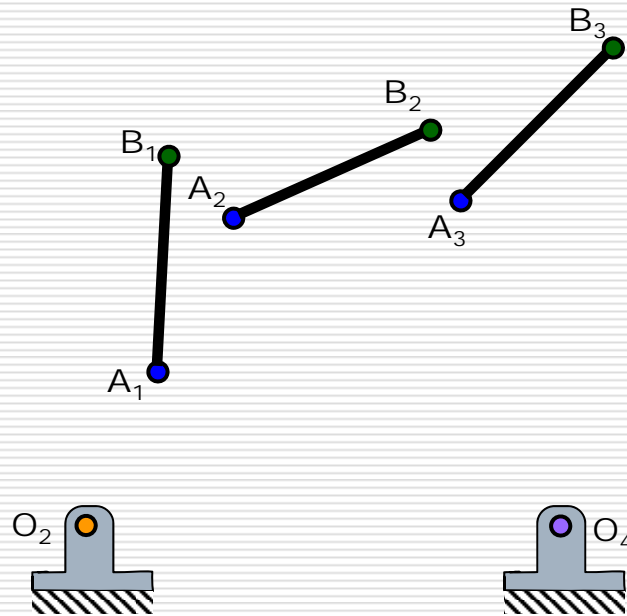# Three Position Graphical Linkage Synthesis

- **Three Position with Specified Fixed Pivots**

Three Position With Specified Fixed Pivots

Coupler AB has three desired positions

$$A_1B_1, A_2B_2, \& A_3B_3$$

A four bar mechanism needs to be designed to generate this movement with the additional constraint that the mechanism must be fixed to the frame at O_2 and O_4.
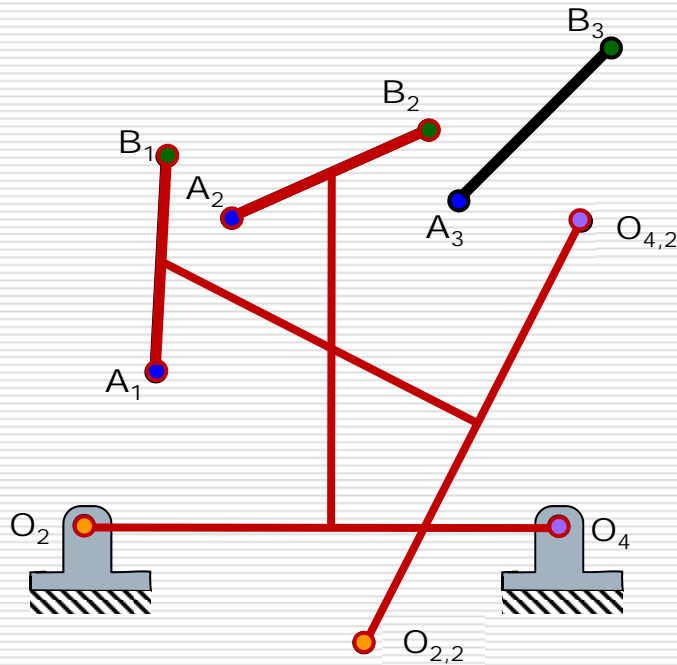
Use Inversion Starting with Position 2

Coupler AB is now fixed and O_2O_4 moves.

Find location of $O_{2,2}$ and $O_{4,2}$
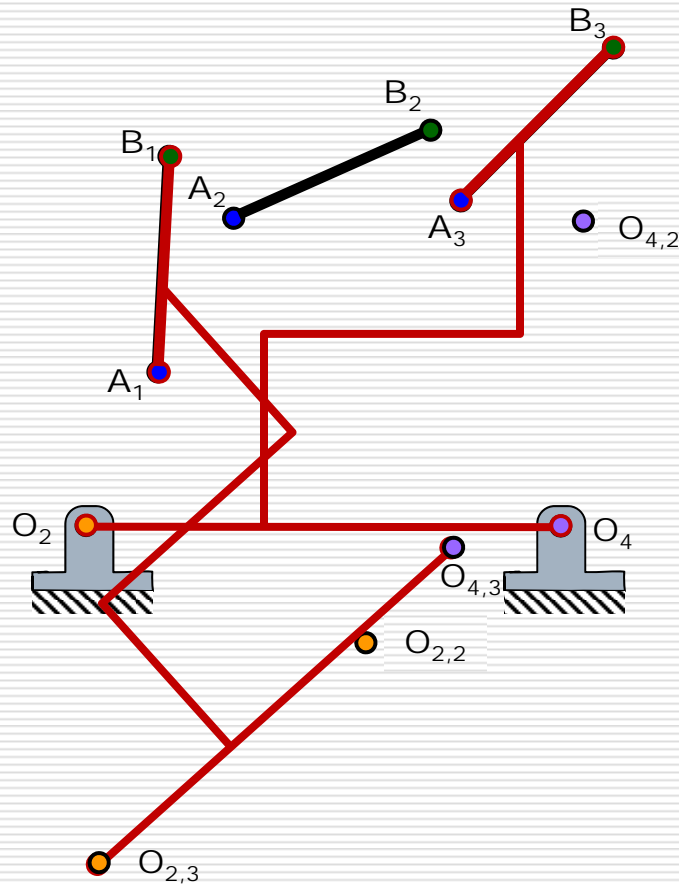- The relative position of O_2O_4 and A_2B_2 must be maintained

Use Inversion Starting with Position 3
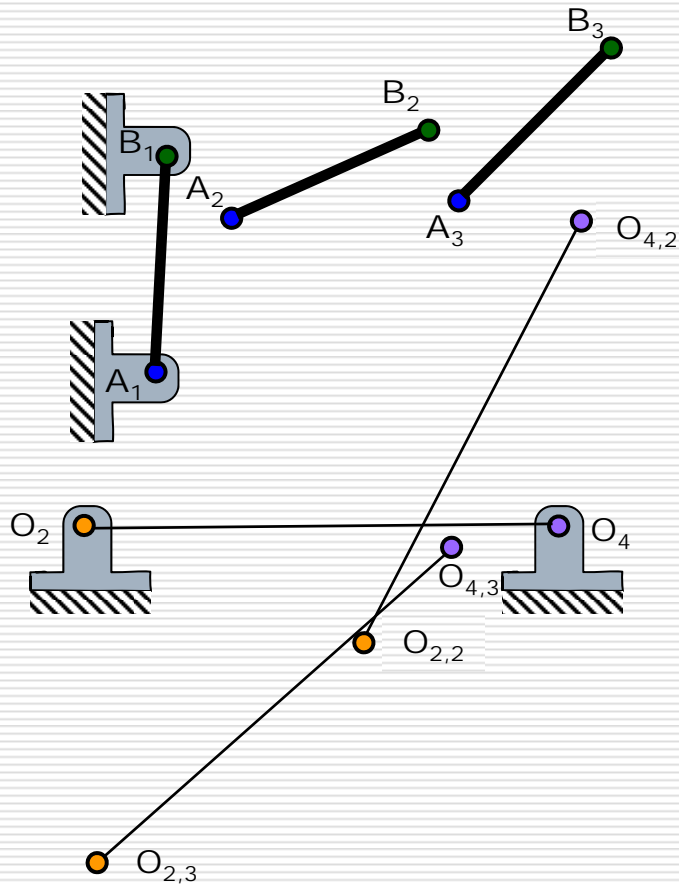
Coupler AB is now fixed and O_2O_4 moves.

Find location of $O_{2,3}$ and $O_{2,3}$
- The relative position of O_2O_4 and A_2B_2 must be maintained

B_3

B_2

B_1

A_2

A_3

$O_{4,2}$

A_1

O_2

O_4

$O_{4,3}$

$O_{2,2}$

$O_{2,3}$

Use Inversion
New Problem to Synthesize

Coupler AB is now fixed and O_2O_4 moves.

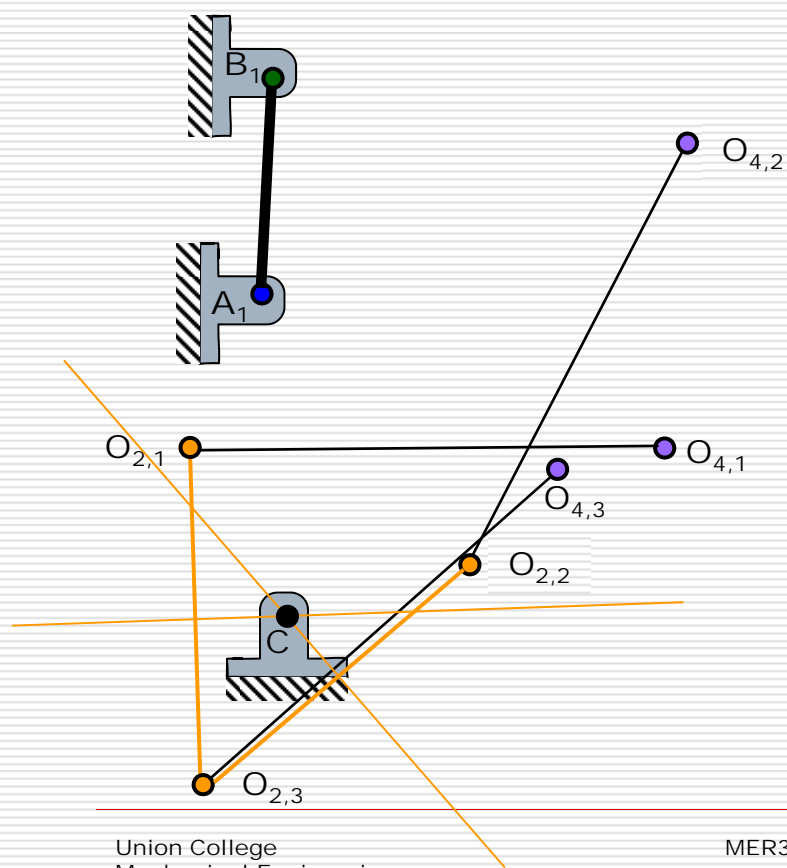**A_2B_2 and A_3B_3 can be removed**

A_1B_1 now becomes the ground

Perform 3 Position Synthesis Using O_2O_4 as Moving

Finding the Roto-Pole for O_2, C

Perpendicular Bisectors for $O_{2,1}O_{2,2}$, and $O_{2,1}O_{2,2}$ locate C

C is a Fixed Roto-Pole

B_1
$O_{4,2}$
A_1
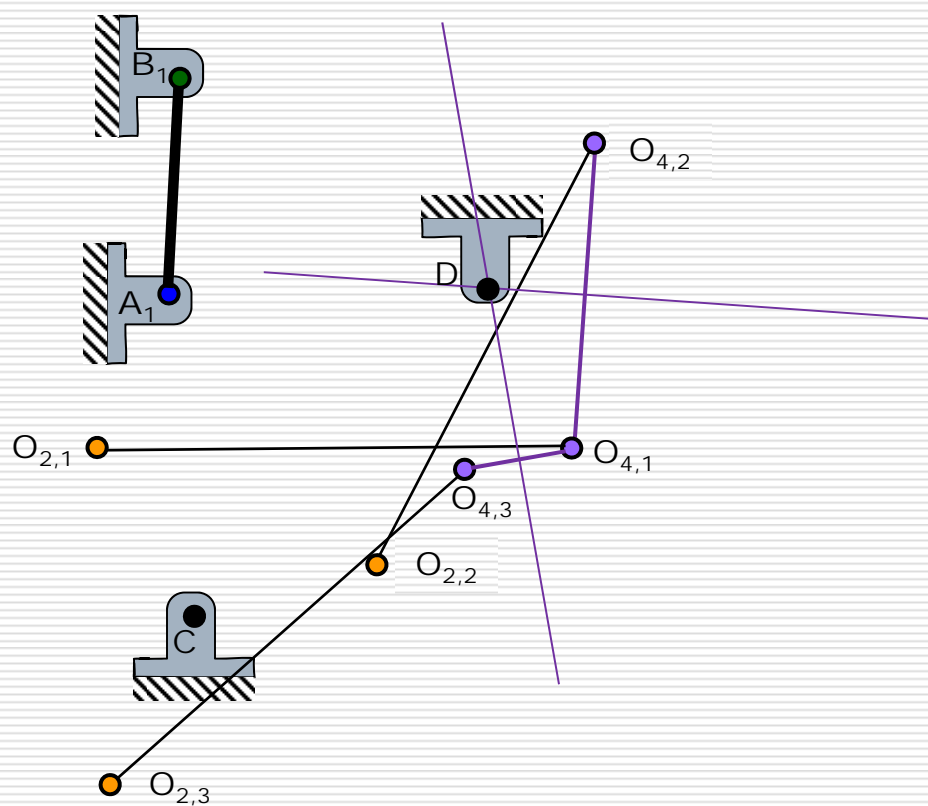$O_{2,1}$
$O_{4,1}$
$O_{4,3}$
$O_{2,2}$
C
$O_{2,3}$

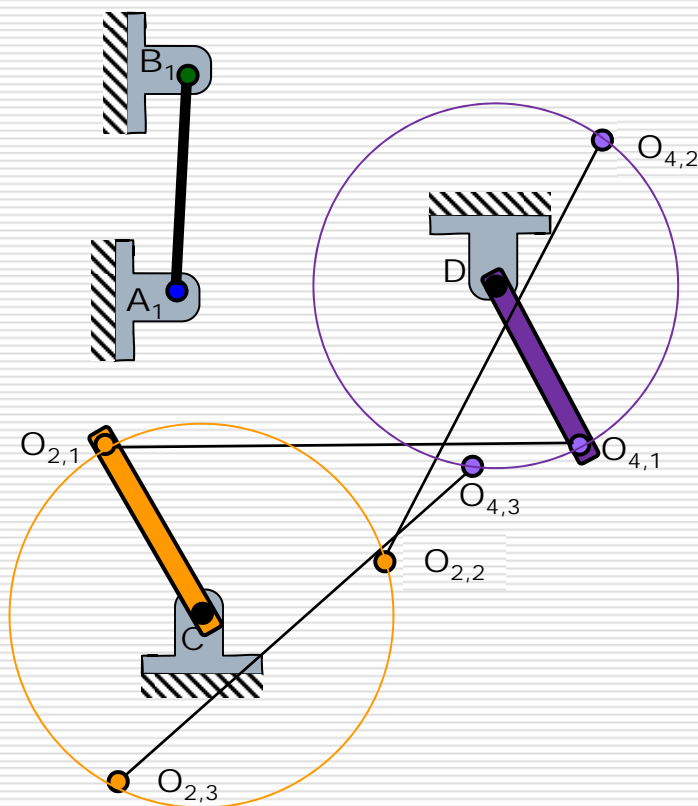# Perform 3 Position Synthesis Using O_2O_4 as Moving

Finding the Roto-Pole for O_4, D

Perpendicular Bisectors for $O_{4,1}O_{4,2}$, and $O_{4,1}O_{4,2}$ locate D

D is a Fixed Roto-Pole

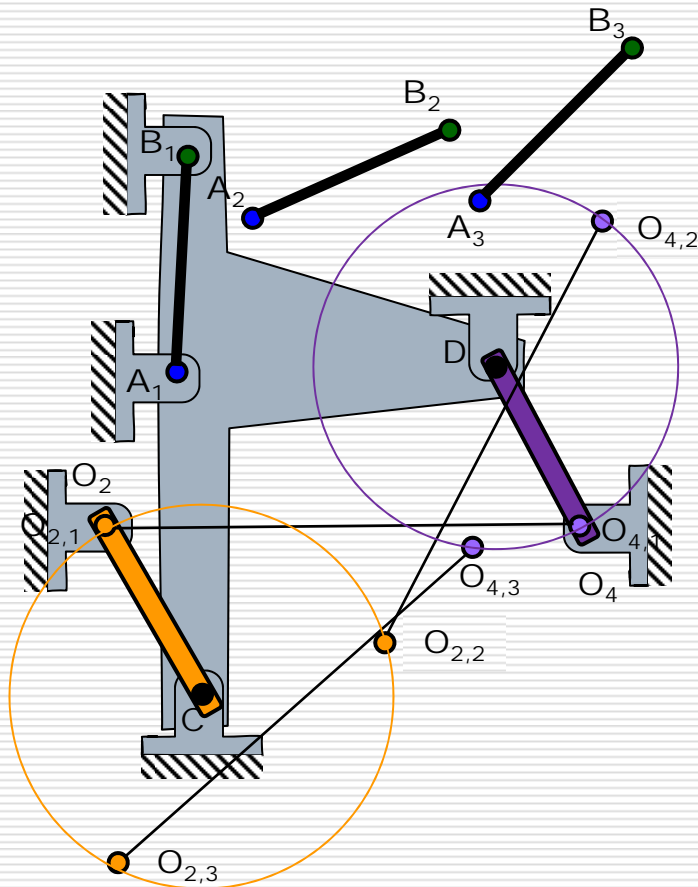# Perform 3 Position Synthesis The Inverted Linkage

The Inverted linkage can now be formed.

A link is connected to C from $O_{2,1}$

A link is connected to D from $O_{4,1}$

Perform 3 Position Synthesis This linkage is inverted back

A_1B_1 and CD are all on the same link.

The mechanism can now be inverted back to the original grounds, O_2O_4