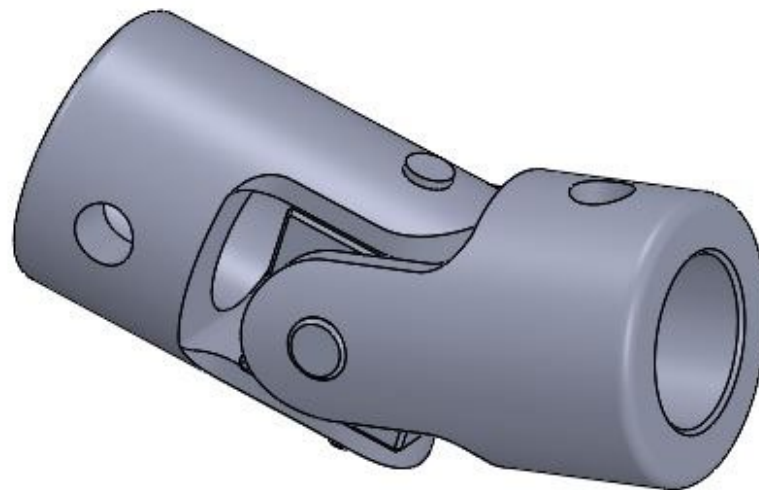


図4.13 干渉計算の結果

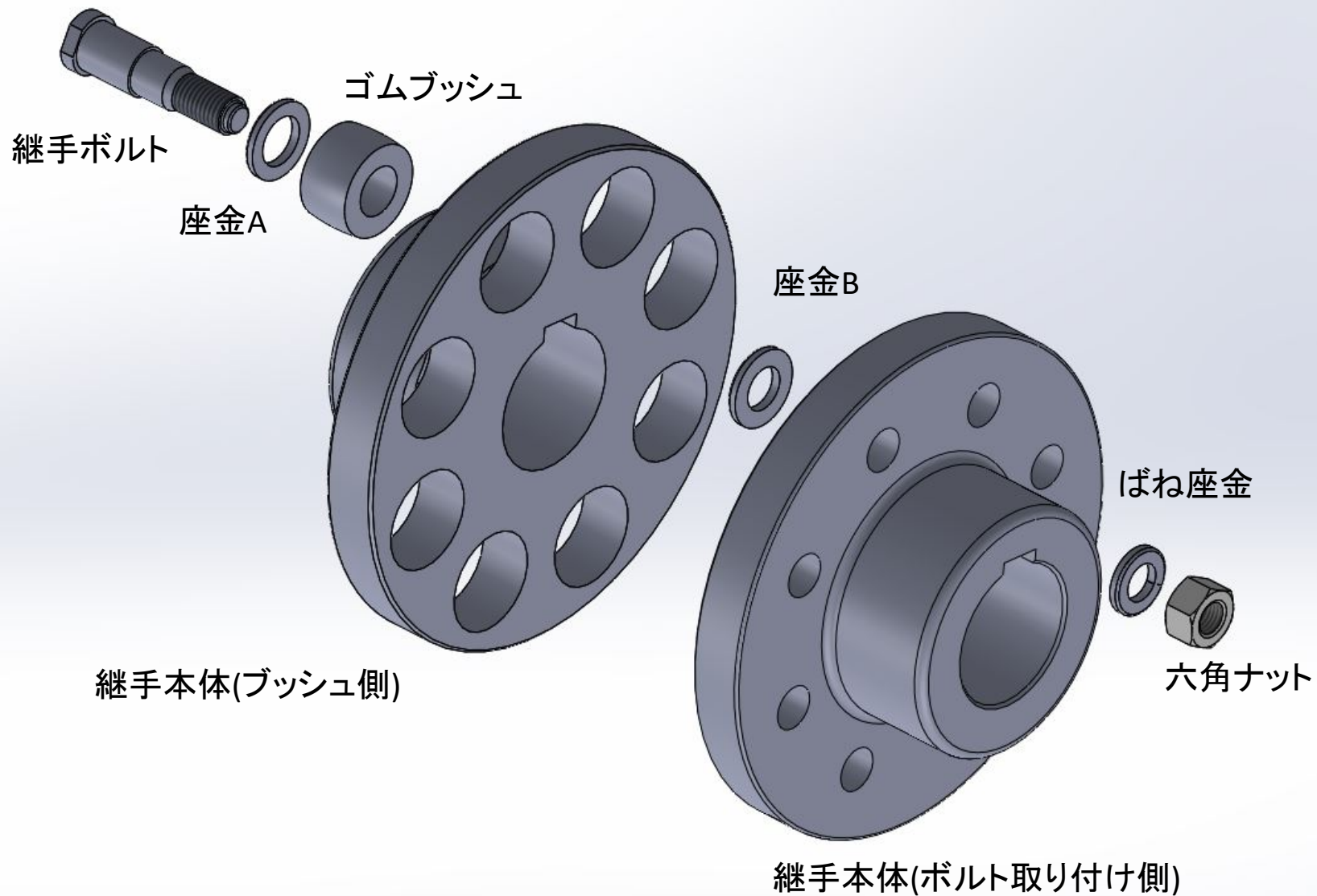


図4.14 フランジ形たわみ軸継手の部品



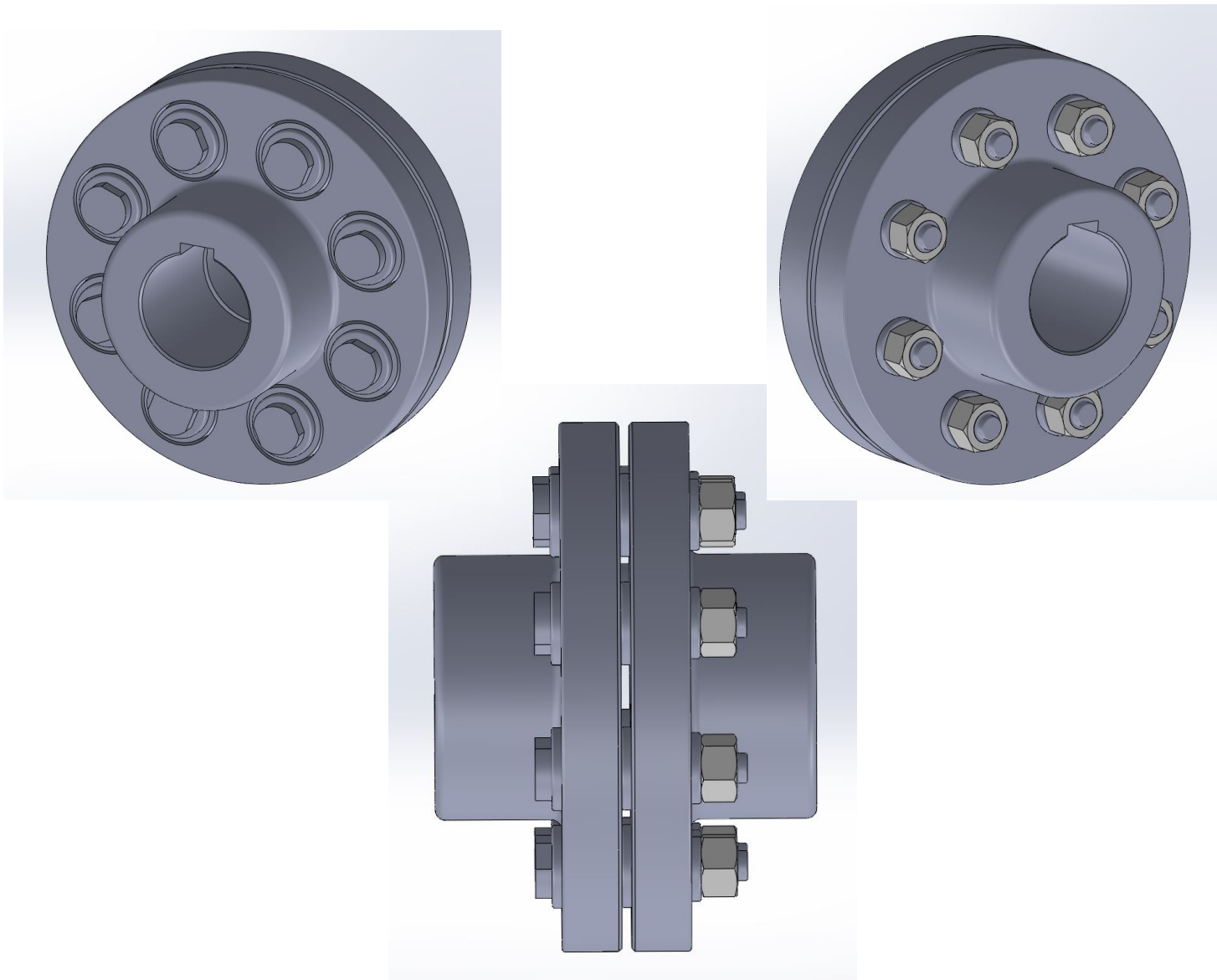


図4.15 フランジ形たわみ軸継手のアセンブリ





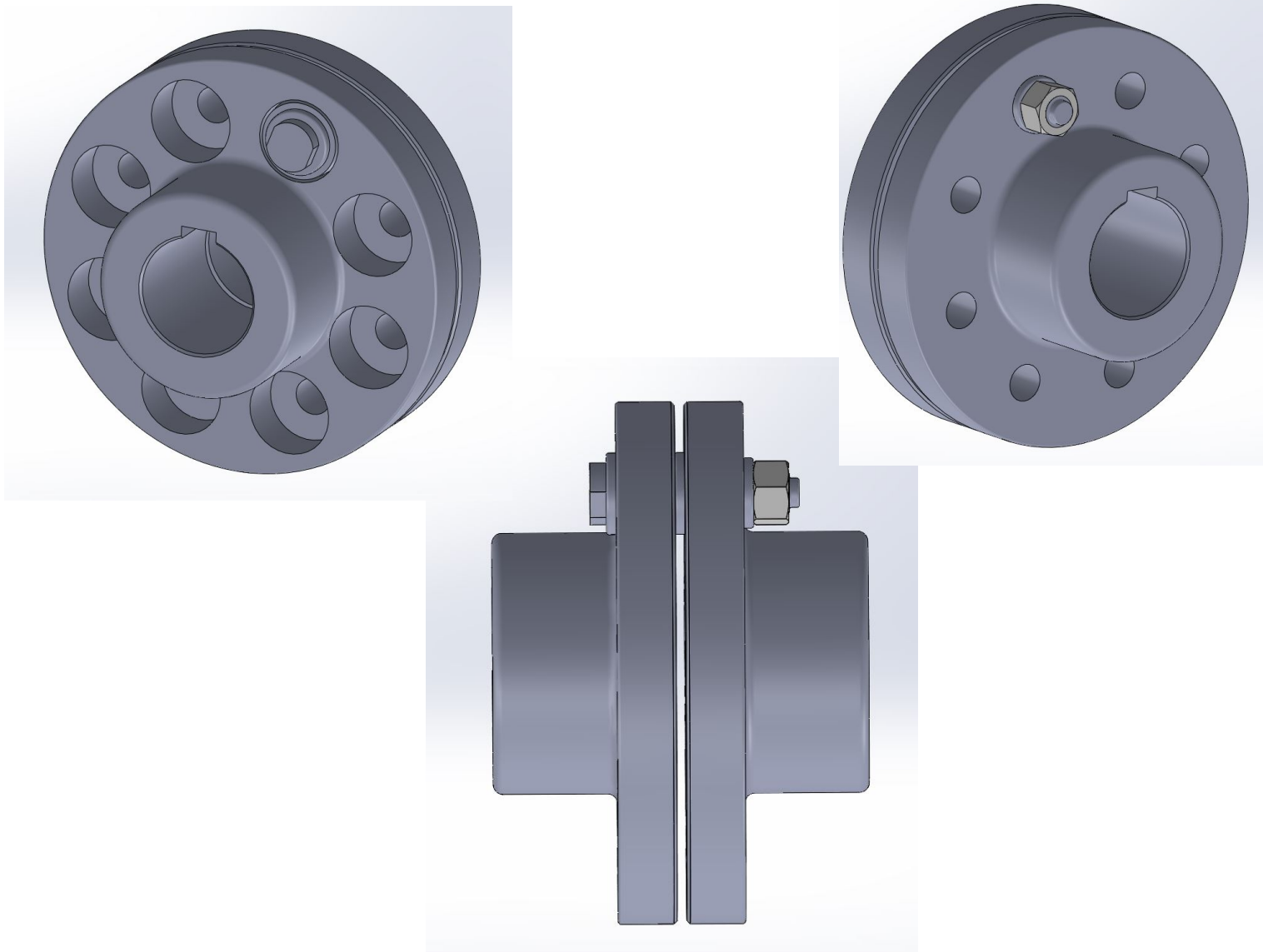


図4.16 Step 6 までの合致の拘束



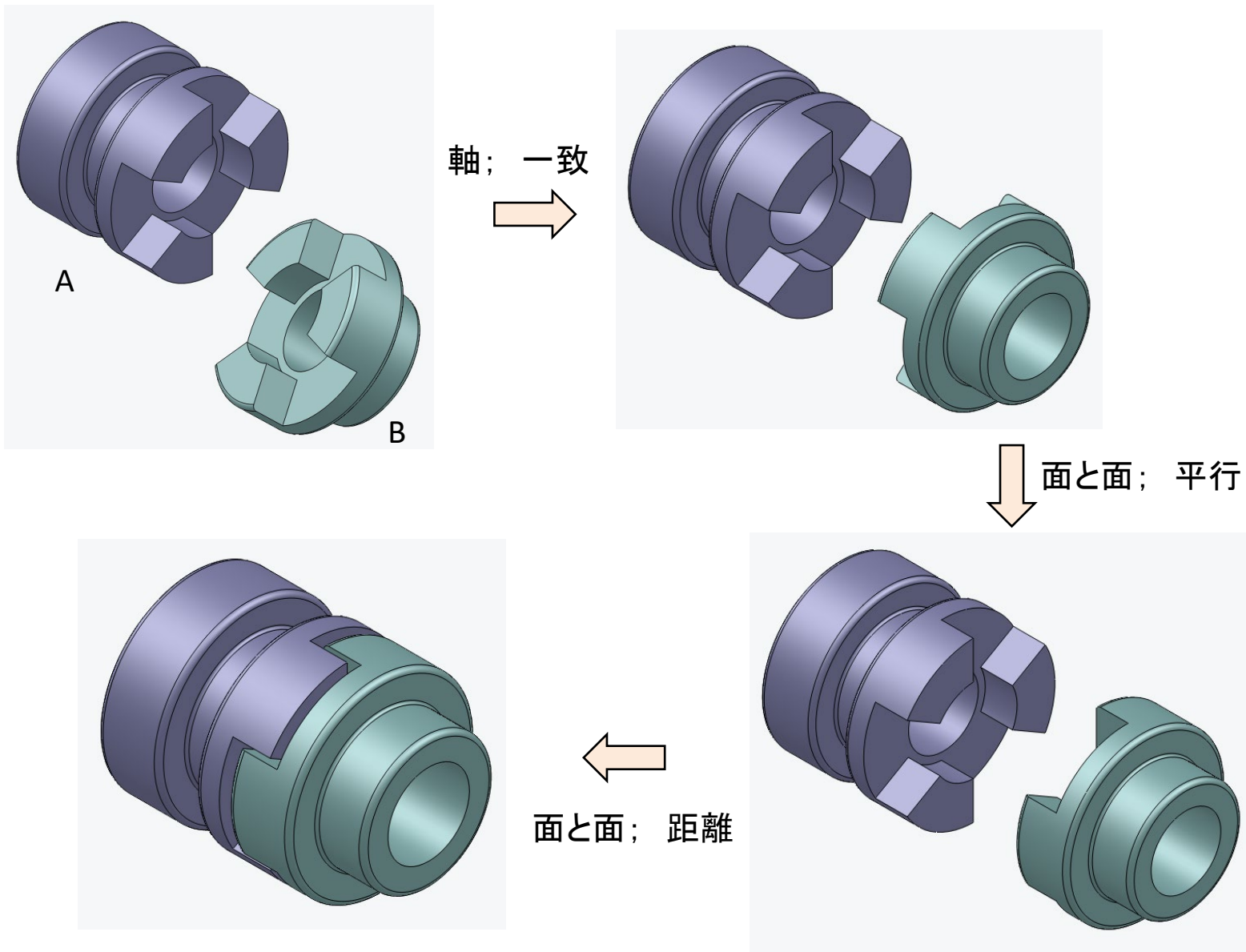
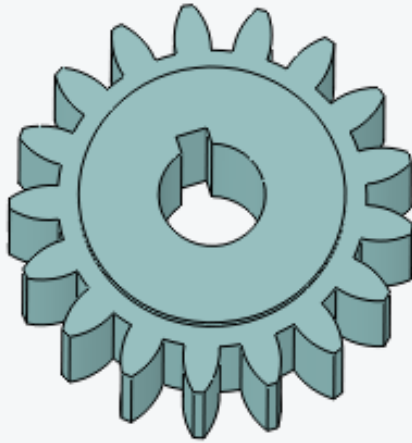


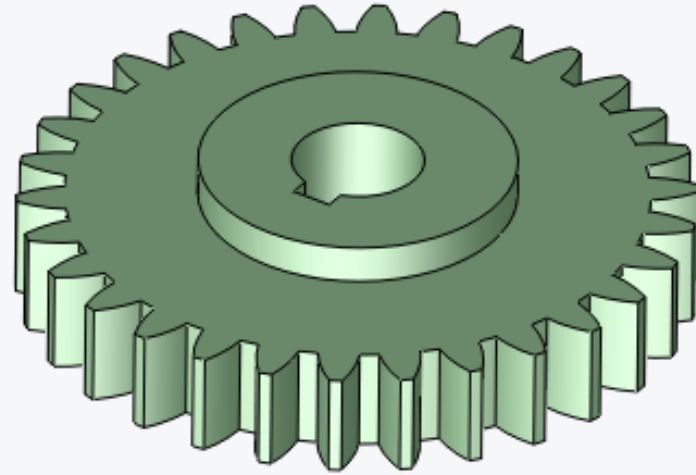
図4.17 かみ合いクラッチの合致の拘束







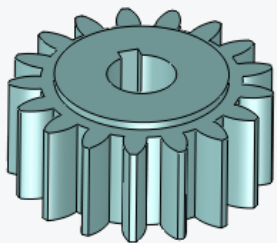
モジュール:4  
歯数:17  
圧力角:20°



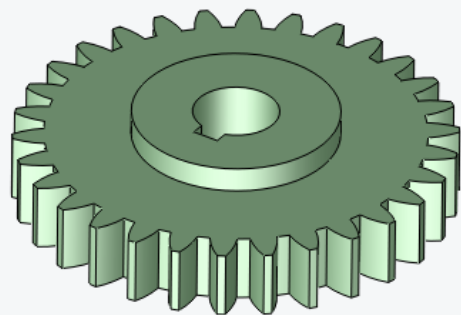
モジュール:4  
歯数:30  
圧力角:20°

図4.18 平歯車

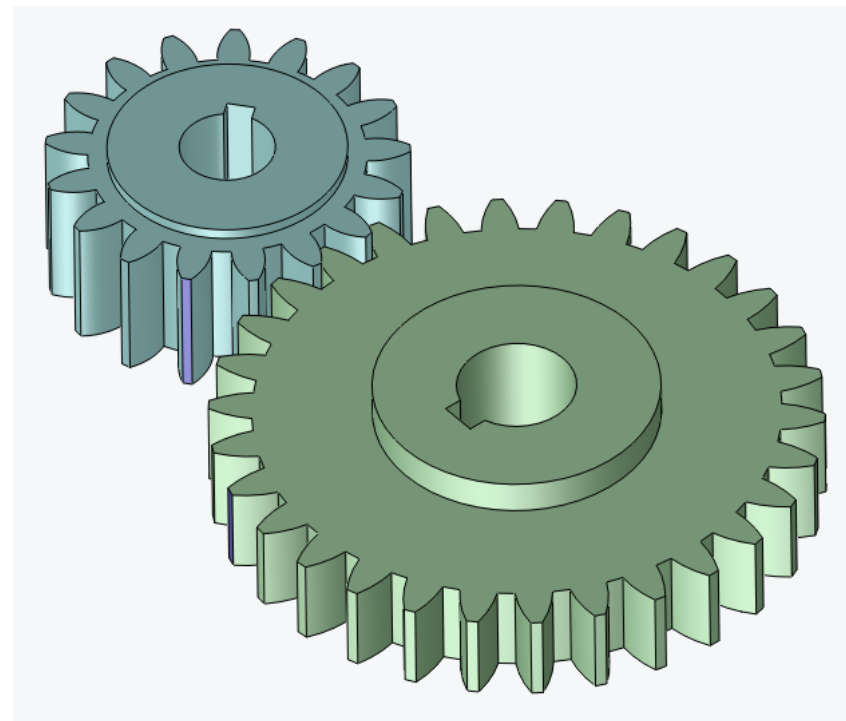




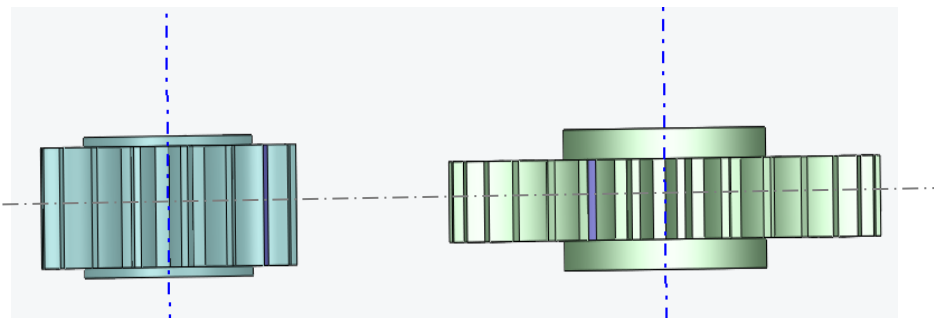
歯車軸； 平行



軸と軸； 距離



歯幅の中心；一致



歯車軸の中心距離； 94mm

図4.19 平歯車のアセンブリ



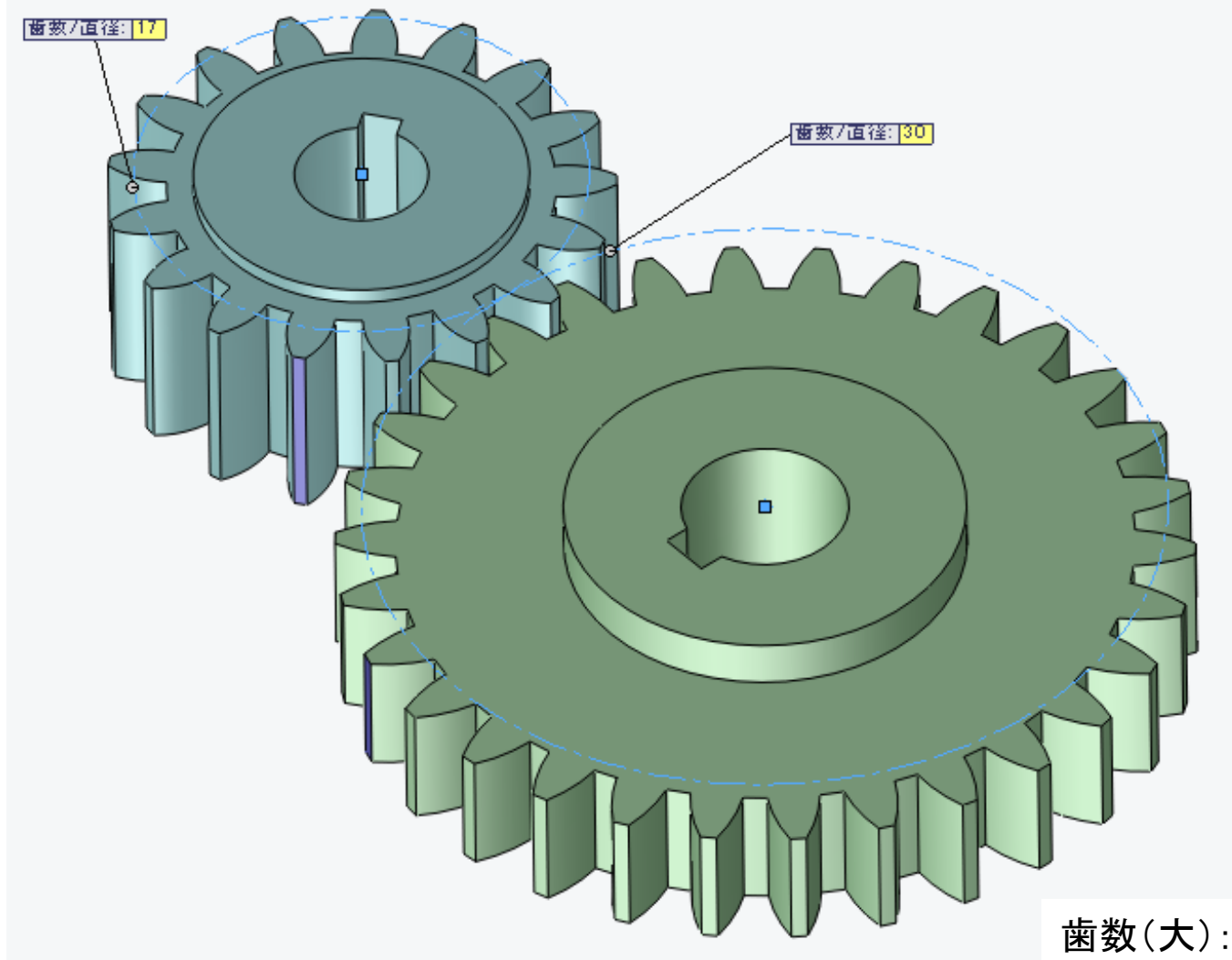


図4.20 歯車比



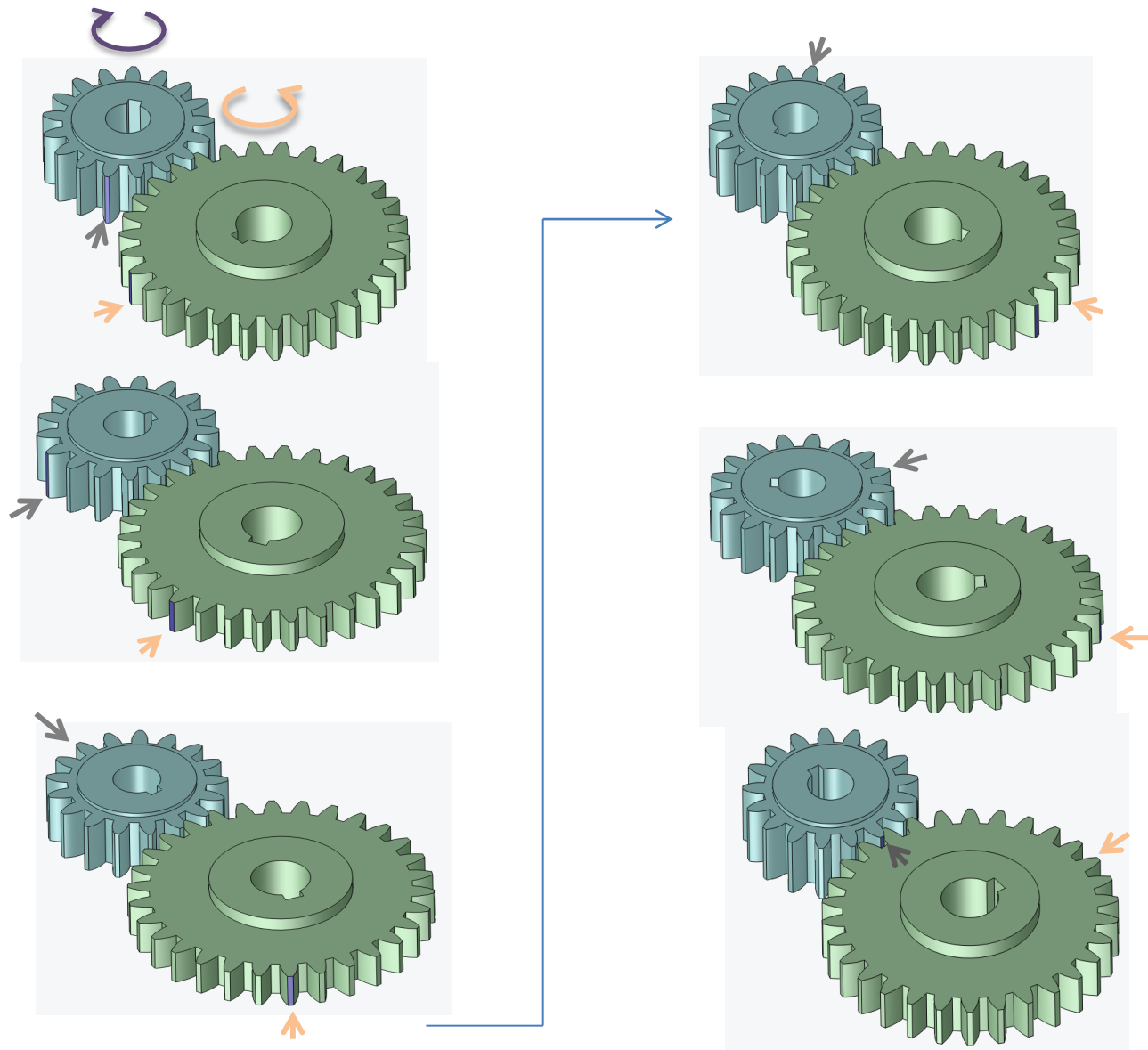
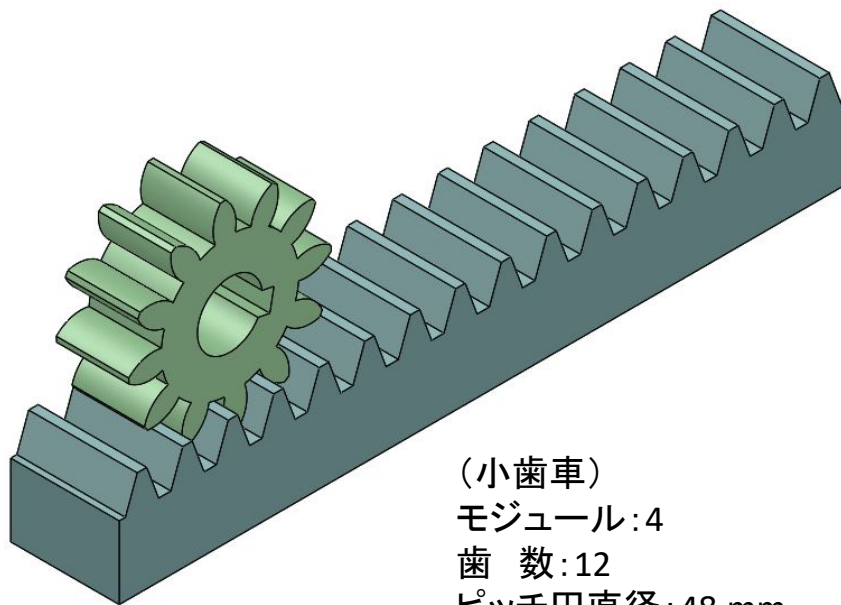


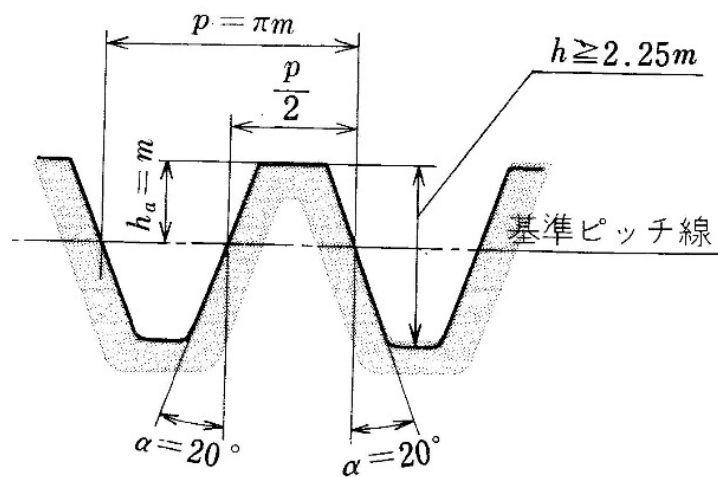
図4.21 歯車の回転





(小歯車)  
 モジュール:4  
 歯数:12  
 ピッチ円直径:48 mm

(ラック)  
 モジュール:4  
 基準ピッチ線の位置:下から25 mm



$m$ : 基準モジュール  
 $a$ : 基準圧力角  
 $p$ : 基準ピッチ  
 $p/2$ : 正面円弧歯厚  
 $h$ : 全歯たけ  
 $h_a$ : 歯末のたけ

インボリュート歯車歯形の基準ラック

図4.22 ラックと小歯車



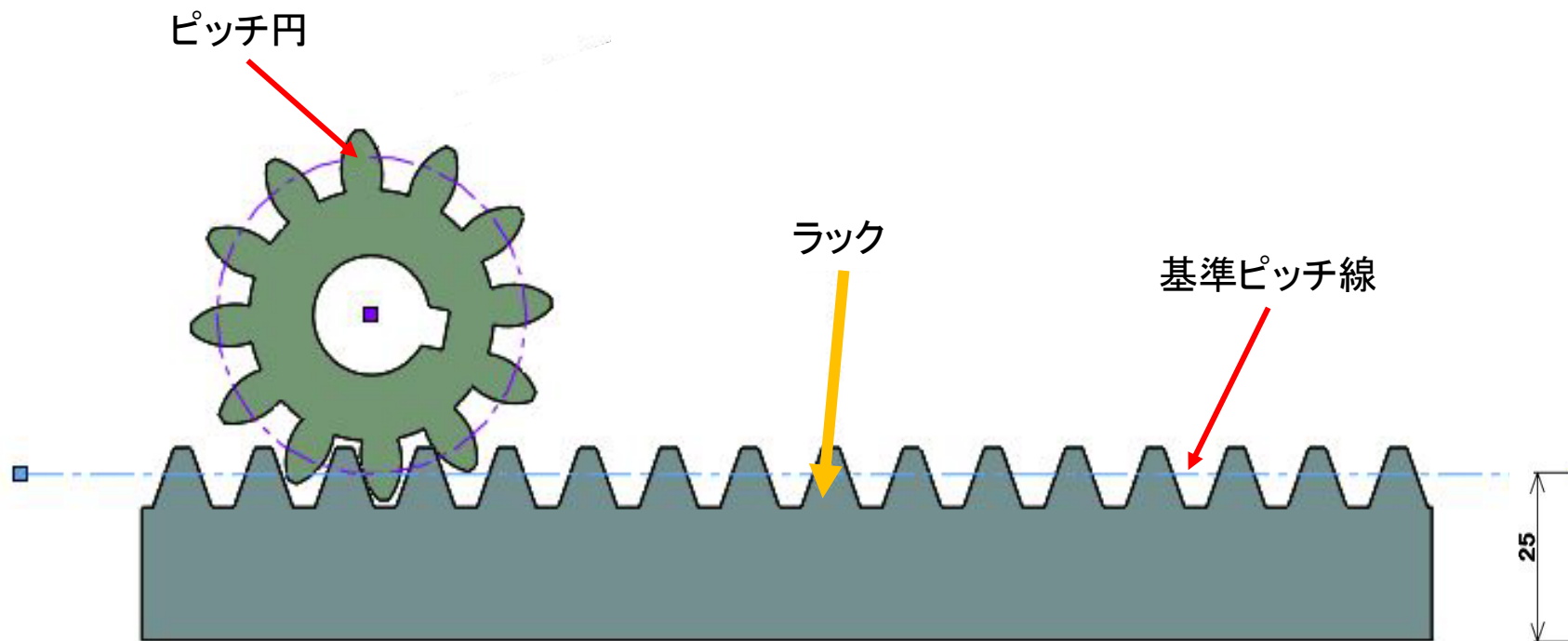


図4.23 合致の拘束(ラックと小歯車)



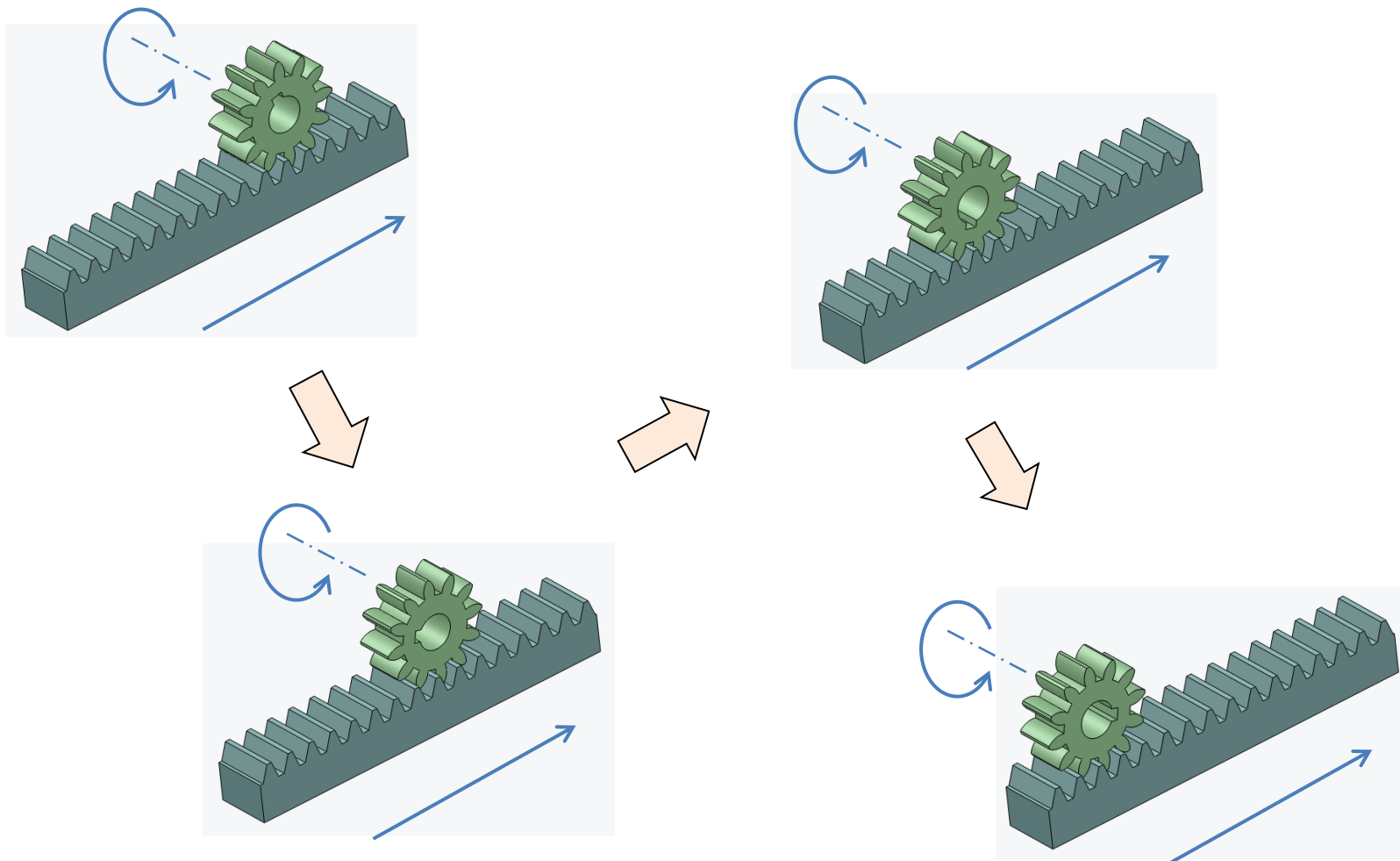
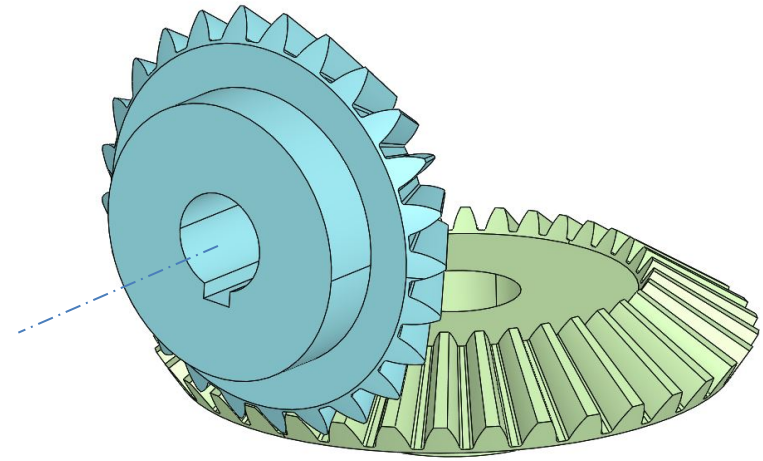
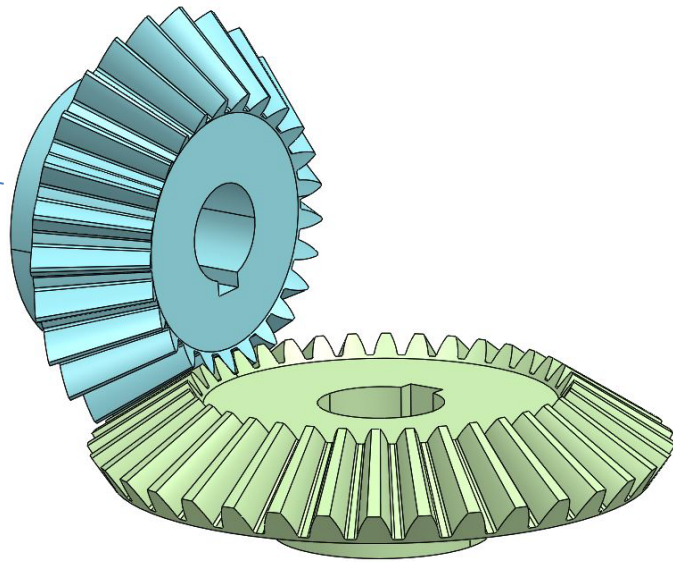


図4.24 小歯車の回転とラックの移動





すぐばかさ歯車 要目表

|       | 小歯車      | 大歯車      |
|-------|----------|----------|
| 歯形    | グリーンソン式  |          |
| モジュール | 4        |          |
| 圧力角   | 20°      |          |
| 歯数    | 25       | 36       |
| 軸角    | 90°      |          |
| 基準円直径 | 100      | 144      |
| ピッチ角  | 34.7778° | 55.2222° |

図4.25 すぐばかさ歯車





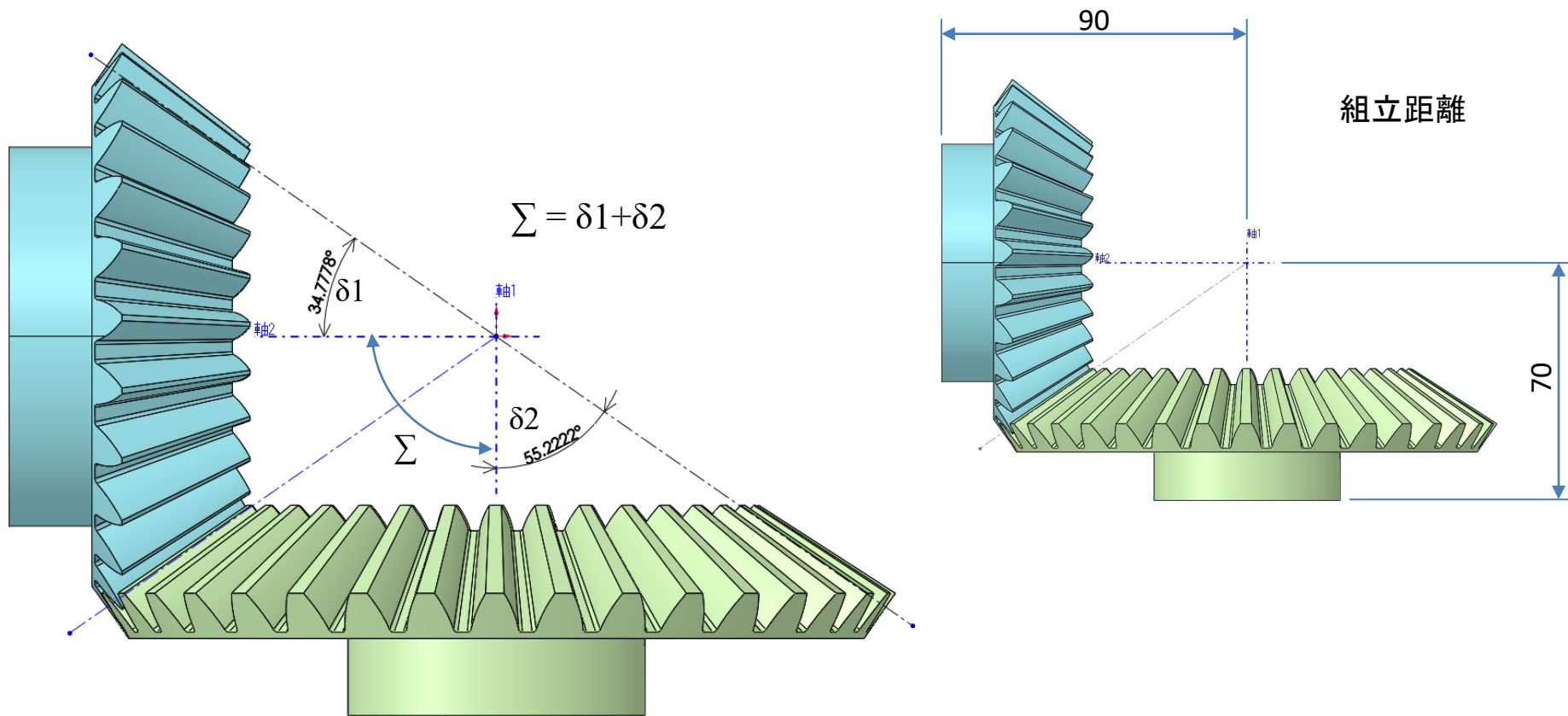


図4.26 軸角 $\Sigma$



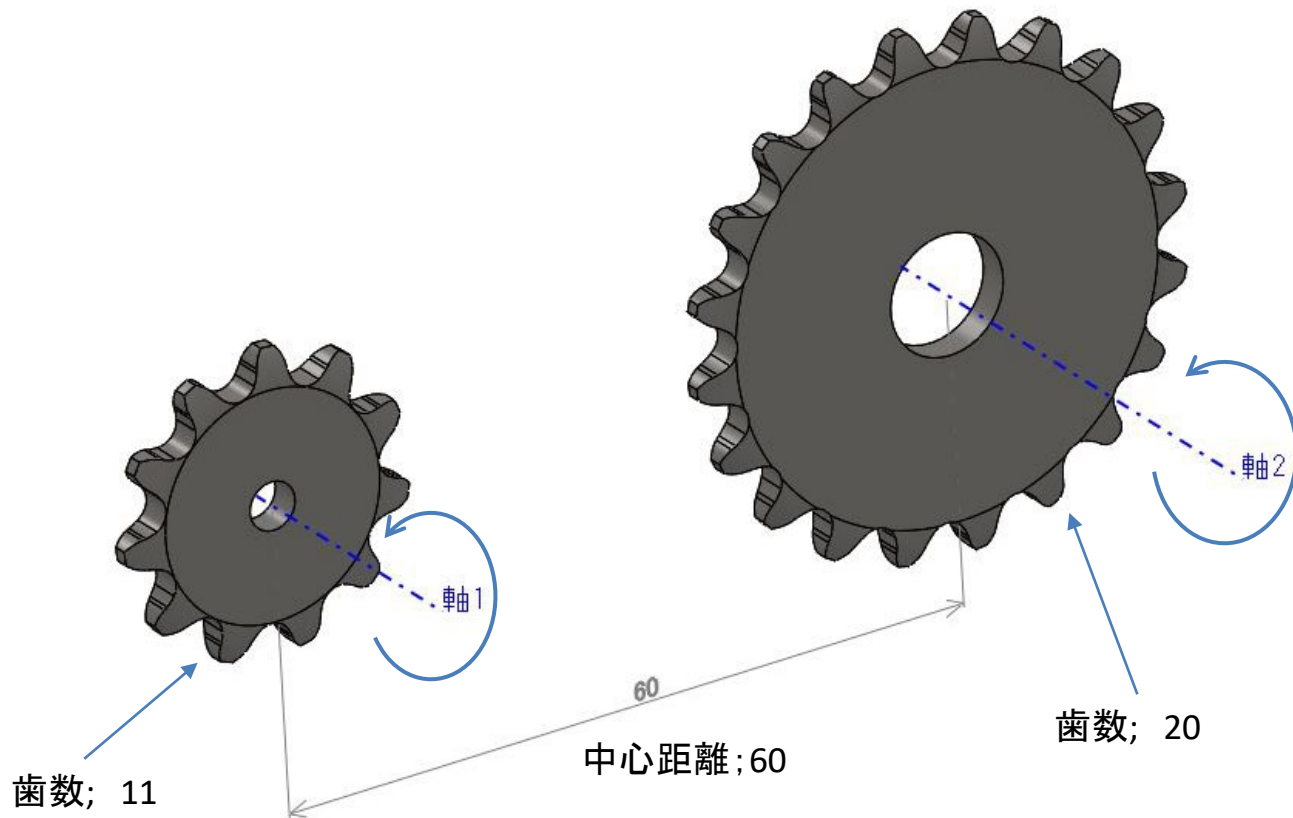
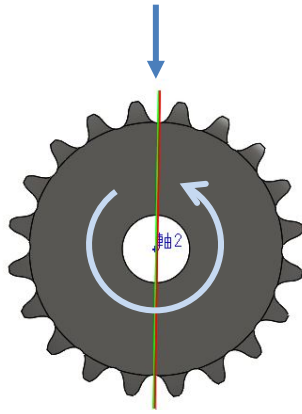
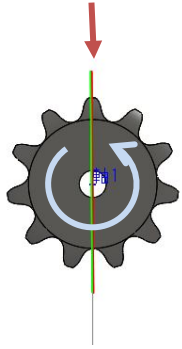


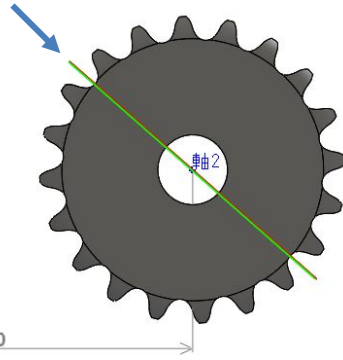
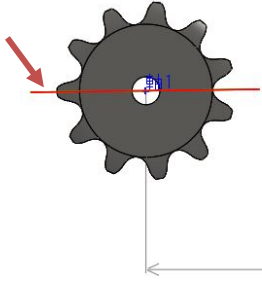
図4.27 スプロケット



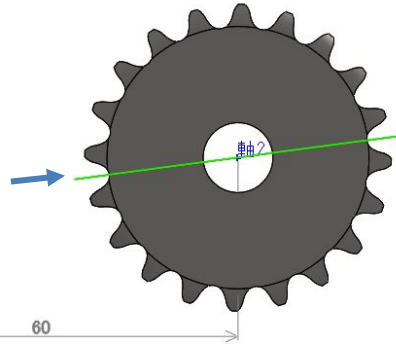
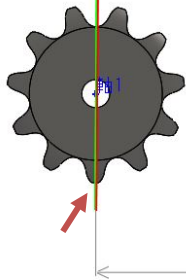
回転角;0度



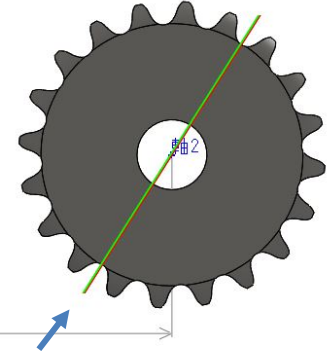
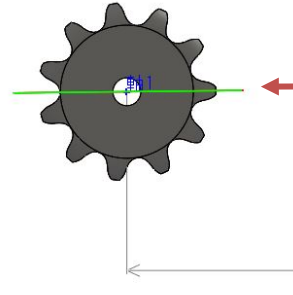
回転角;90度



回転角;180度



回転角;270度



回転角;360度

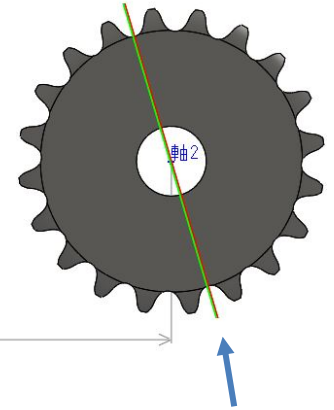
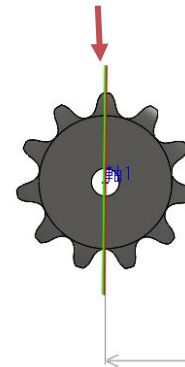
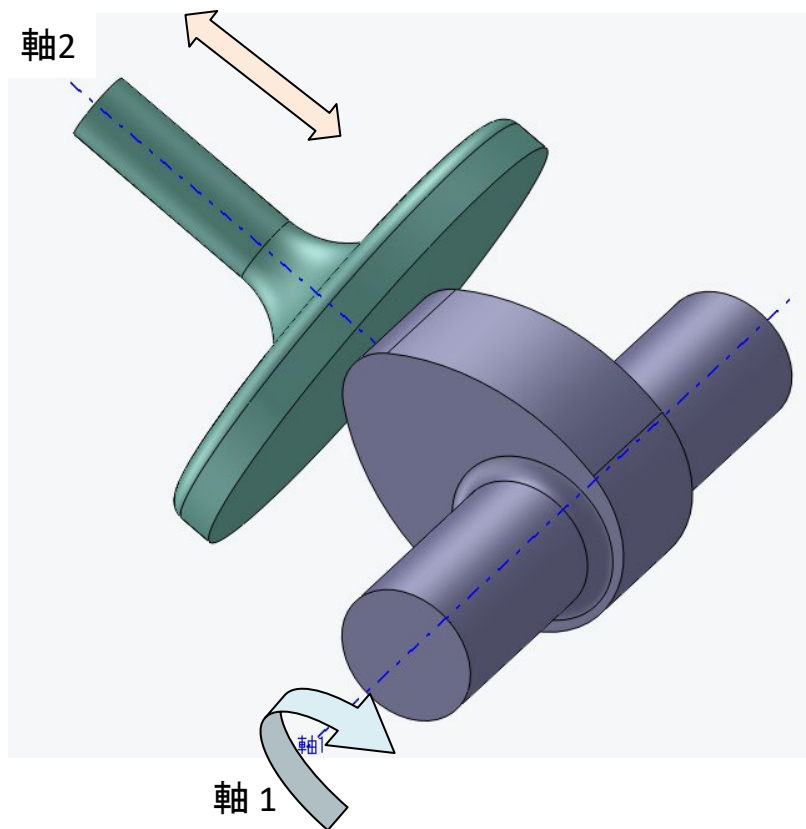
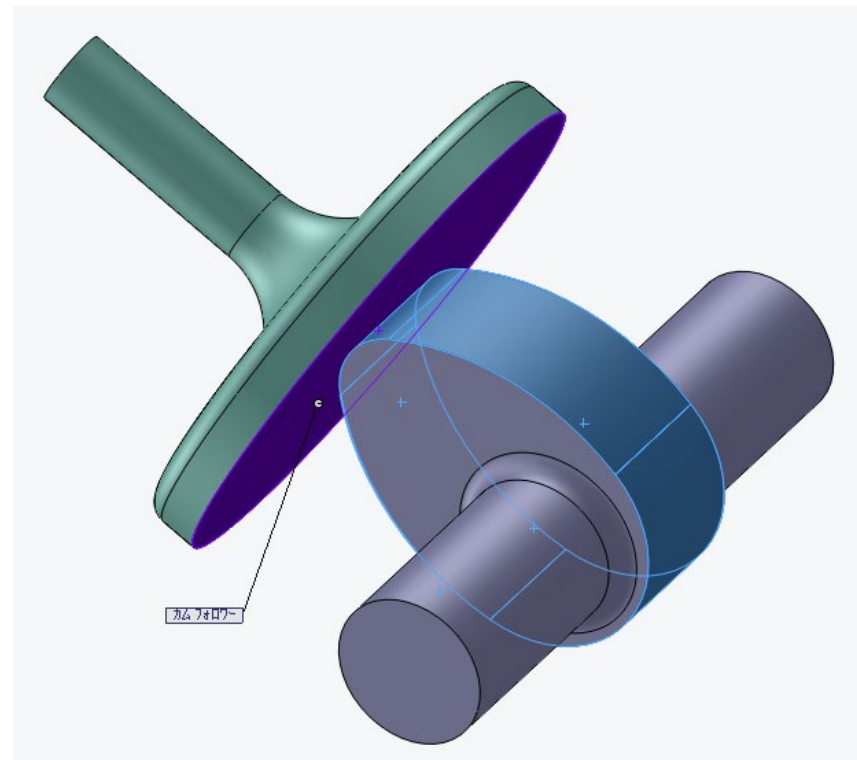


図4.28 スプロケットの動き(回転)





カムシャフトと軸1：一致， フォロワと軸2：一致



カムとフォロワーの拘束

図4.29 カムとフォロワーのアセンブリ



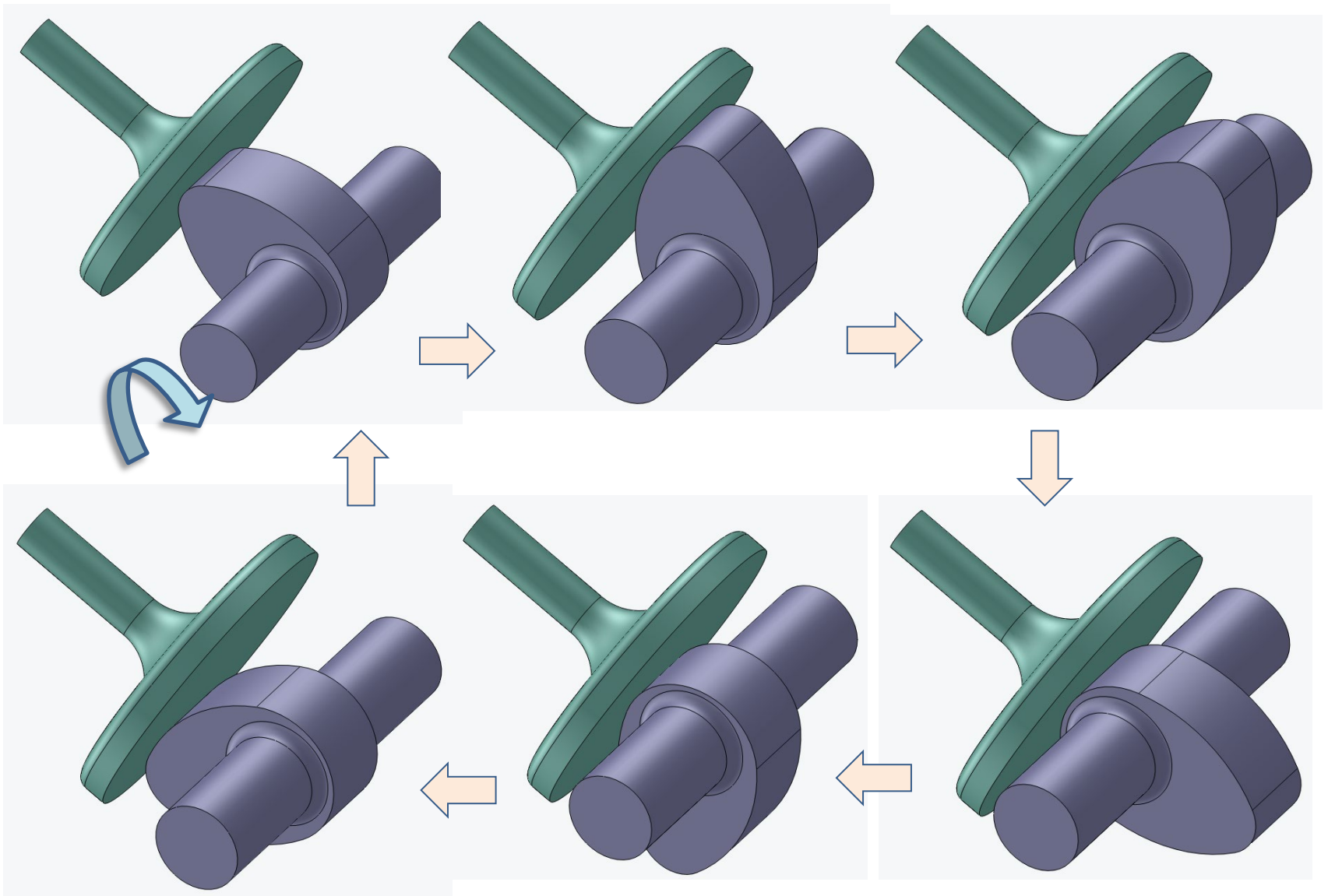
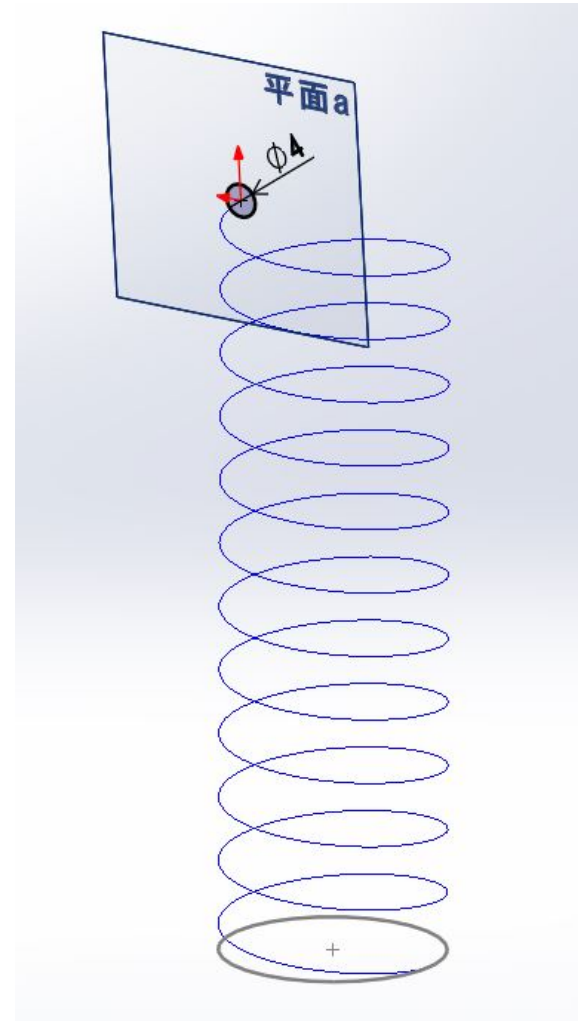
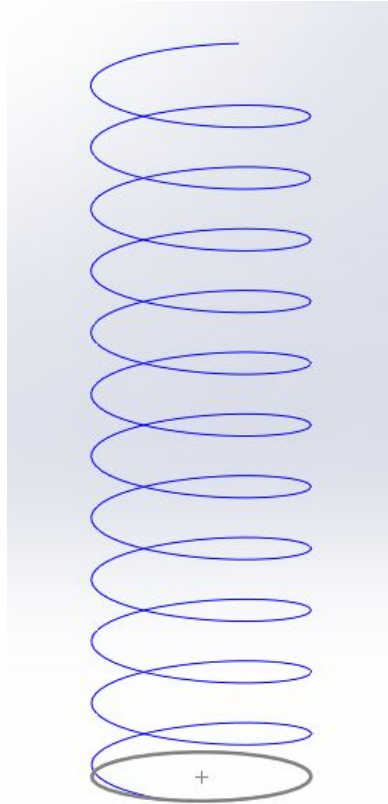
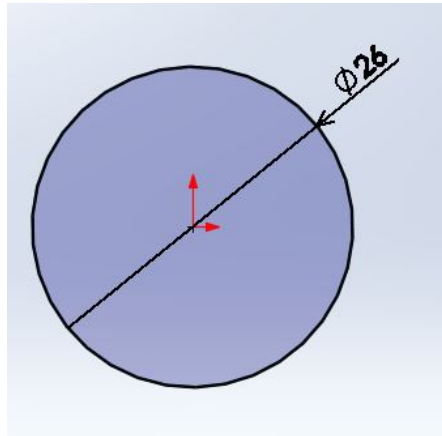


図4.30 カムとフォロワの動き





|            |        |
|------------|--------|
| 材料の直径(mm)  | : 4    |
| コイル平均径(mm) | : 26   |
| 総巻き数       | : 11.5 |
| 有効巻き数      | : 9.5  |
| 自由高さ(mm)   | : (80) |

図4.31 コイルばねのモデリング(続く)





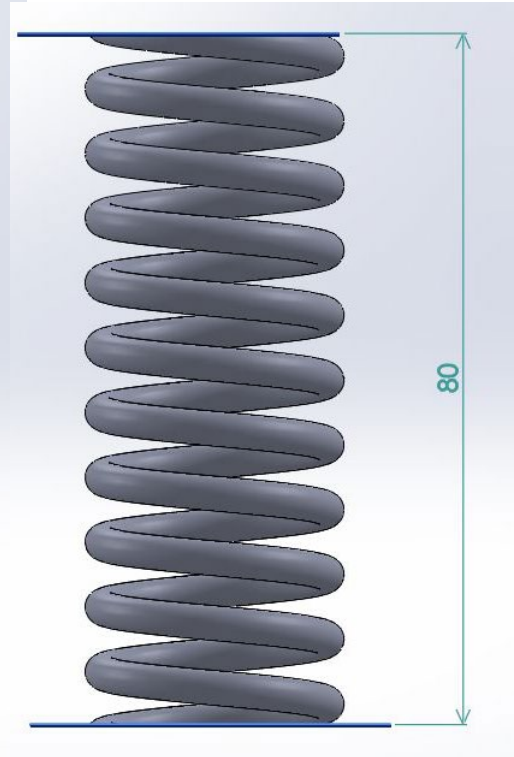
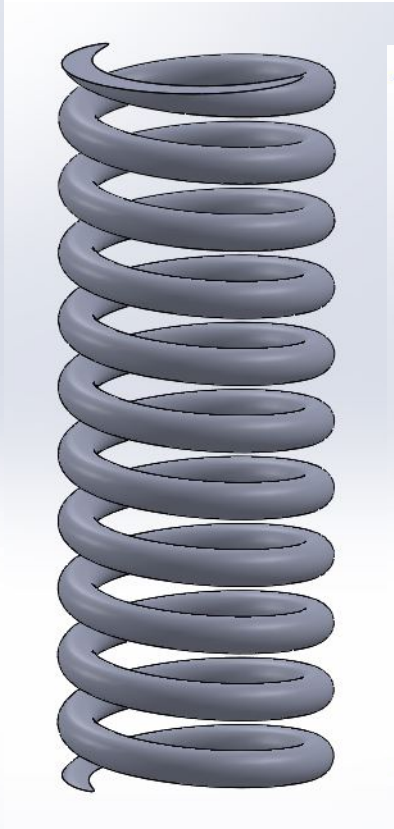
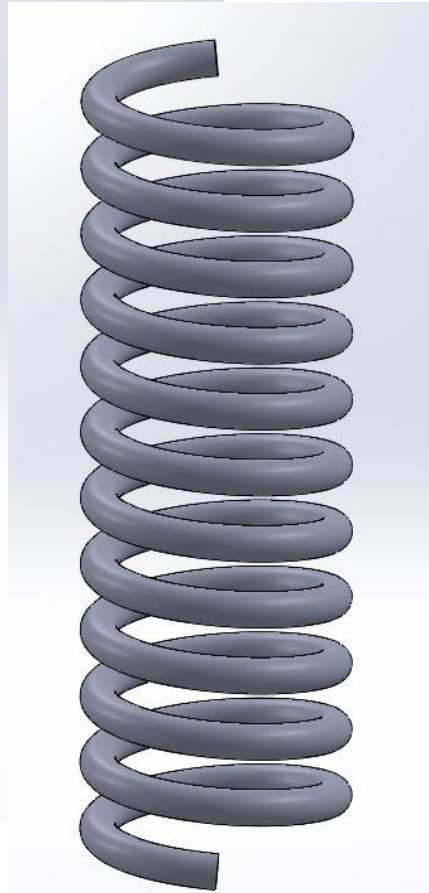
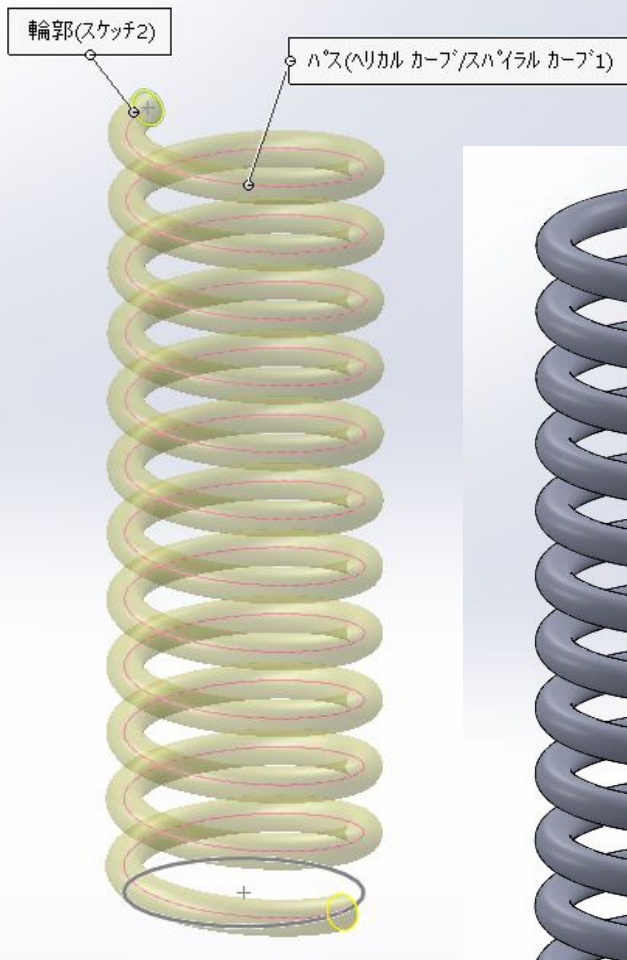


図4.31 コイルばねのモデリング(続き)



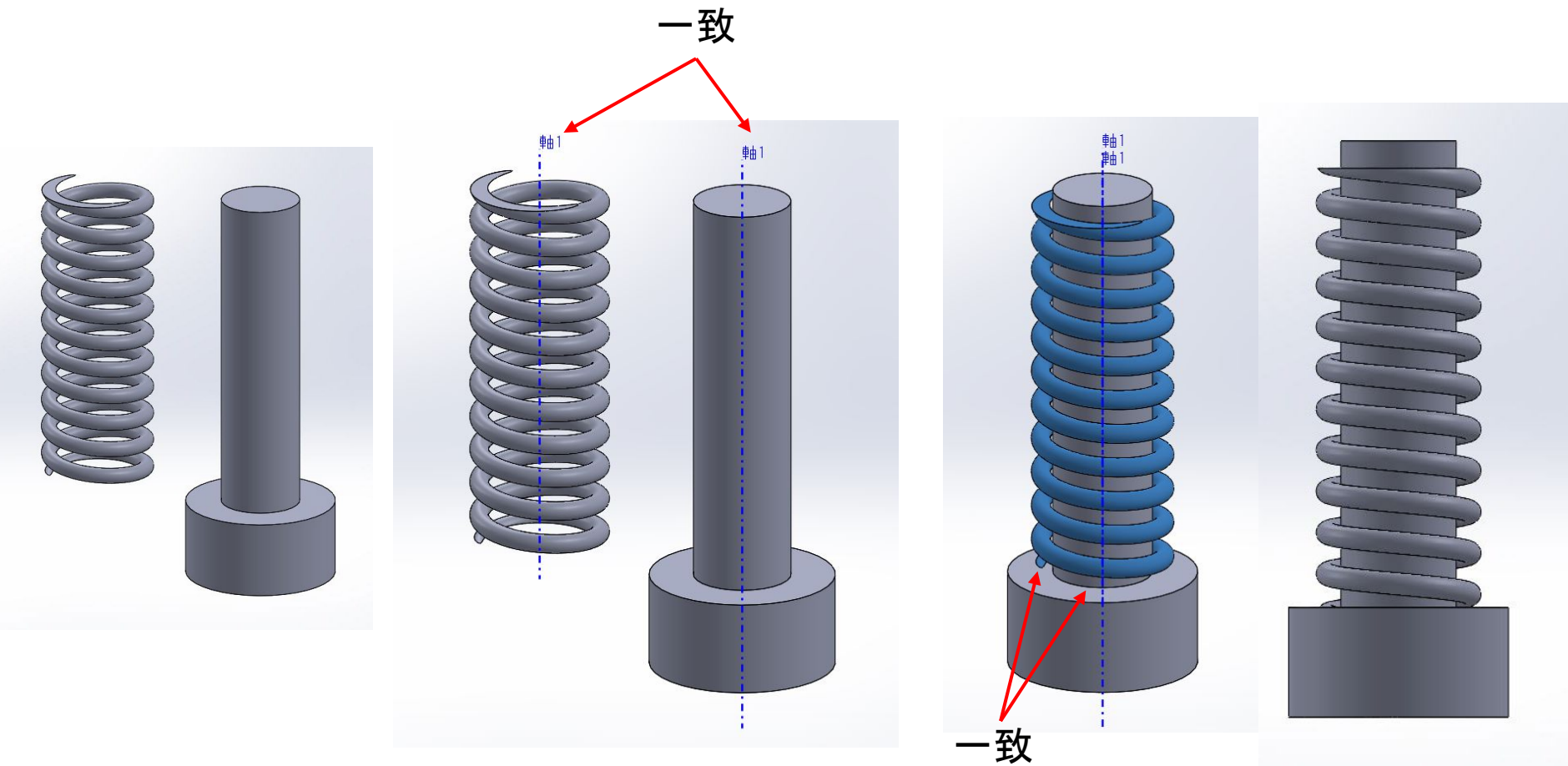
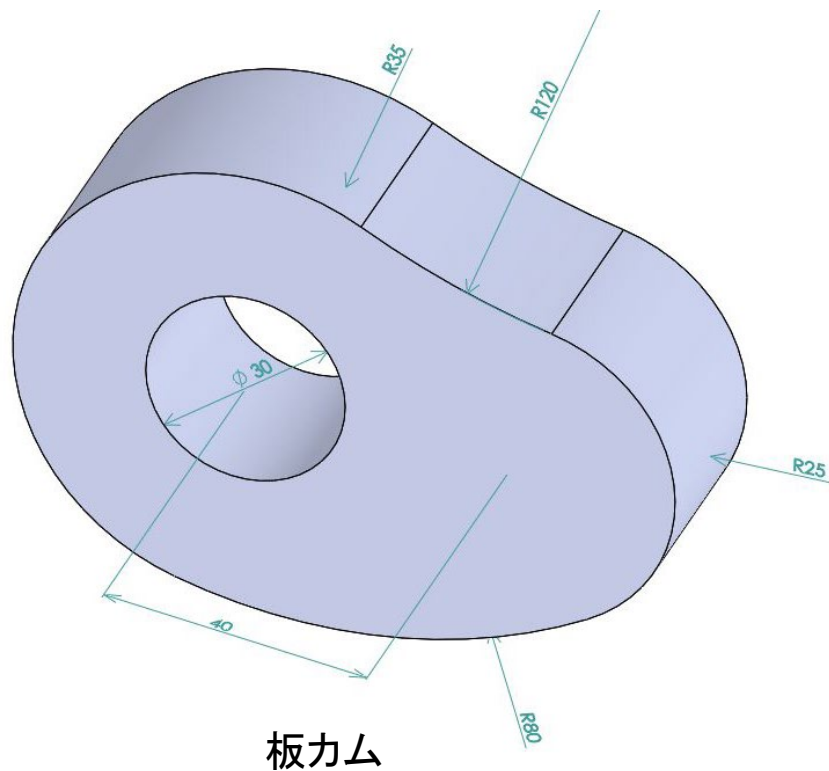


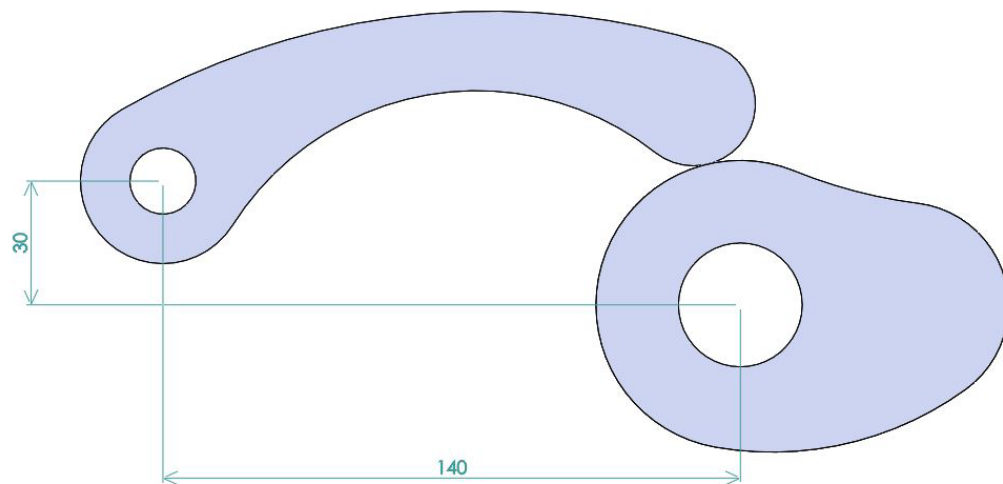
図4.32 コイルばねのアセンブリ



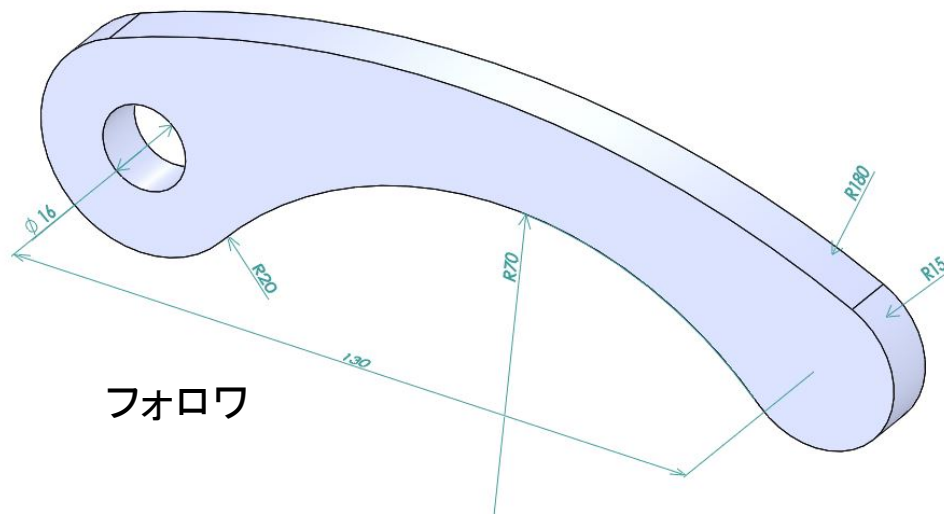




板カム

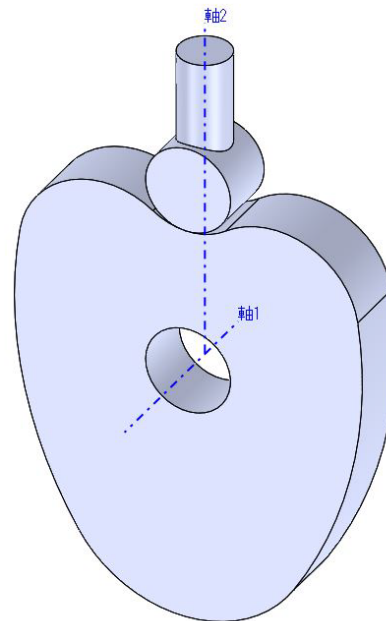
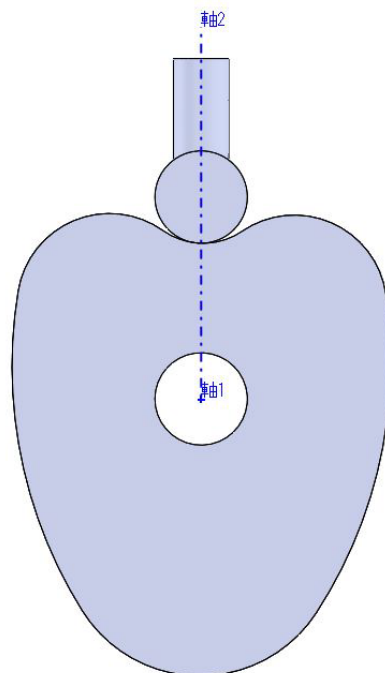
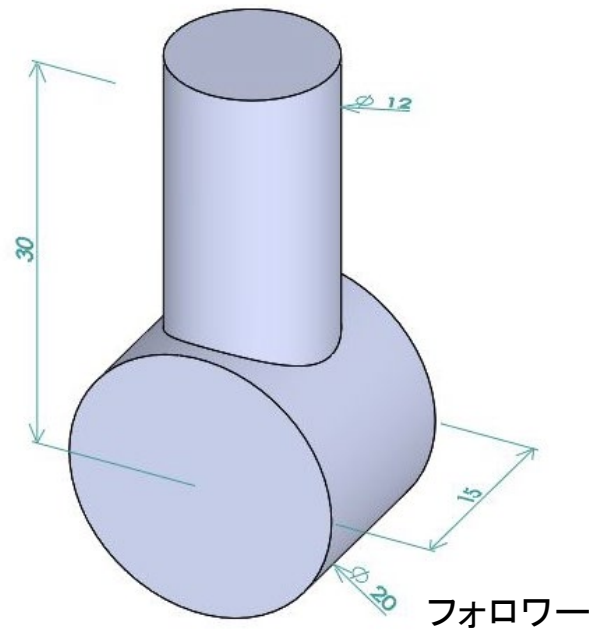
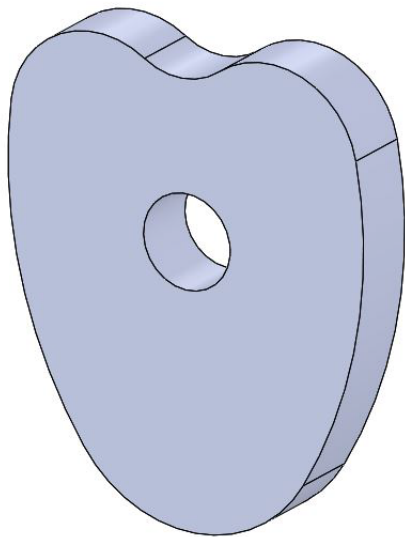
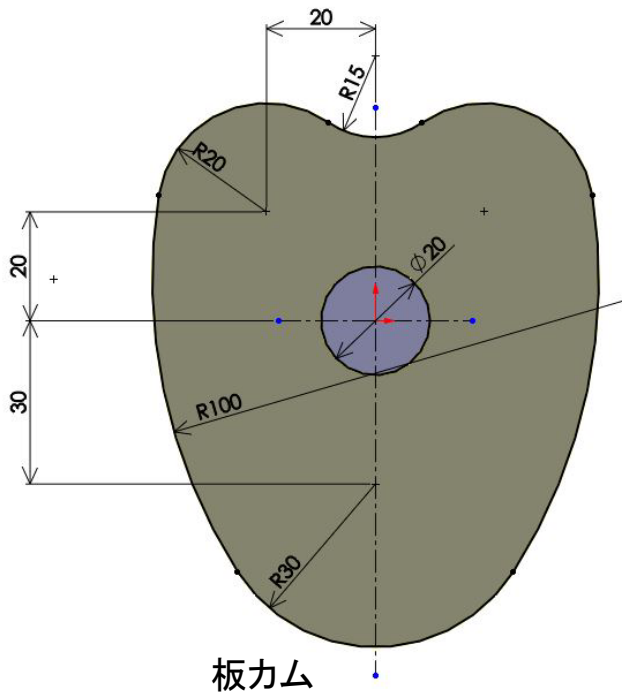


問図4.1



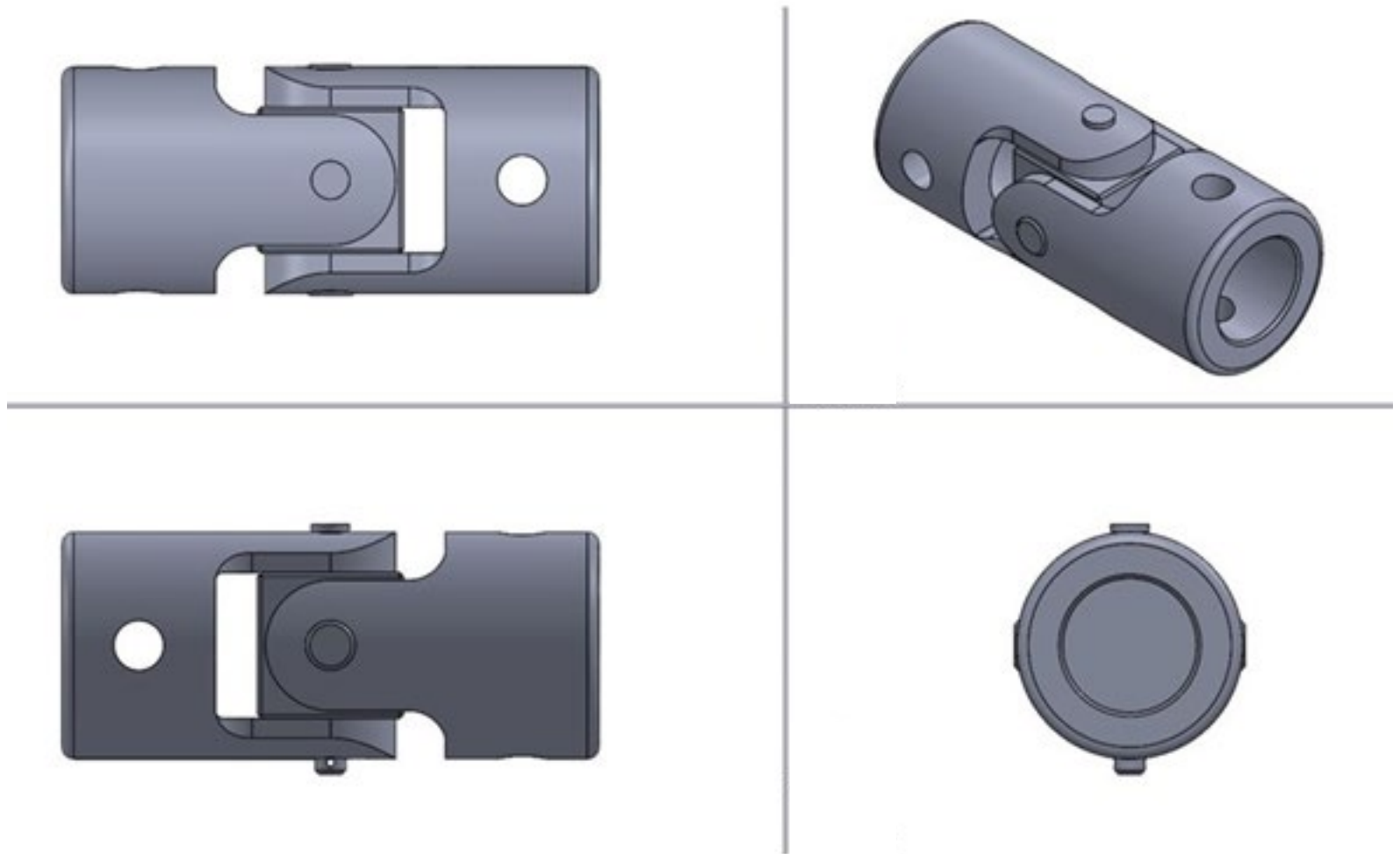
フォロワ





問図4.2





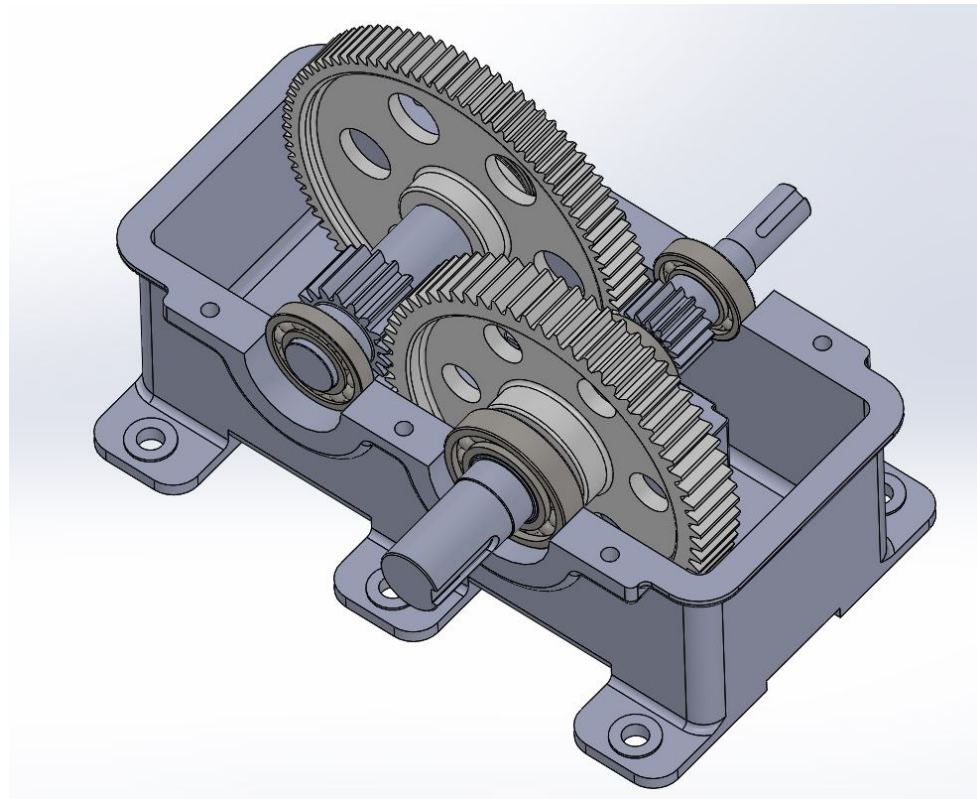
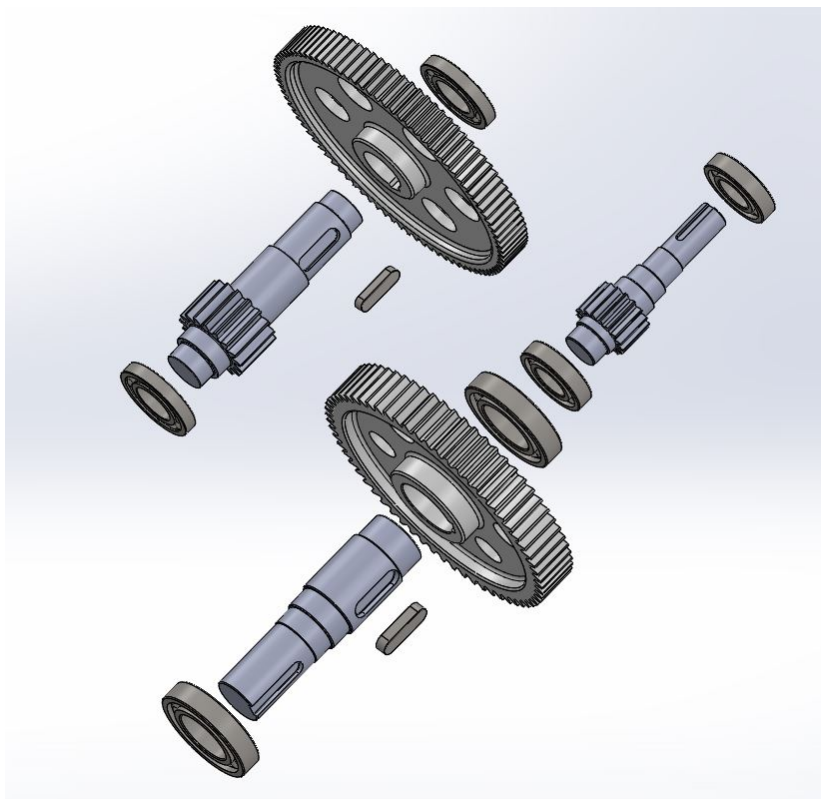
問図4.3





問図4.4





問図4.5

