Zero Structural Error Function Generating Mechanisms

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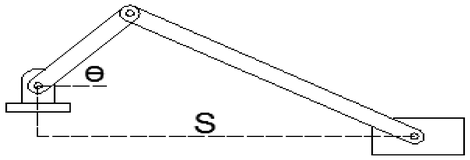
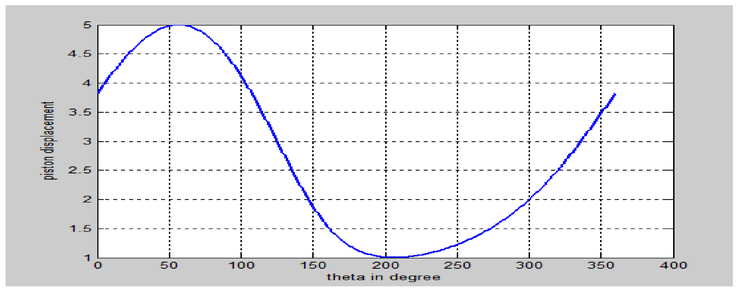
Objective: To generate chains of drag-link mechanisms connected to a final slider-crank device capable of producing any periodic curve.

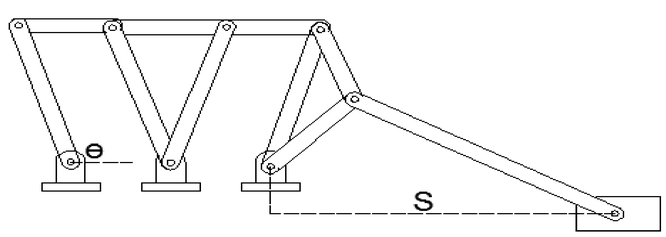
Introduction:

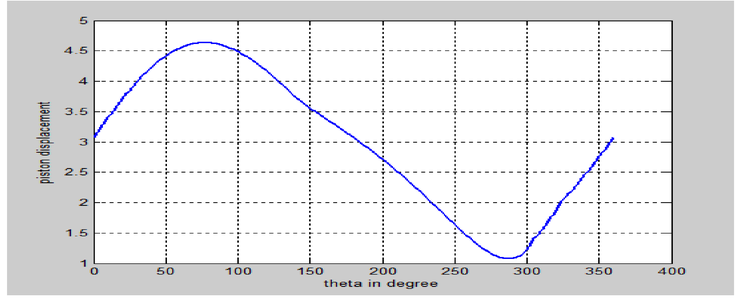
Slider-crank device is shown below. As the crankshaft makes full rotations, the output piston produces periodic curves similar to a sine wave.





Adding drag-link mechanisms to the slider-crank device warps the curve.





Motivation:

- Designing the slider-crank device to end up with the periodic curve required.
- Getting Less error as we add more drag-link mechanisms.

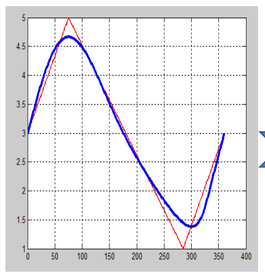
Methodology:

Utilized

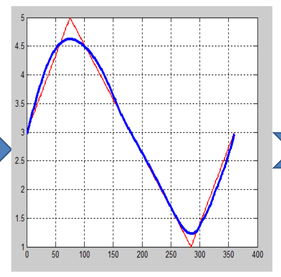
- Matlab to generate the drag-link mechanisms.
- SolidWorks to animate the final mechanism.

Examples:

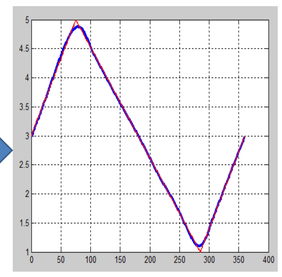
The figures below show how the error reduces as we add more drag-link mechanisms.



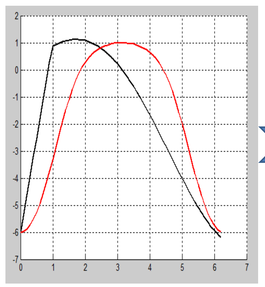
1 drag-link mechanism



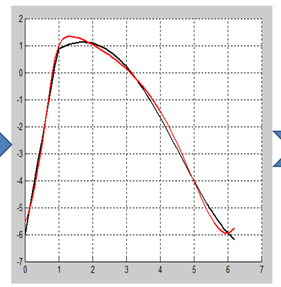
4 drag-link mechanisms



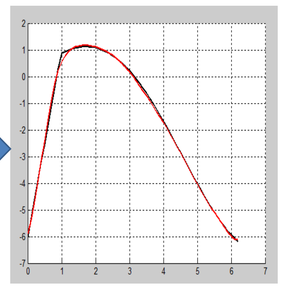
8 drag-link mechanisms



only slide-crank device

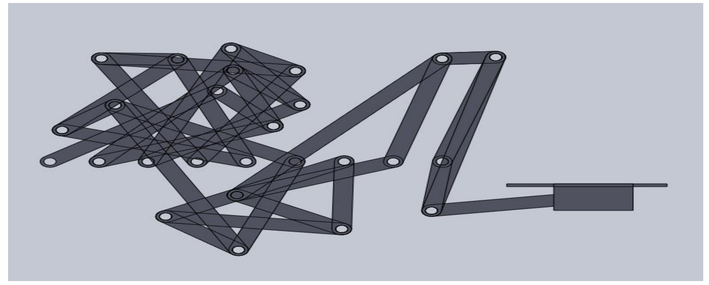


3 drag-link mechanisms

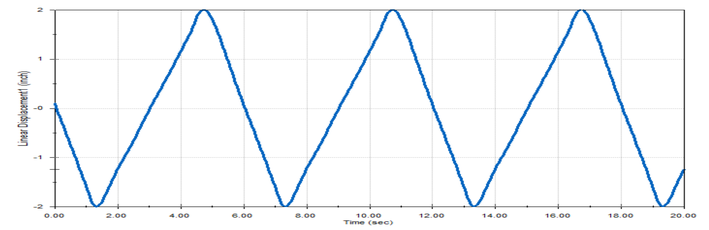


6 drag-link mechanisms

SolidWorks Result:



Eight drag-link mechanisms



Motion of slider-crank generated by SolidWorks for the first example discussed.

Future Direction:

Geared five-bar mechanism to get curves with more than one max and min points.