# Design and calculation of Whitworth mechanism

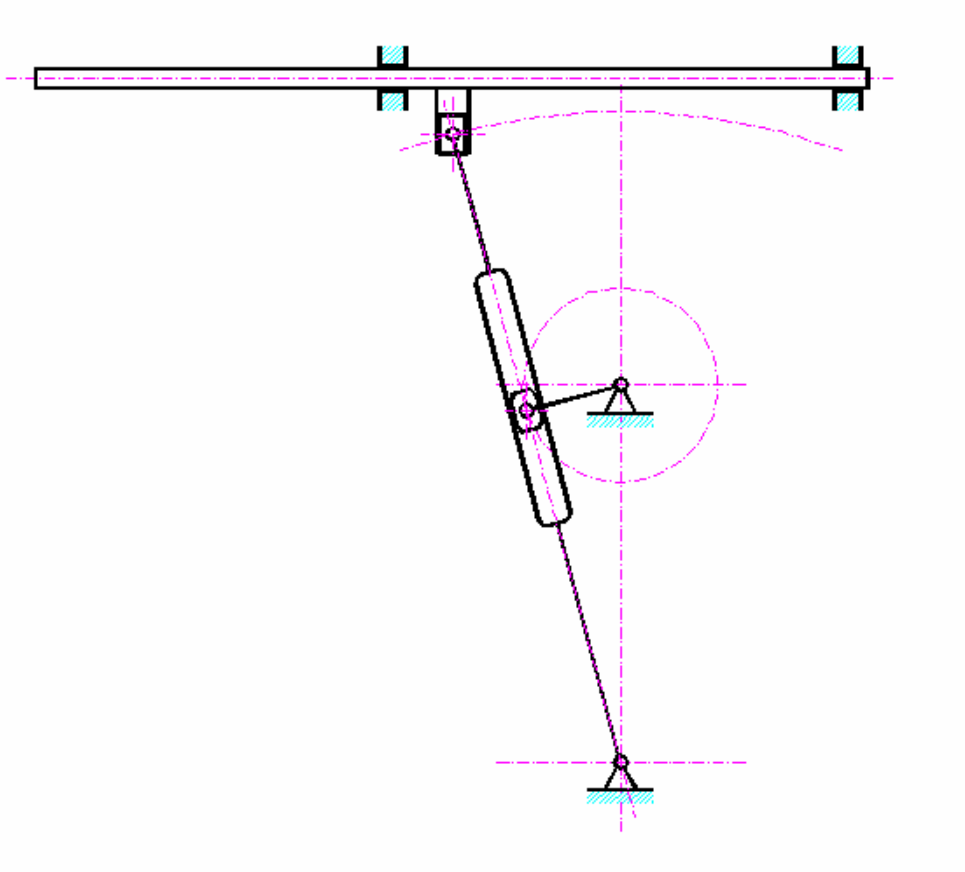
**Production Machines I**

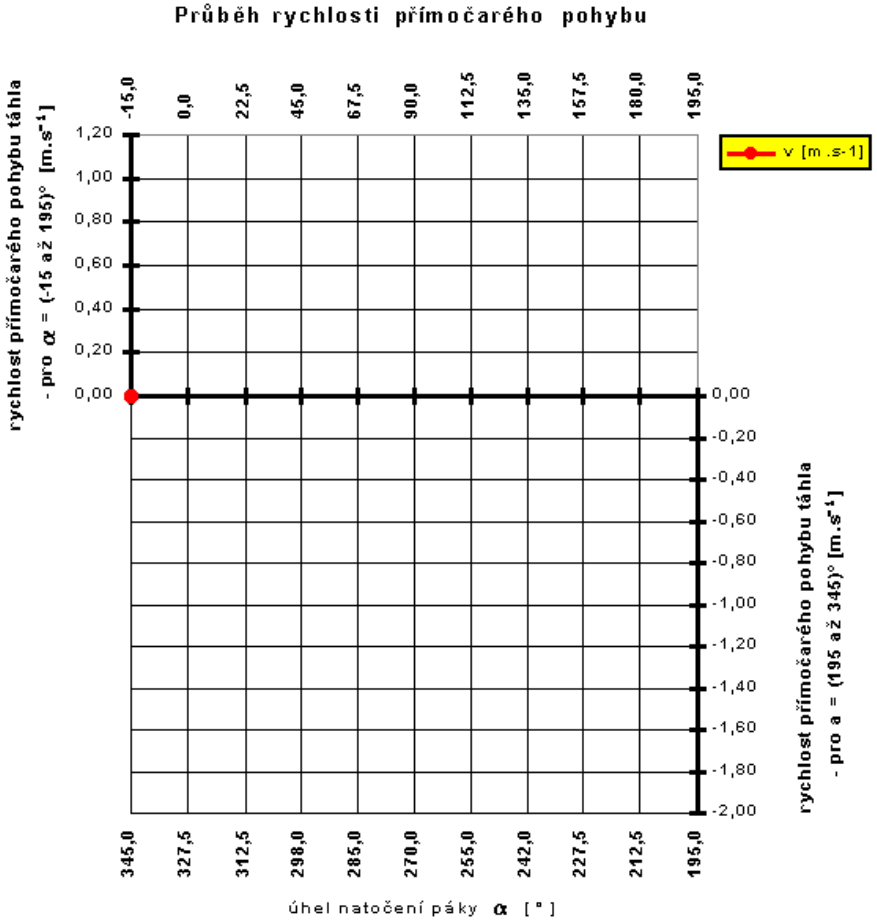
**Liberec, 15. 1. 2013**

**Petr Zelený**

## Mechanism animation

## Progress of linear motion speed of slider





## Video demonstrations of the mechanism application

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## Summary of findings from videos and animation

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- transfer rotary motion to reciprocating.

Application in the field of machine tools:

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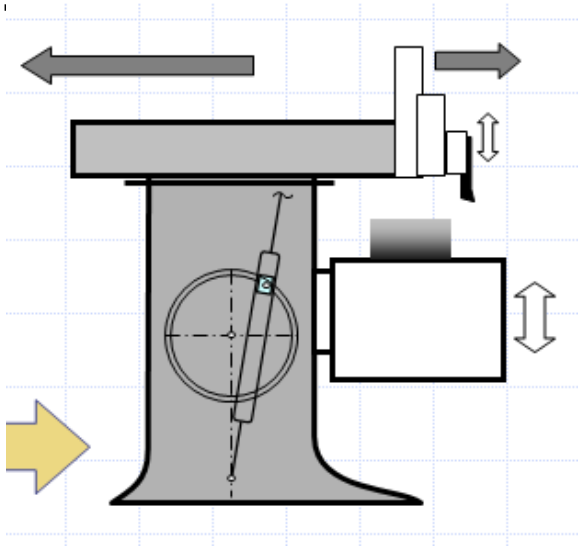
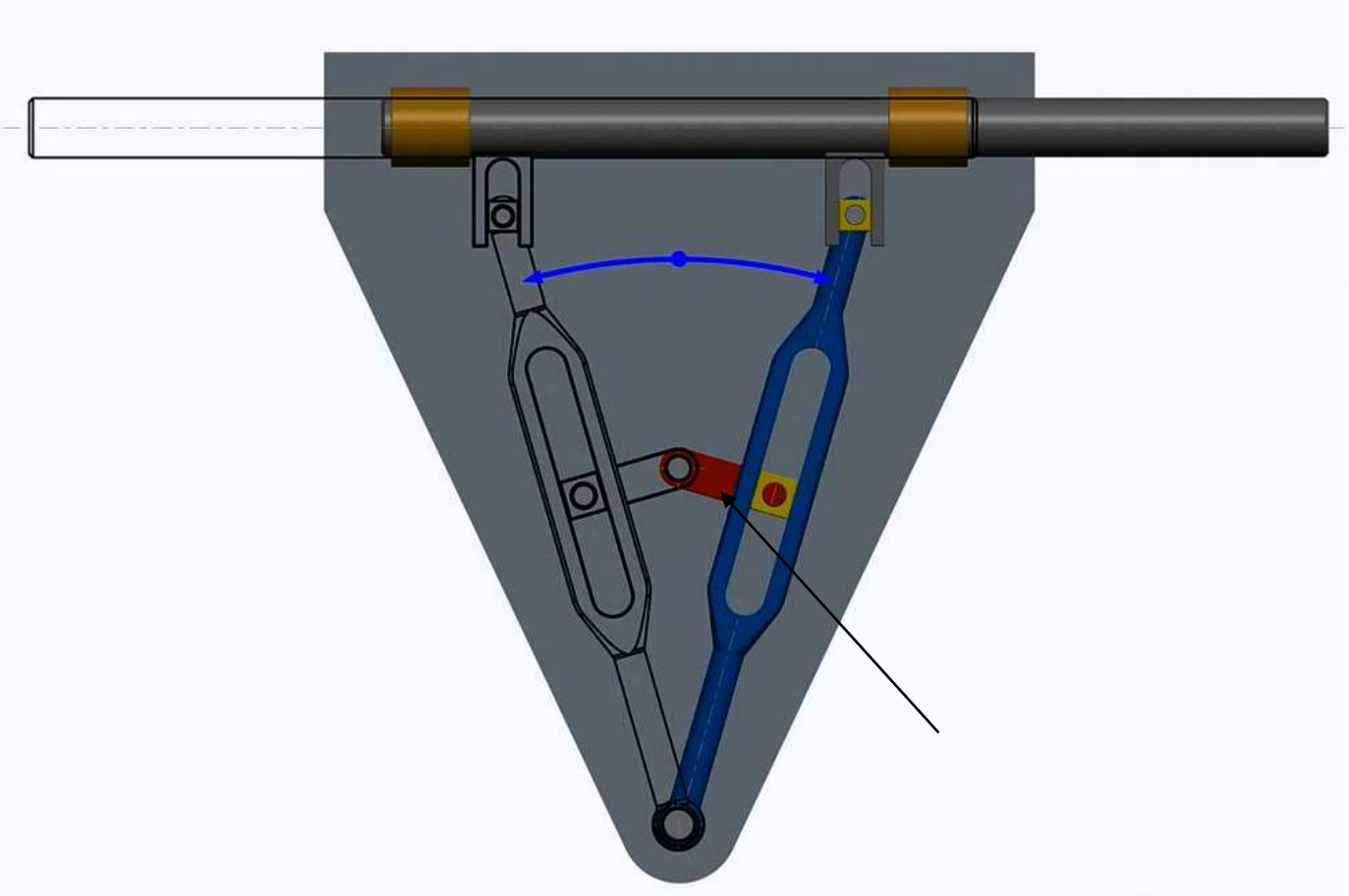
Application in the field of machine tools:

- for horizontal Shaping Machines.



## Mechanism description



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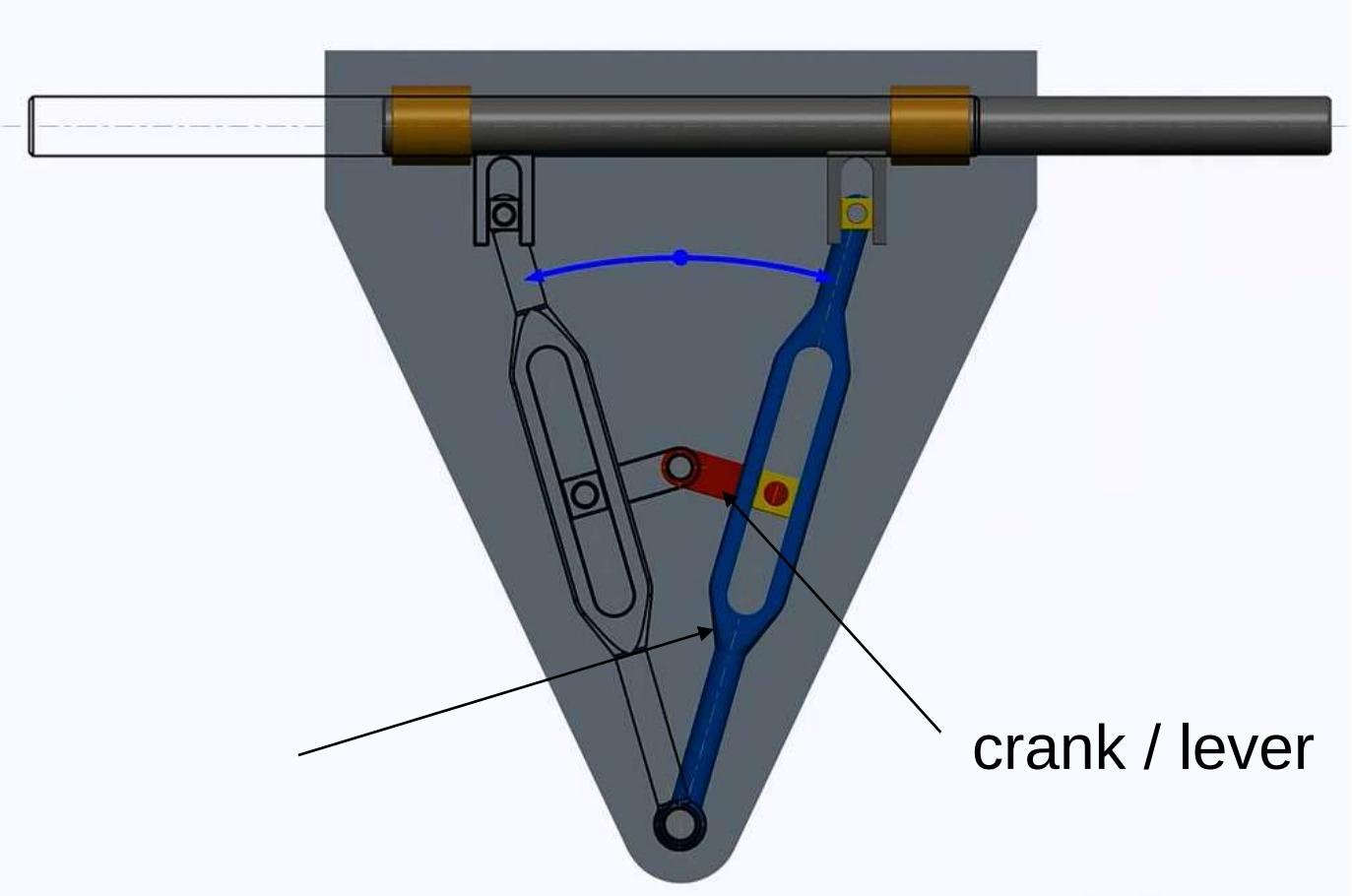

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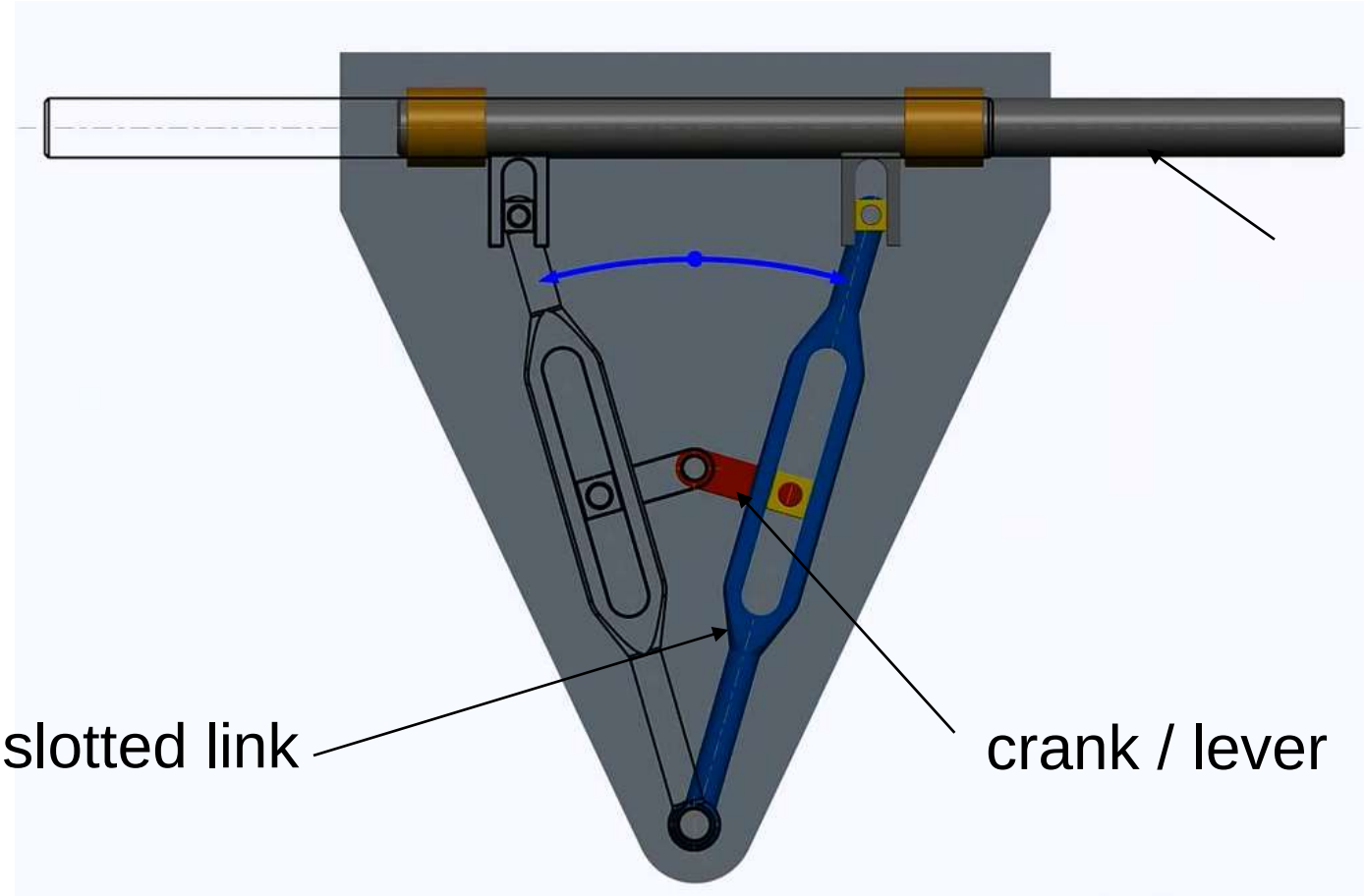

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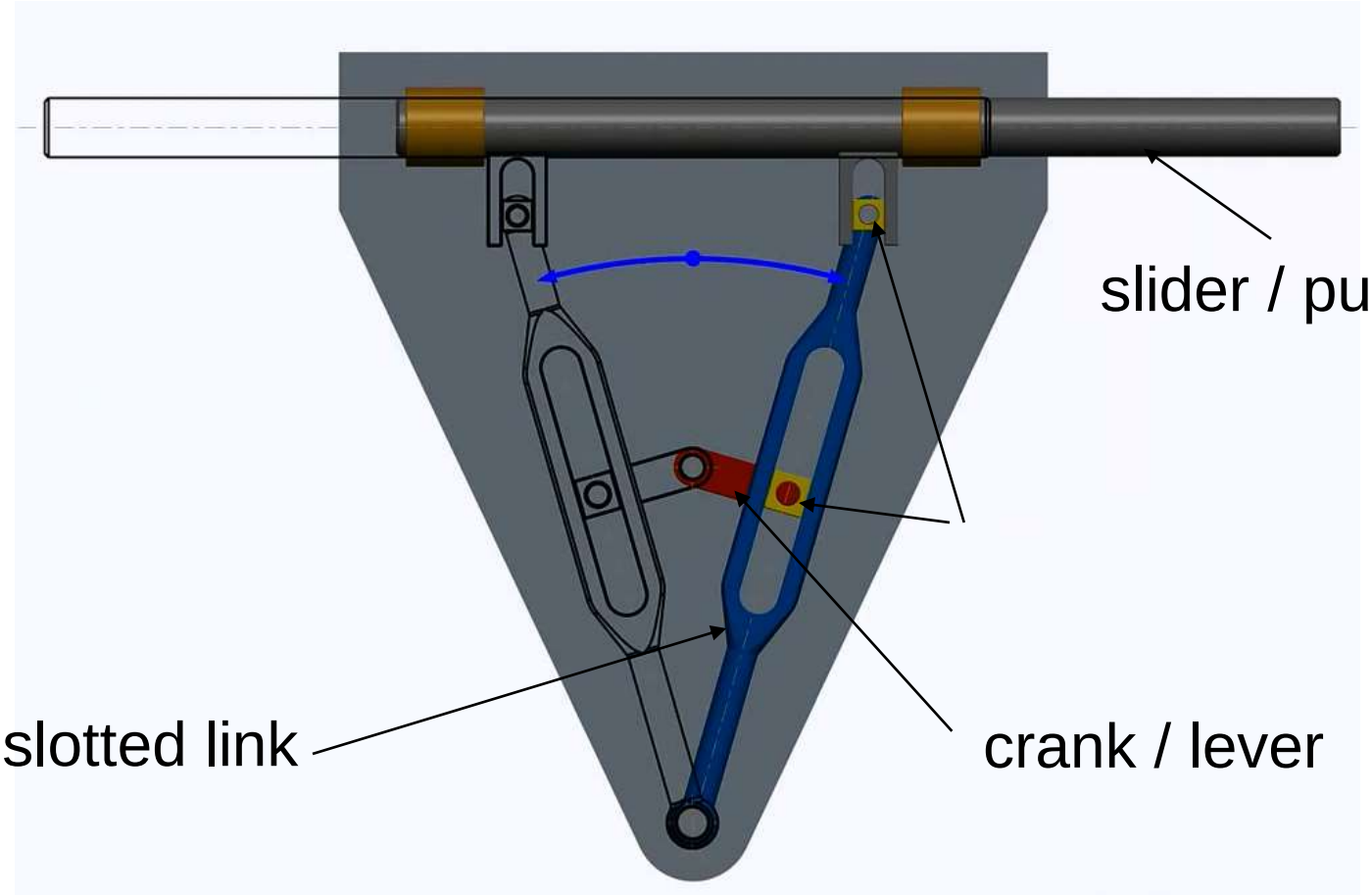

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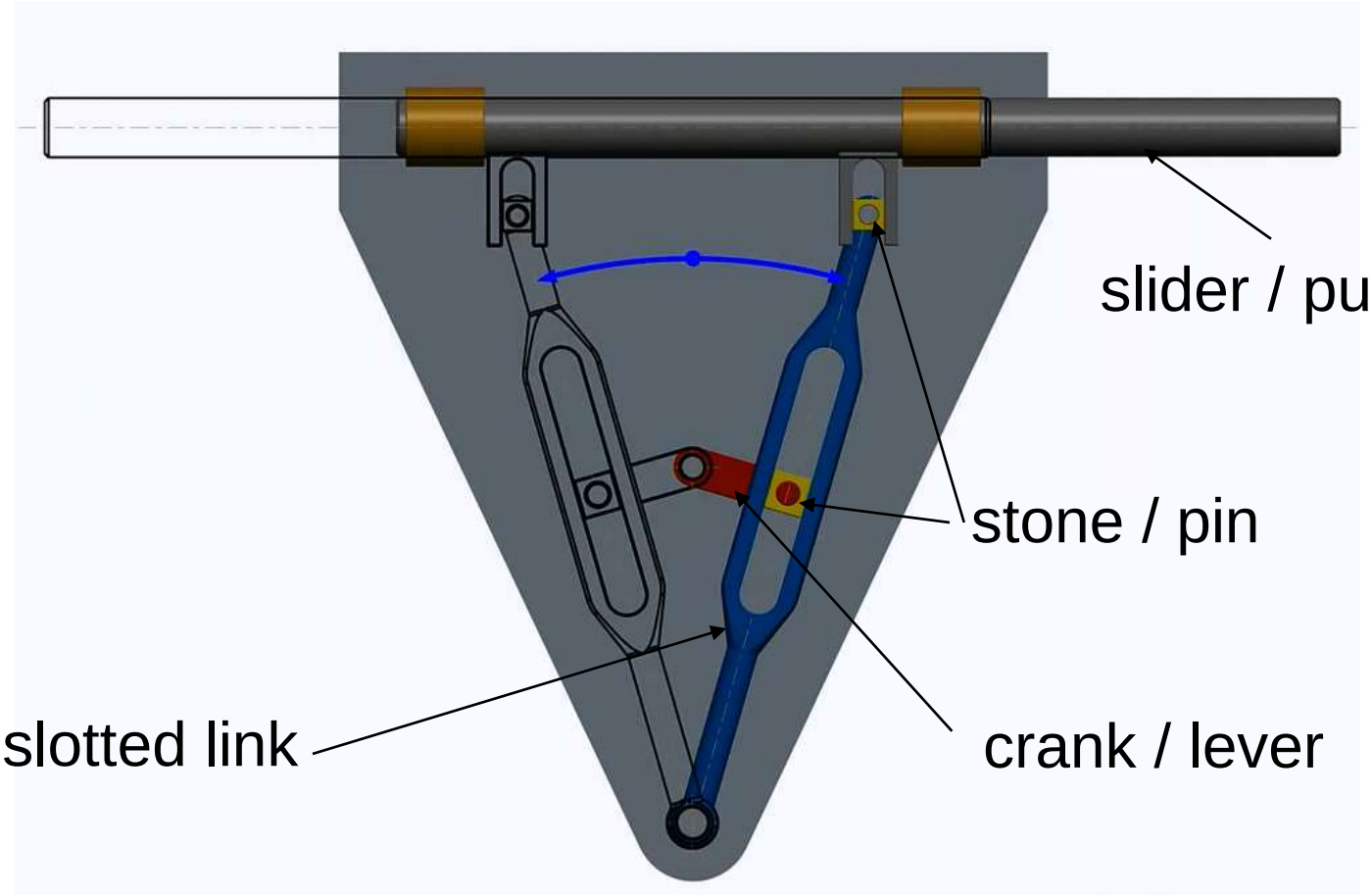
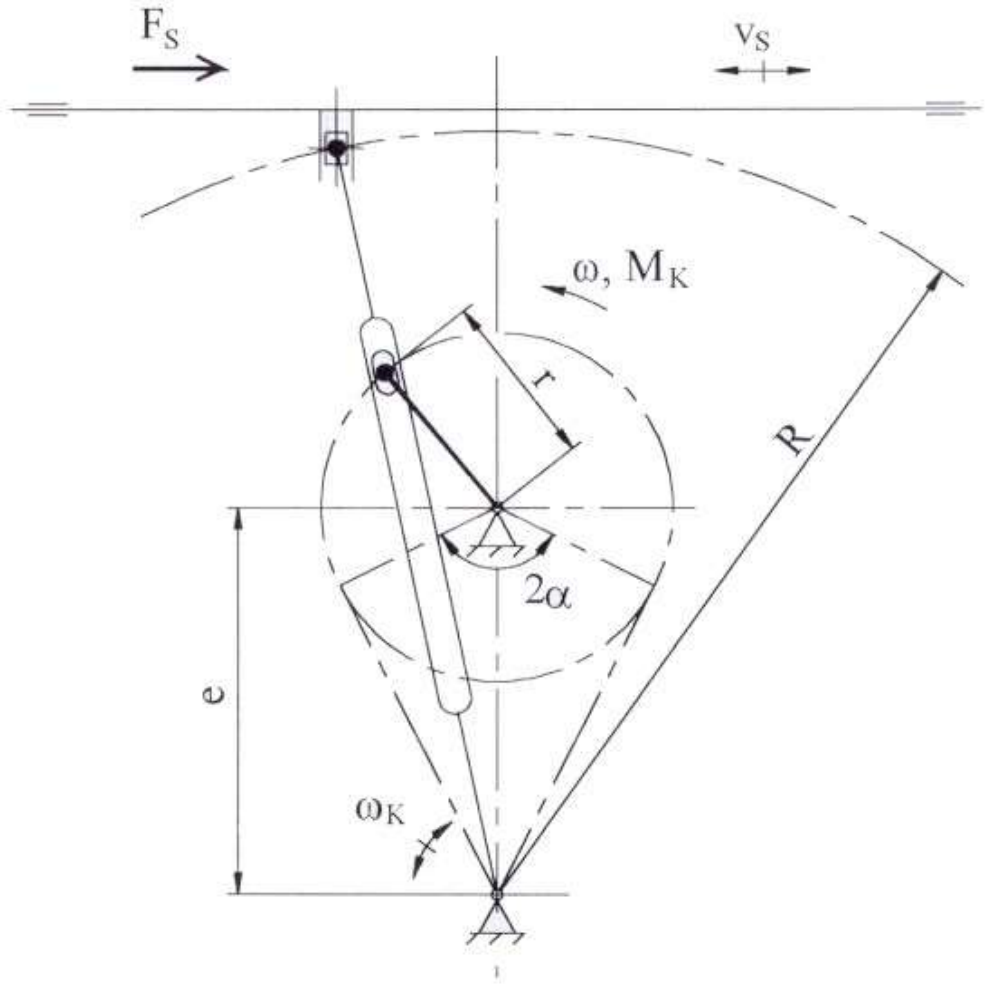


## Mechanism scheme



## Mechanism calculation

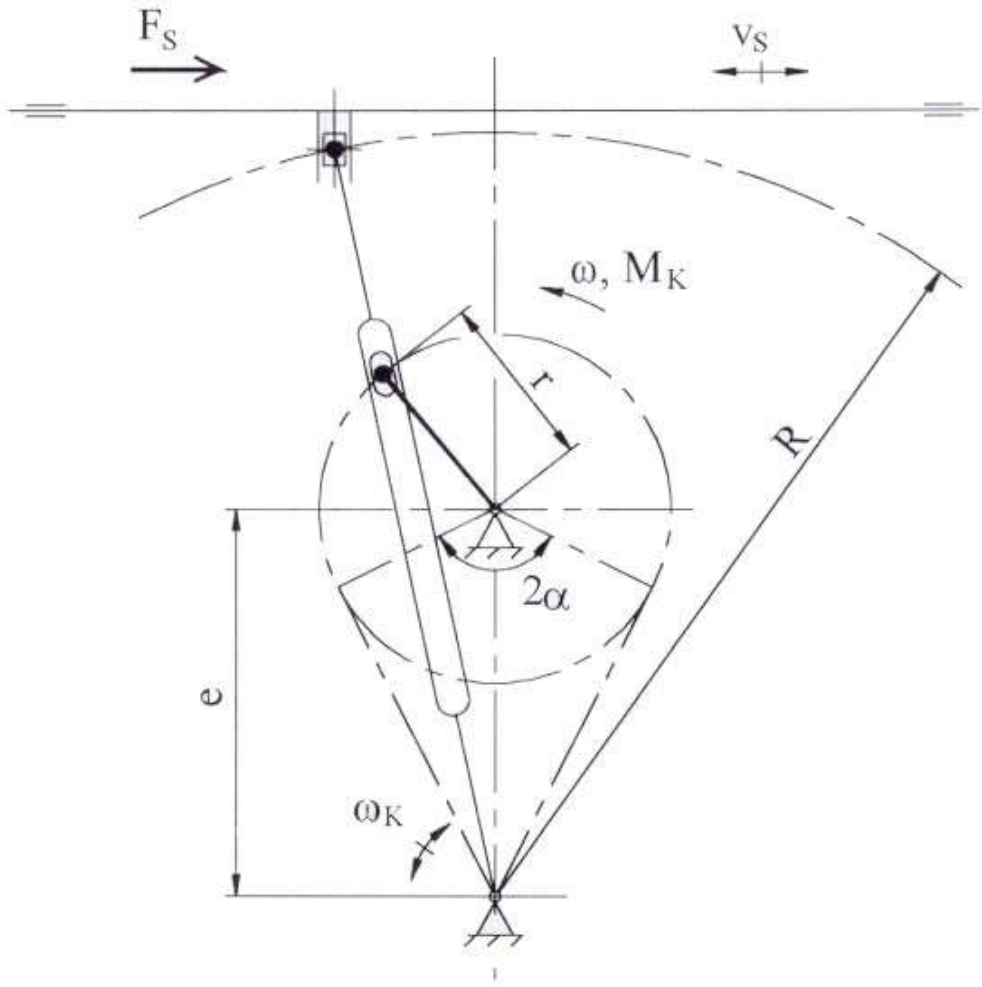
Task:

Given:

- $v_s$= 50 m/min; $F_s$=1000 N;
- R = 700 mm; r = 150 mm;
- e = 250 mm;

Calculate:

- revolutions n,
- torque $M_K$,
- motor power P,
- max. reverse speed $v_R$,
- main time $t_{m,}$
- secondary time $t_s$.



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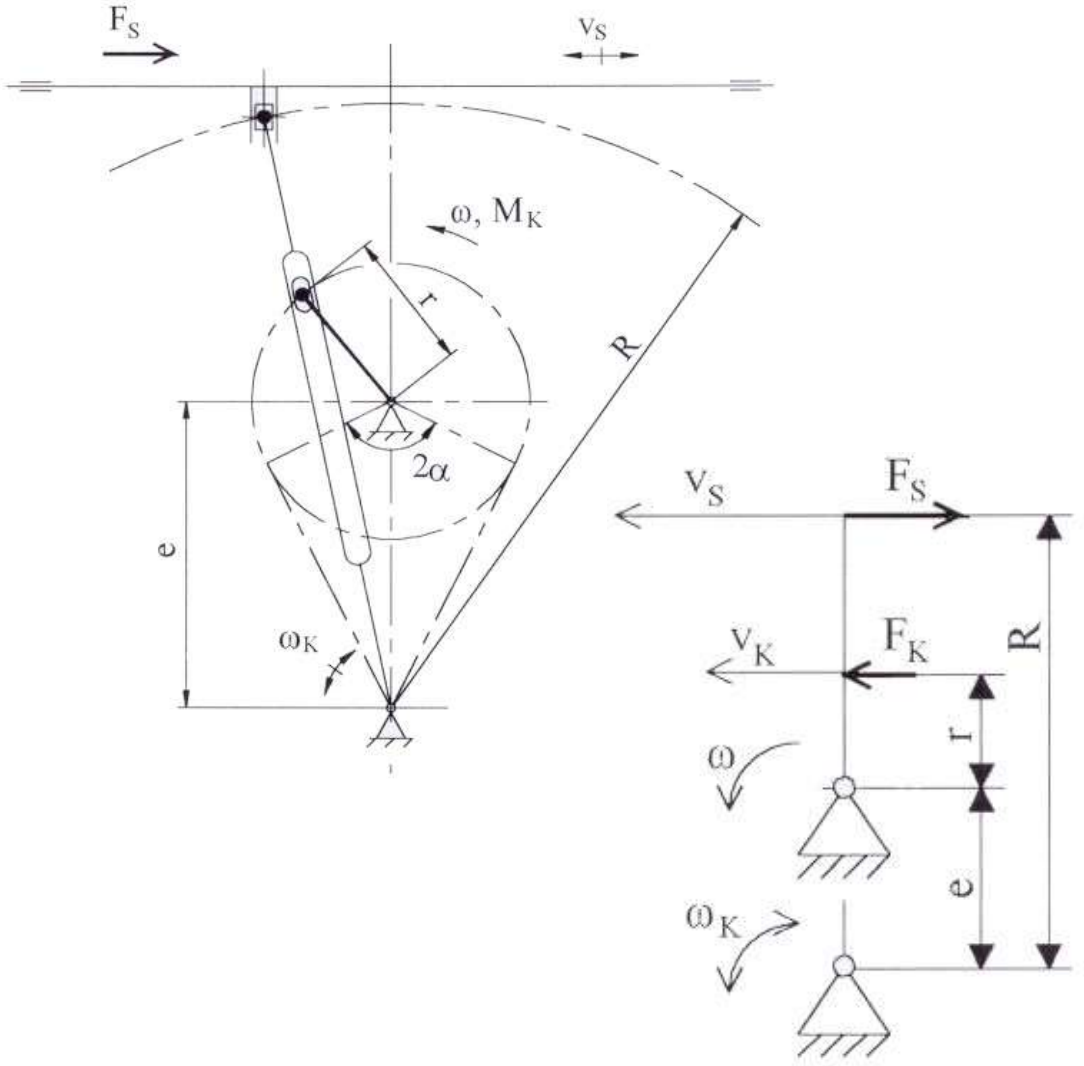

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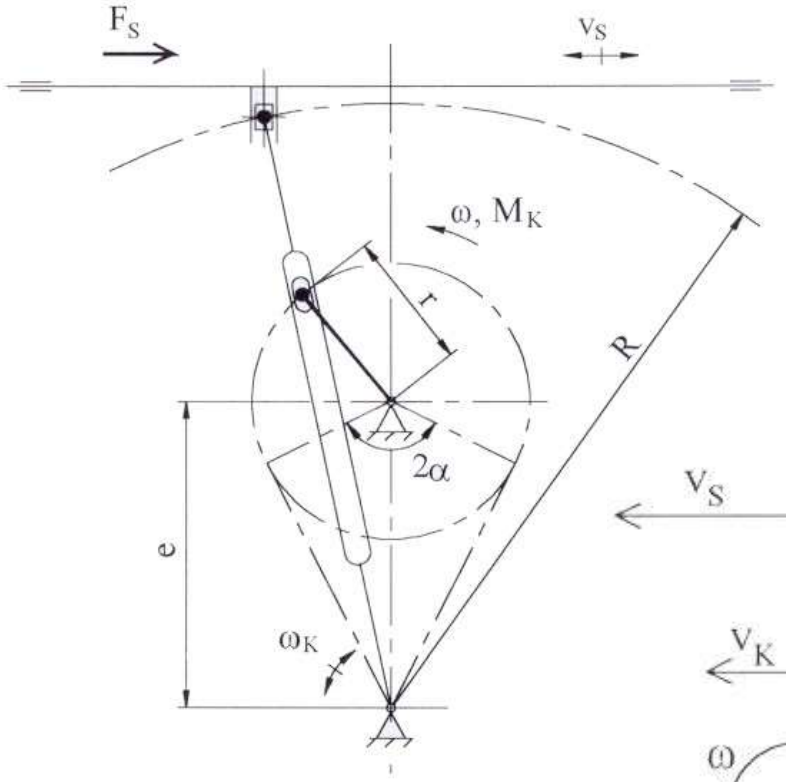


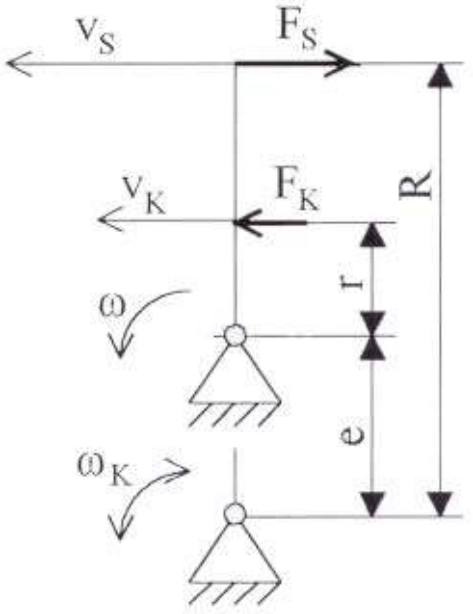


Results:

n = 30,3 rpm ; $M_K$= 262,5 N m; P = 832,9 W;

$v_R$= 200 m/min; $t_m$= 1,4 s; $t_s$= 0,58 s

## Summary

We are at the end of the exercise, do you know following?

- Include Whitworth mechanism to group of mechanisms!
- Give an example of using Whitworth mechanism for machine tool!
- Draw scheme of Whitworth mechanism!
- Describe Whitworth mechanism and its parts!
- Calculate parameters of Whitworth mechanism!

## New example (homework)

Given:

- P = 1 kW; n = 31 rpm; R = 800 mm; r = 170 mm; e = 300 mm;

Calculate:

- torque $M_K$,
- force on the slider $F_s$,
- the slide speed in the forward direction $v_s$ ,
- max. reverse speed $v_R$,
- main time $t_{m,}$
- secondary time $t_s$.

Results:

$M_K$= 308 N m; $F_s$ = 1064,4 N; $v_s$ = 56,4 m/min; $v_R$= 203,8 m/min;

$t_m$= 1,34 s; $t_s$= 0,6 s