

Mecanismos e Dinâmica de Máquinas

Prof. Paulo Boni

Aula I

Aula I

- **Conteúdo da disciplina**
- **Avaliações**
- **Horário do professor**
- **Plano de aula**
- **Livros**

Conteúdo da disciplina

- **Análise e Síntese** de mecanismos

- Mecanismos articulados
- Cames
- Engrenagens
- etc...

CONCEITO

Cinemática e dinâmica de máquinas

envolve projeto de máquinas em função dos movimentos requeridos.

Mecanismo

é um componente de uma máquina que consiste de dois ou mais corpos arrançados de forma que o movimento de um produz o movimento dos outros

CONCEITO

Síntese

é um procedimento no qual um produto é projetado para satisfazer um conjunto de requisitos. Dado um conjunto de requisitos de performance, busca-se um mecanismo que satisfaça essas especificações

Análise de mecanismos

As dimensões de um mecanismo são dadas e deseja-se determinar suas características de movimento, verificação se os requisitos de performance são satisfeito

CONCEITO

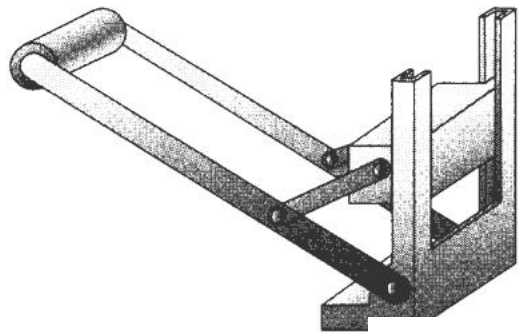
Cinemática

estudo do movimento de mecanismos sem referência às forças que agem no sistema.

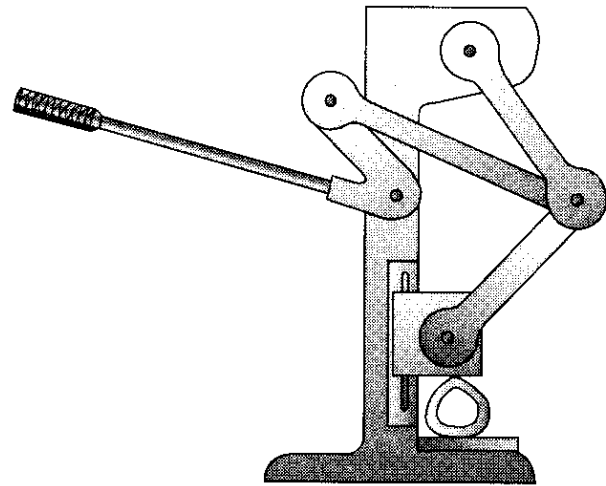
Dinâmica

é o estudo do movimento de corpos individuais e mecanismos sobre a influência de forças e torques

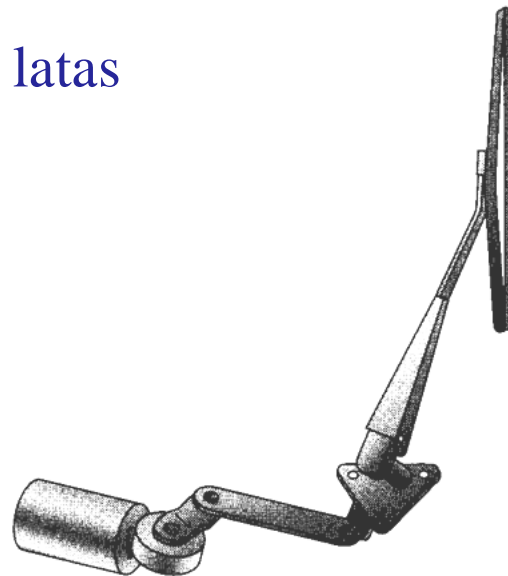
Exemplos de Mecanismos



Amassador de latas

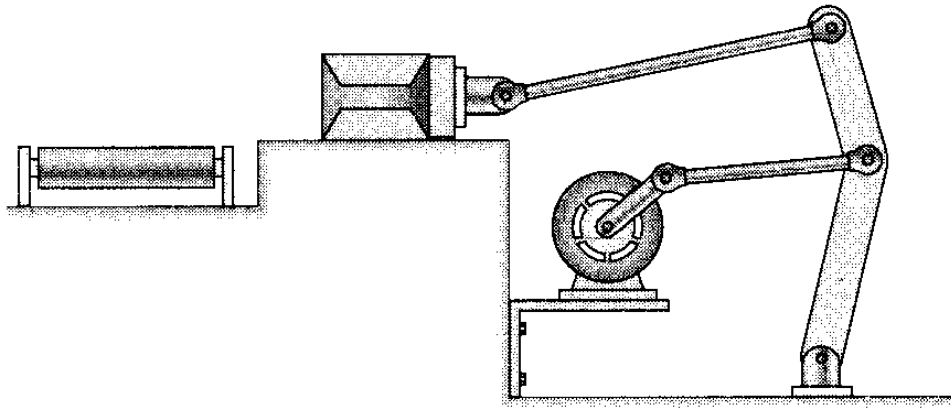


Prensa

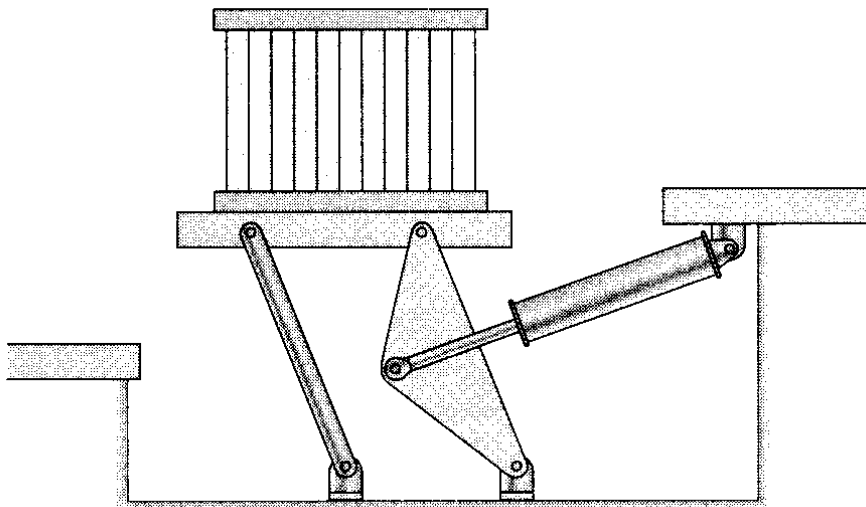


Limpador traseiro

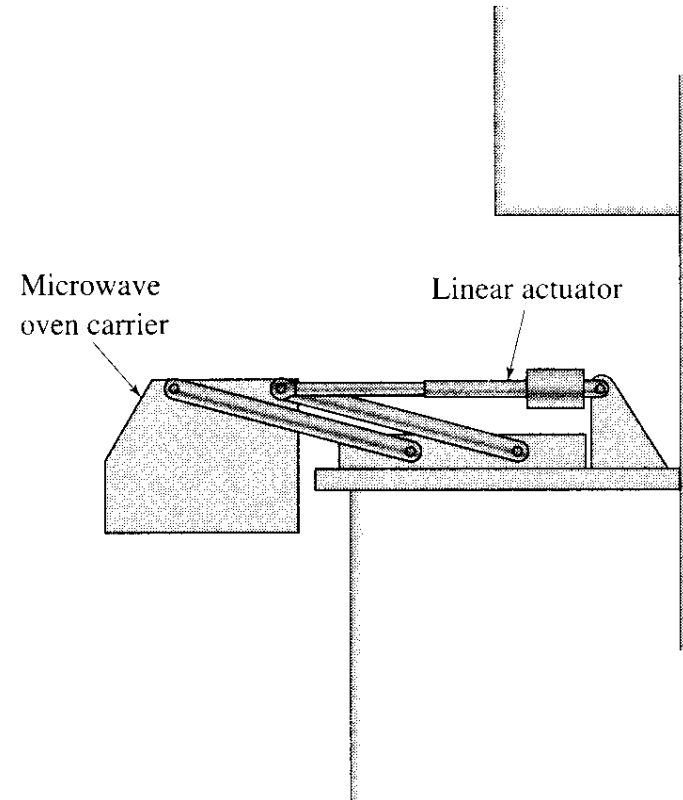
Exemplos de Mecanismos



Move embalagens de uma bancada de montagem para uma esteira

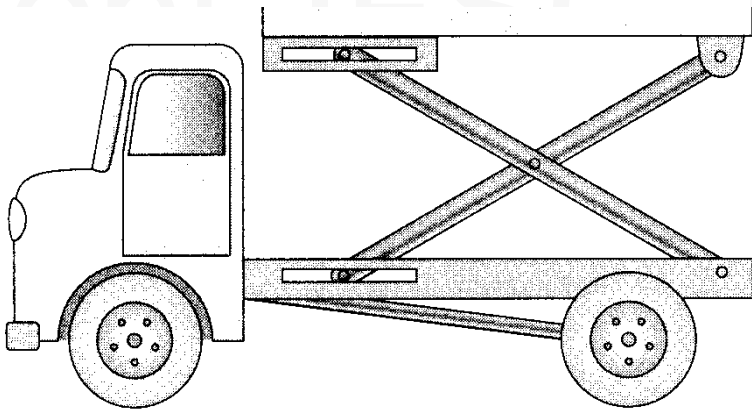


Plataforma de elevação

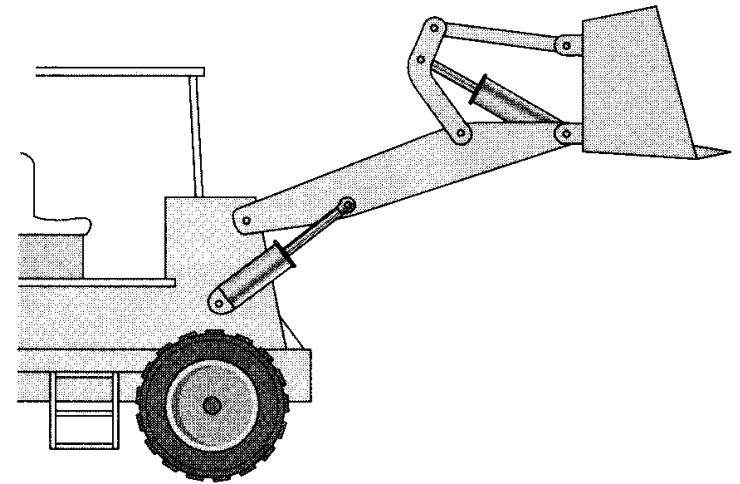


Suporte de microondas para atender pessoas em cadeira de rodas

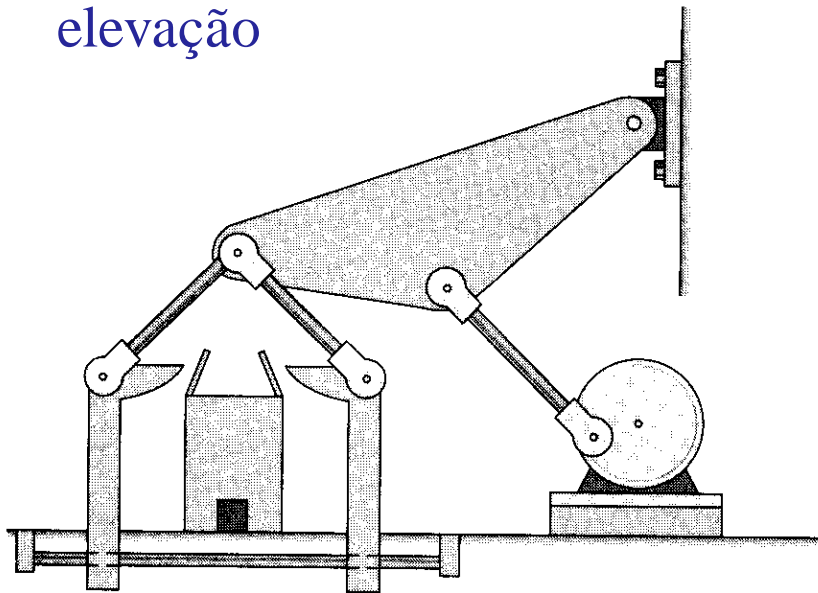
Exemplos de Mecanismos



Plataforma de elevação

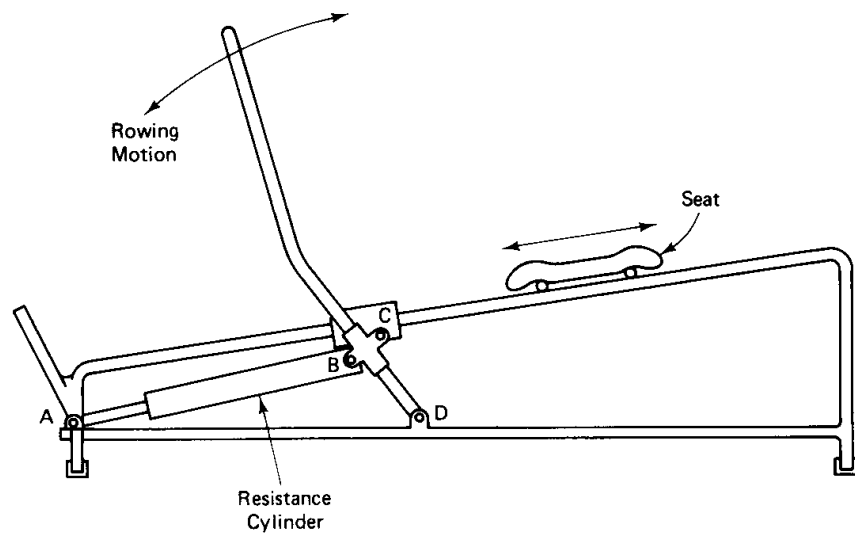


Pá-carregadeira

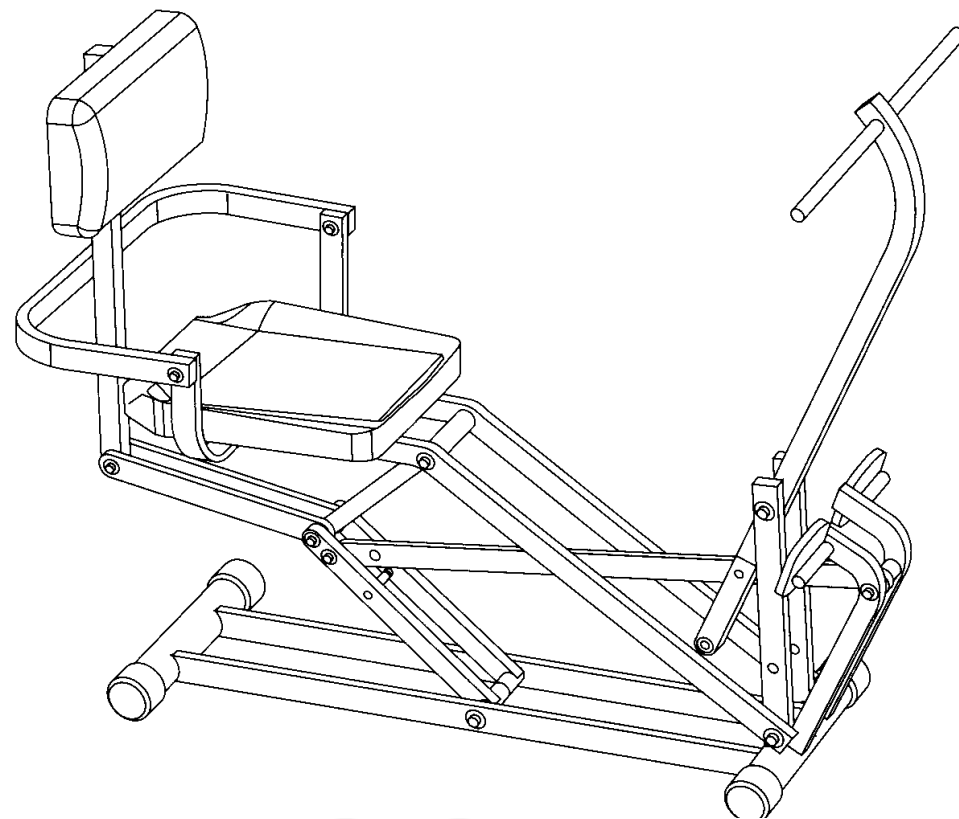


Dispositivo para fechar a tampa da caixa

Exemplos de Mecanismos



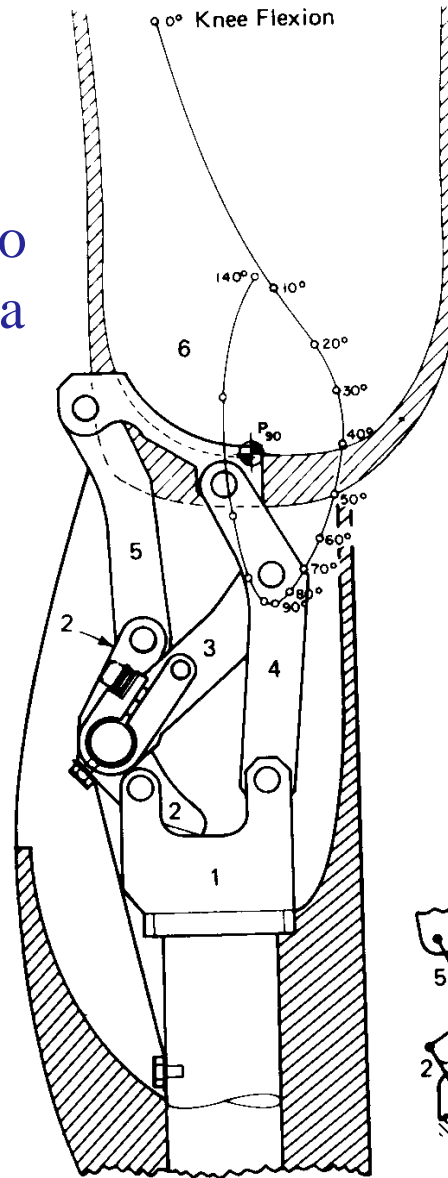
Máquina de academia



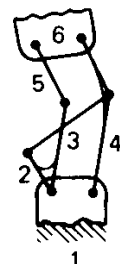
Projeto conceitual

Exemplos de Mecanismos

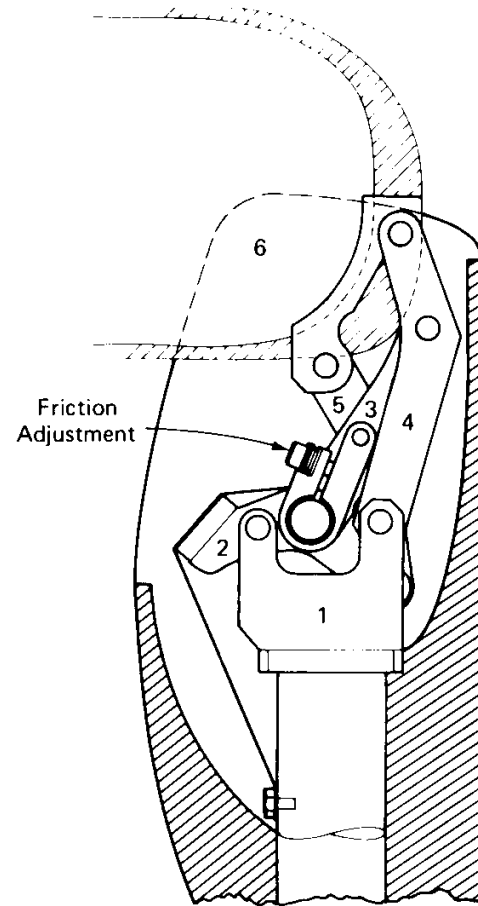
Posição
estendida



(a)



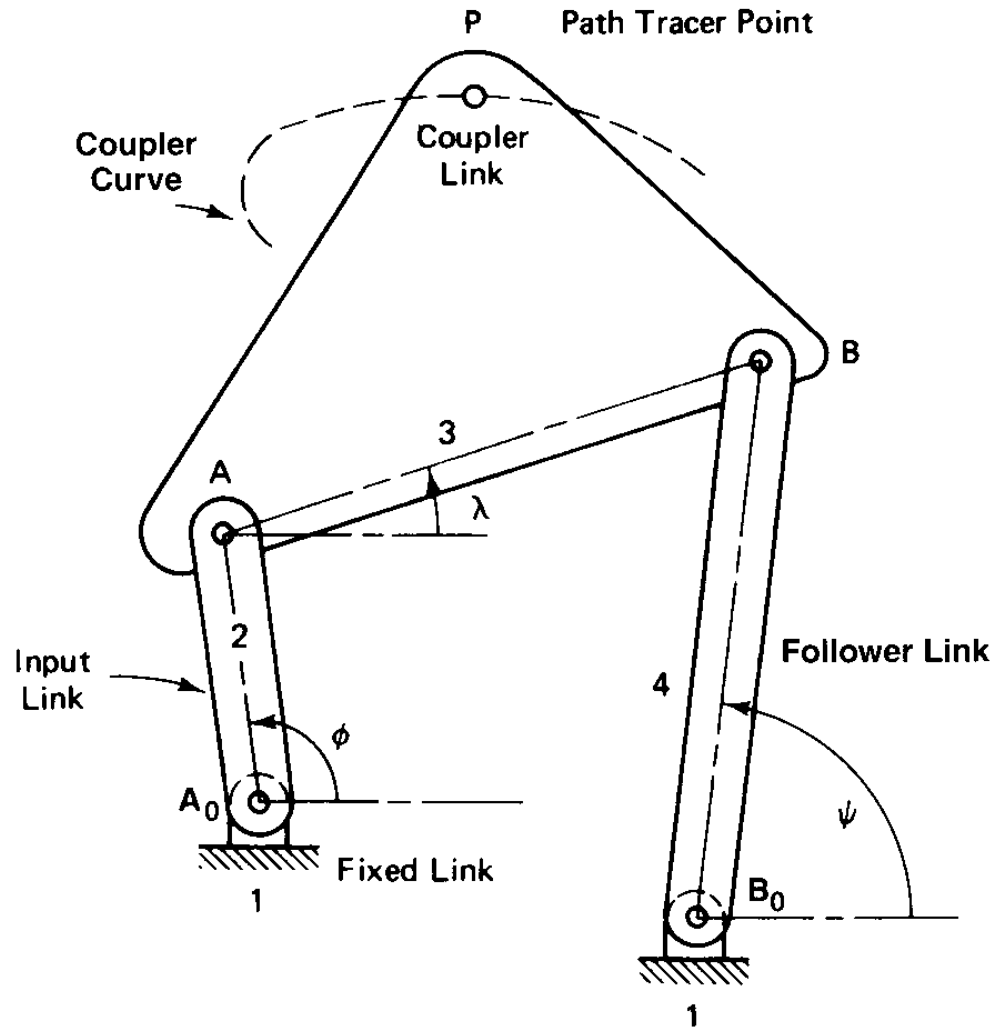
(b)



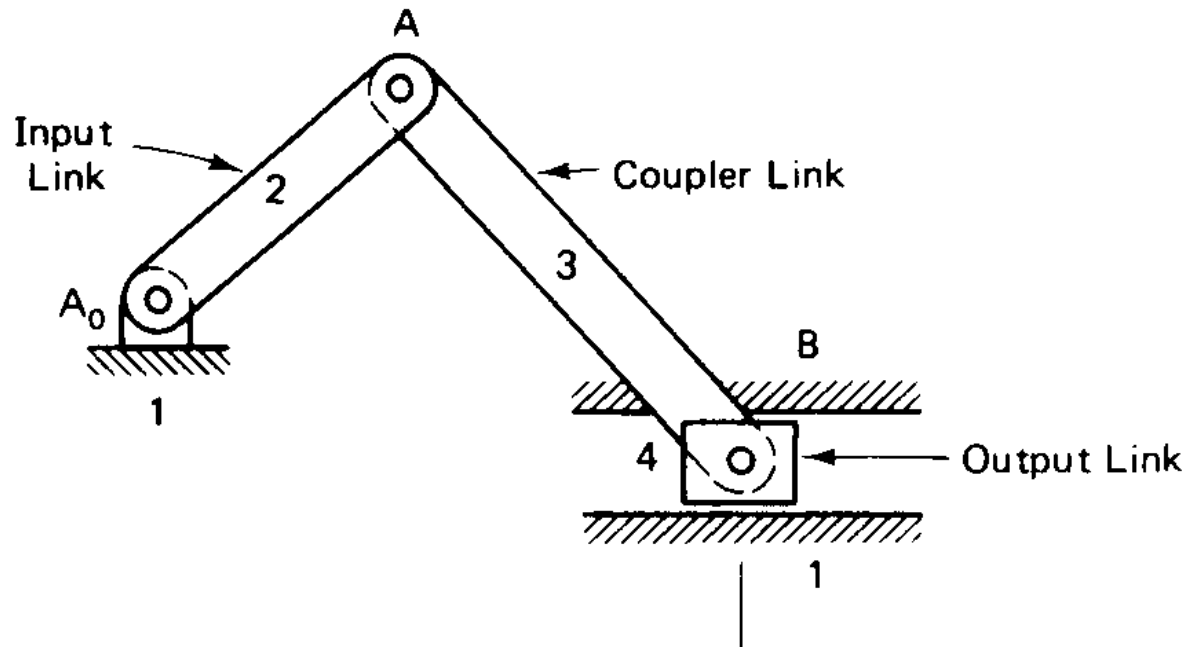
Posição
flexionada

Prótese de joelho com
mecanismo de seis barras

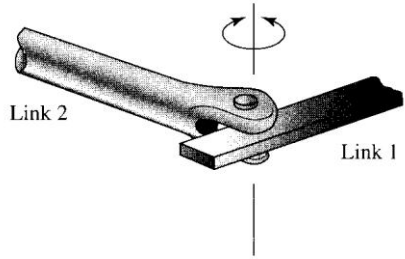
Mecanismo de quatro barras



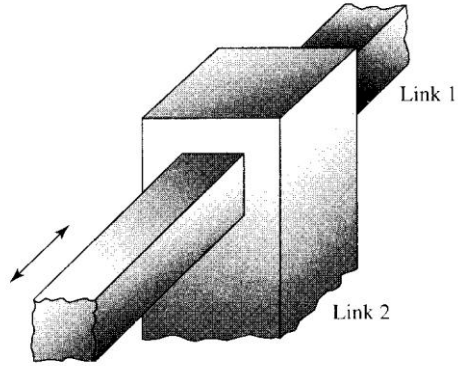
Mecanismo biela-manivela



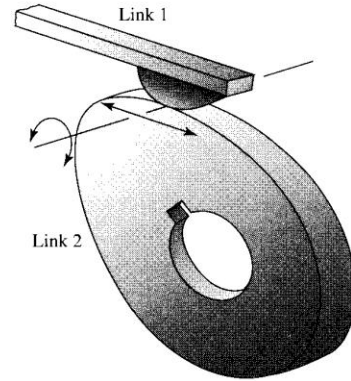
Pares cinemáticos



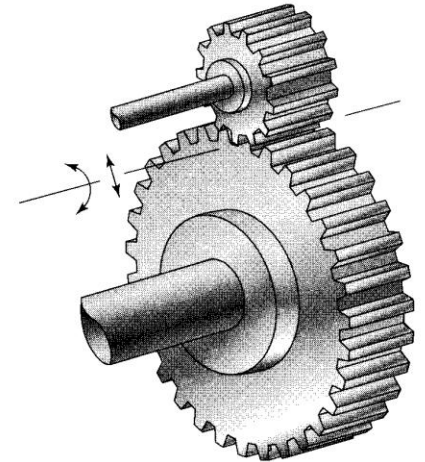
(a) Pin



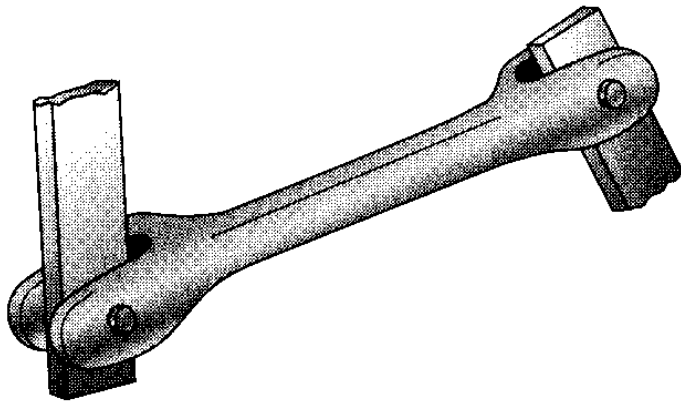
(b) Sliding



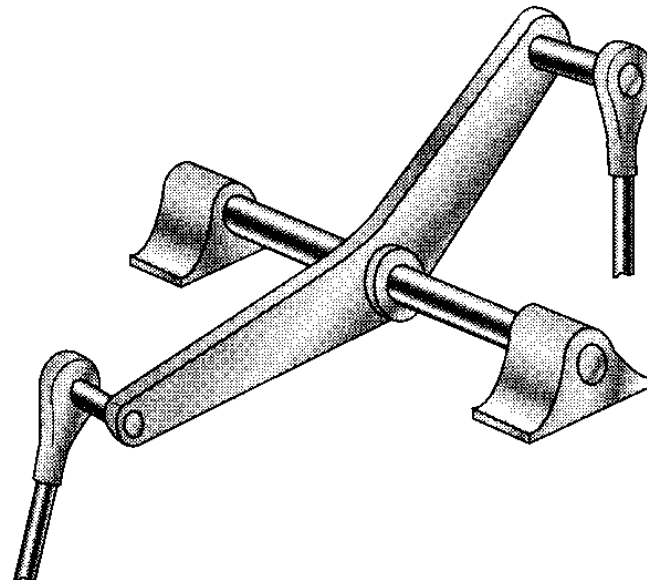
(a) Cam joint



(b) Gear joint



(a) Simple link



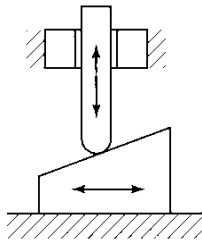
(b) Complex link

Tipos de movimento em mecanismos

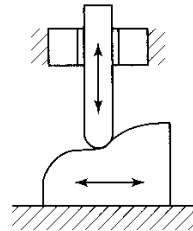
A maioria das fontes de potência disponíveis possuem movimento rotacional puro (motor elétrico, manivela) ou translacional puro (cilindros hidráulicos e pneumáticos).

Translação para Translação

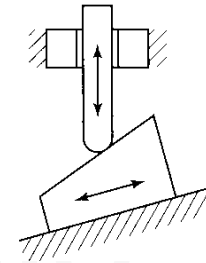
Wedge Cam Follower:
(Perpendicular)



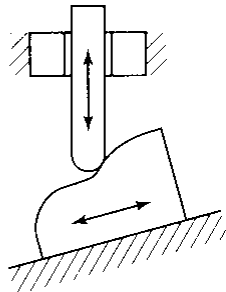
Wedge Cam Follower:
(Perpendicular)



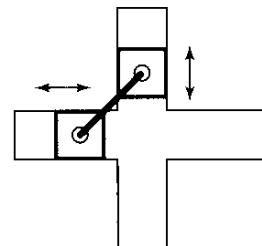
Wedge Cam Follower:
(Skew)



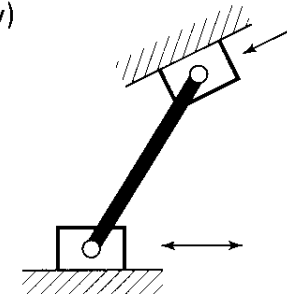
Wedge Cam Follower:
(Skew)



Double-slider:
(Perpendicular)



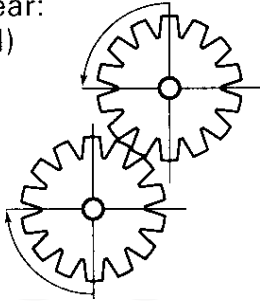
Double-slider:
(Skew)



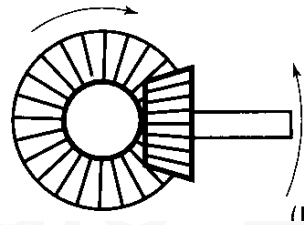
Tipos de movimento em mecanismos

Rotação para Rotação

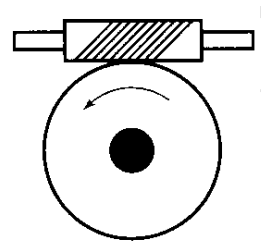
Spur Gear:
(Parallel)



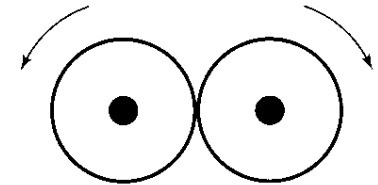
Bevel Gear:
(Perpendicular)



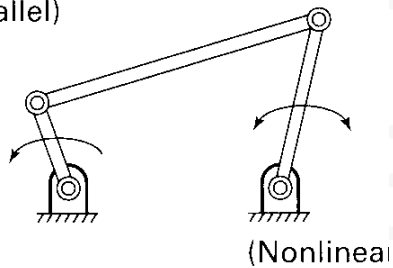
Worm Gear:
(Perpendicular)



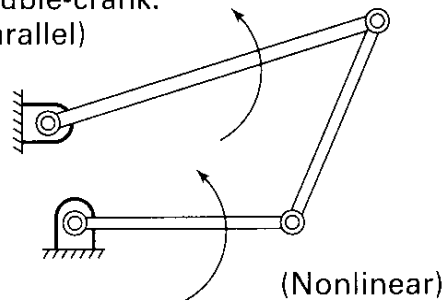
Friction Rollers Pair:
(Parallel)



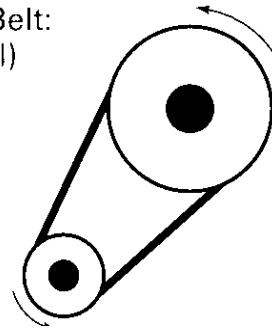
Crank-rocker:
(Parallel)



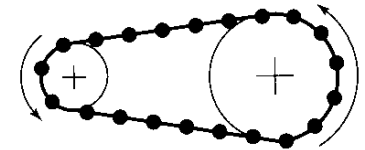
Double-crank:
(Parallel)



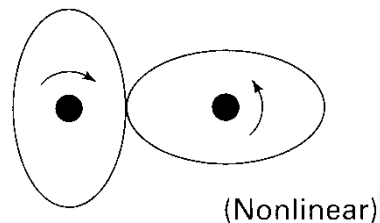
Pulley Belt:
(Parallel)



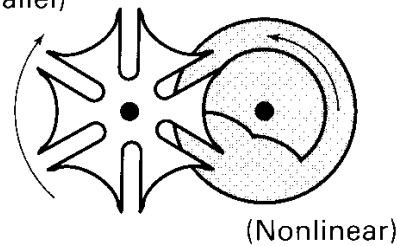
Sprocket and Chain:
Parallel)



Noncircular Gear:
(Parallel)



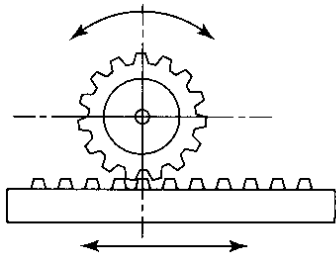
Geneva Wheel:
(Parallel)



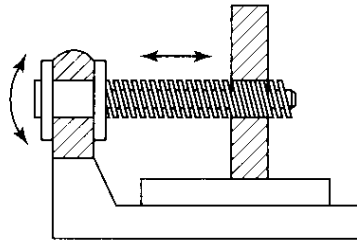
Tipos de movimento em mecanismos

Rotação para translação

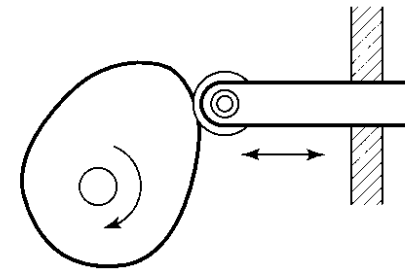
Rack-pinion:
(Perpendicular)



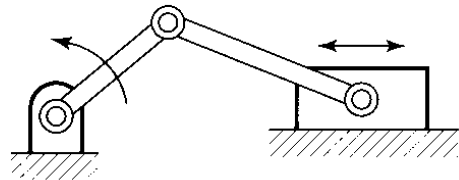
Screw Mechanism:
(Parallel)



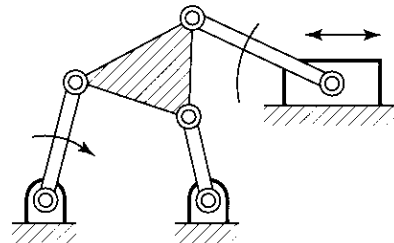
Cam Follower:
(Perpendicular)



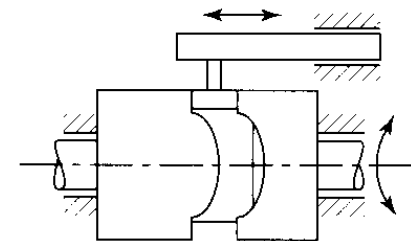
Slider-crank:
(Perpendicular)



Six-bar Dwell Linkage:
(Perpendicular)



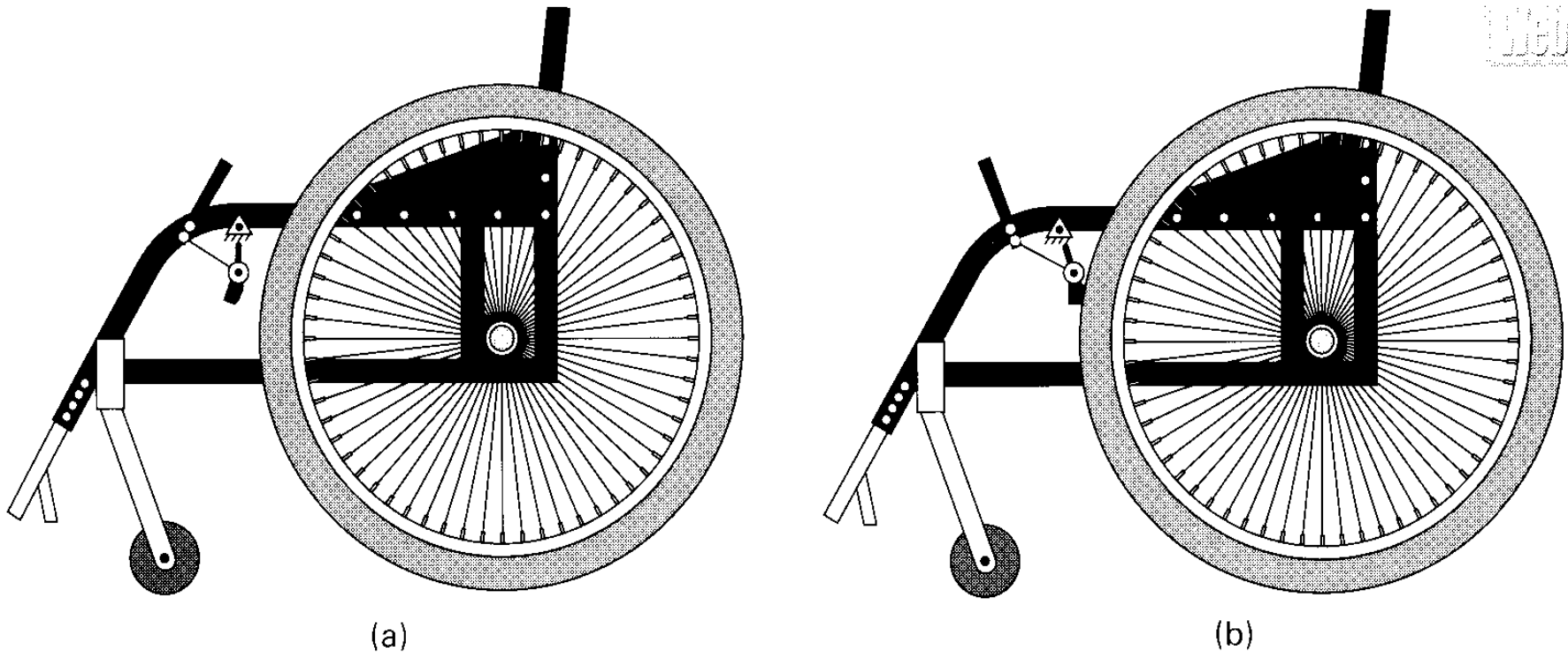
Cylindrical Cam Follower:
(Parallel)



Categorias de Síntese de Mecanismos

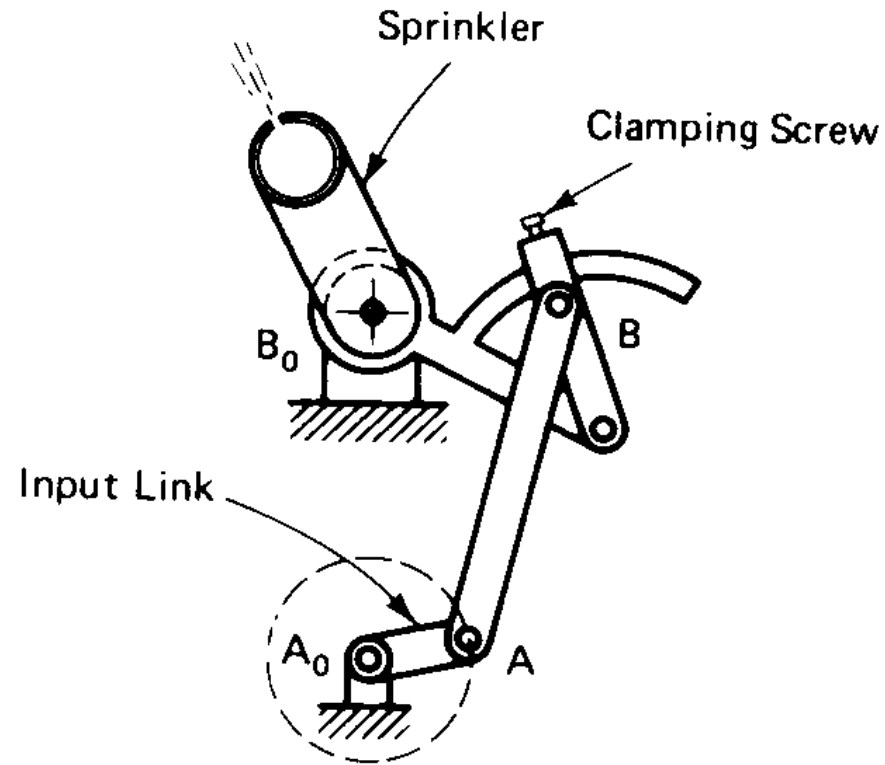
Mecanismos para Geração de Função

Interessa o movimento relativo entre os elos.



Mecanismo de quatro barras utilizado como freio de uma cadeira de rodas

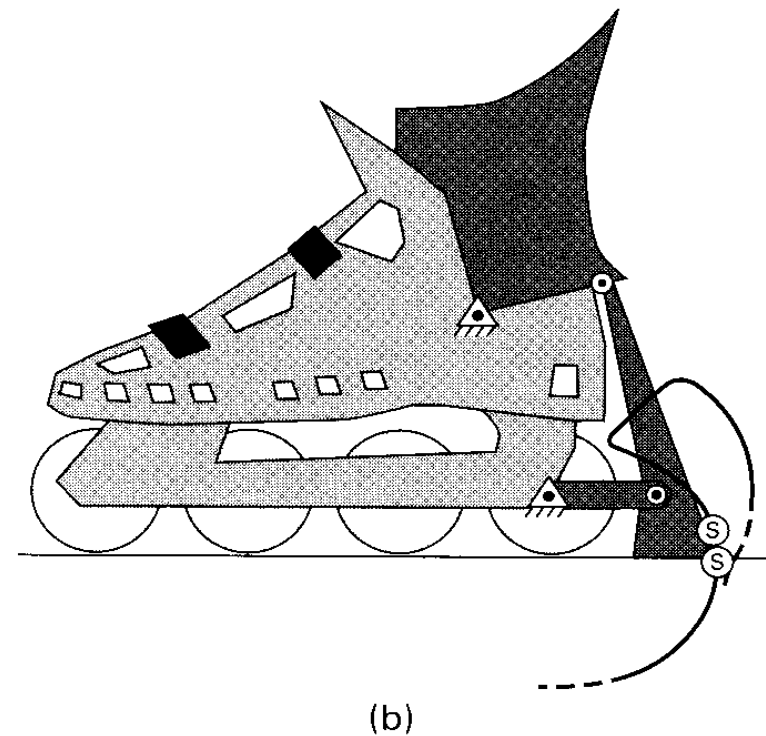
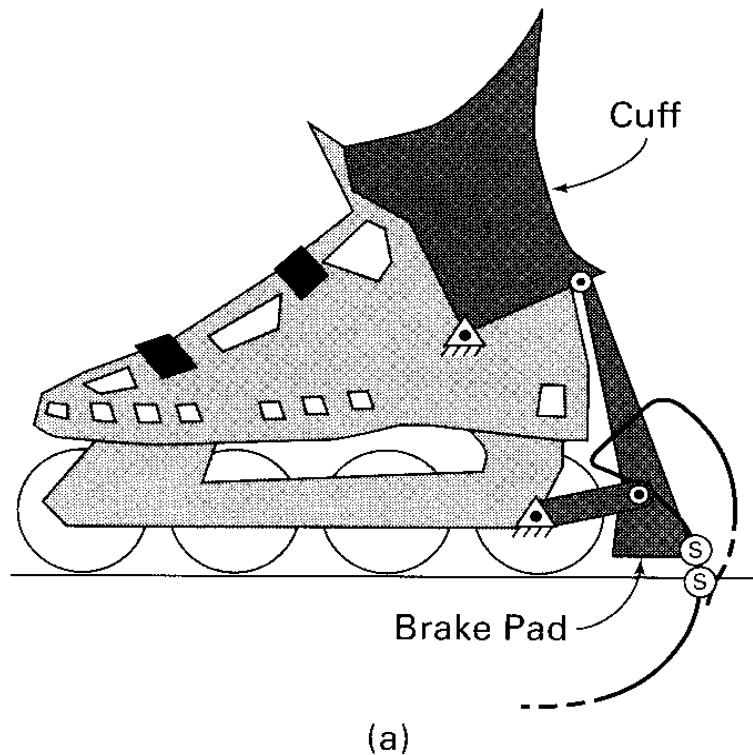
Mecanismos para Geração de Função



Mecanismo de quatro barras aplicado num irrigador de grama

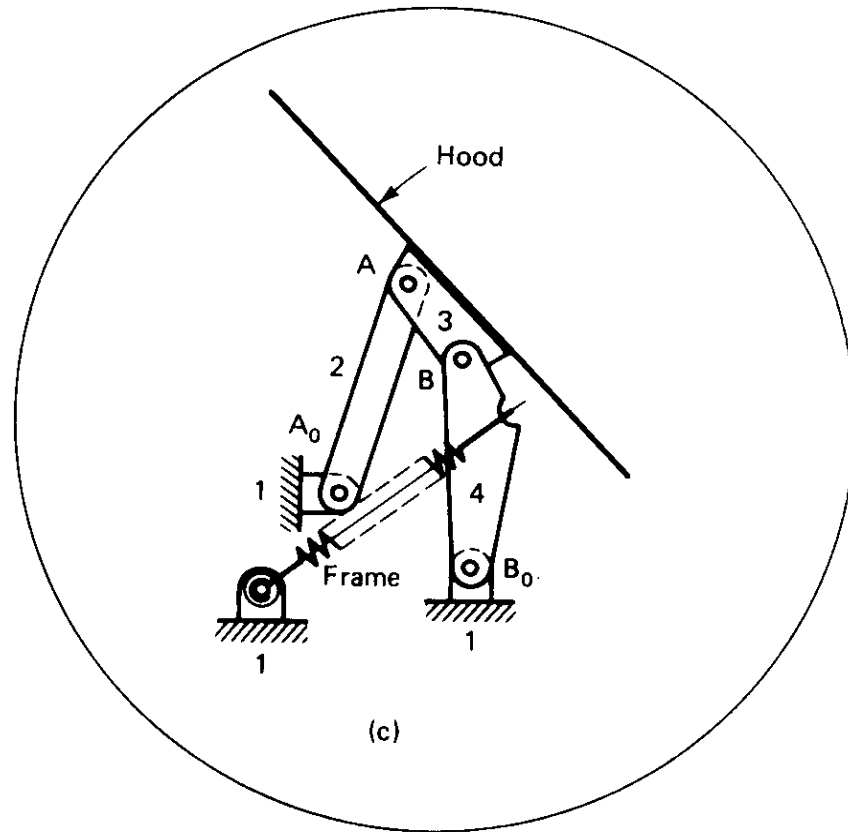
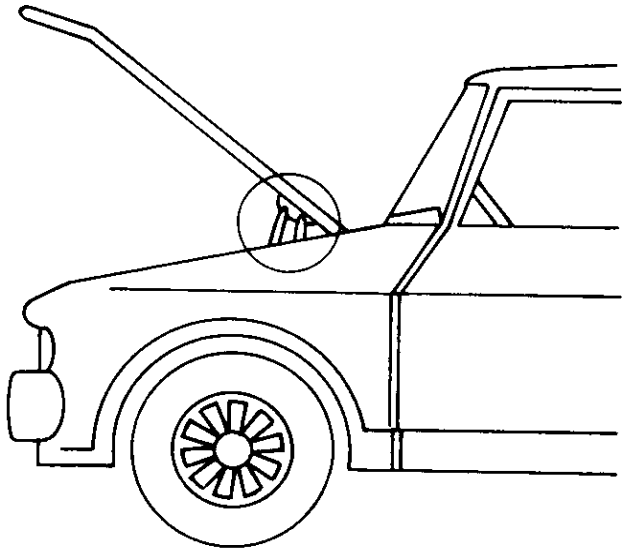
Mecanismos para Geração de Movimento

Interessa o movimento do elo intermediário



Sistema de freio para *roller*

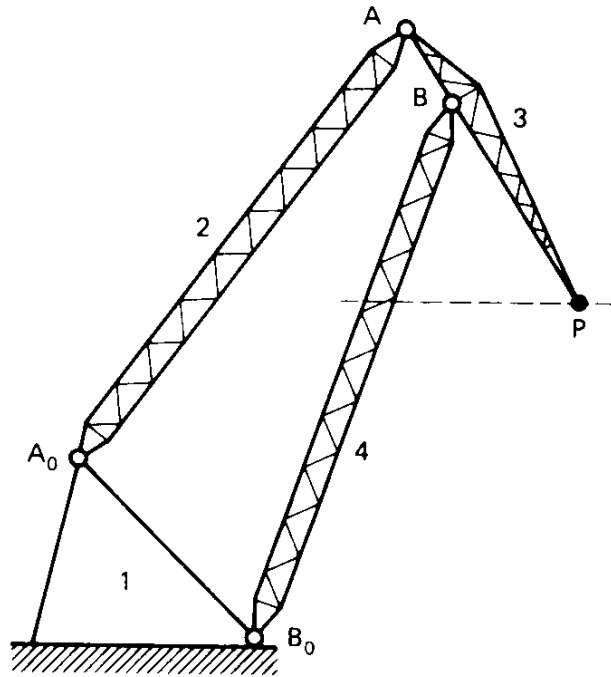
Mecanismos para Geração de Movimento



Mecanismo de quatro barras para abertura do compartimento do motor

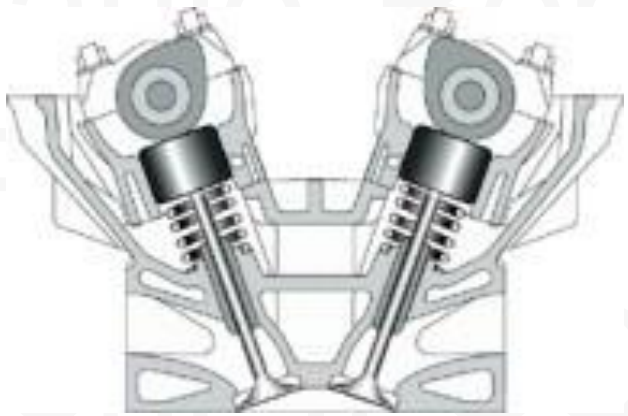
Mecanismos para Geração de Percurso

Interessa o percurso de um ponto isolado (ponto de interesse)

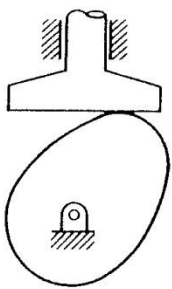


Guindaste – movimento em linha reta

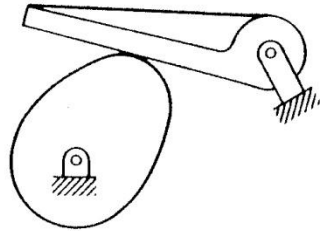
Cames



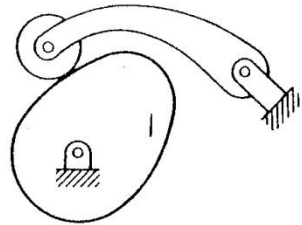
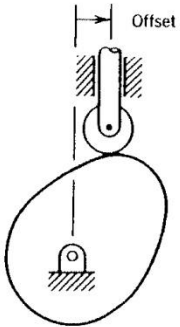
Cames



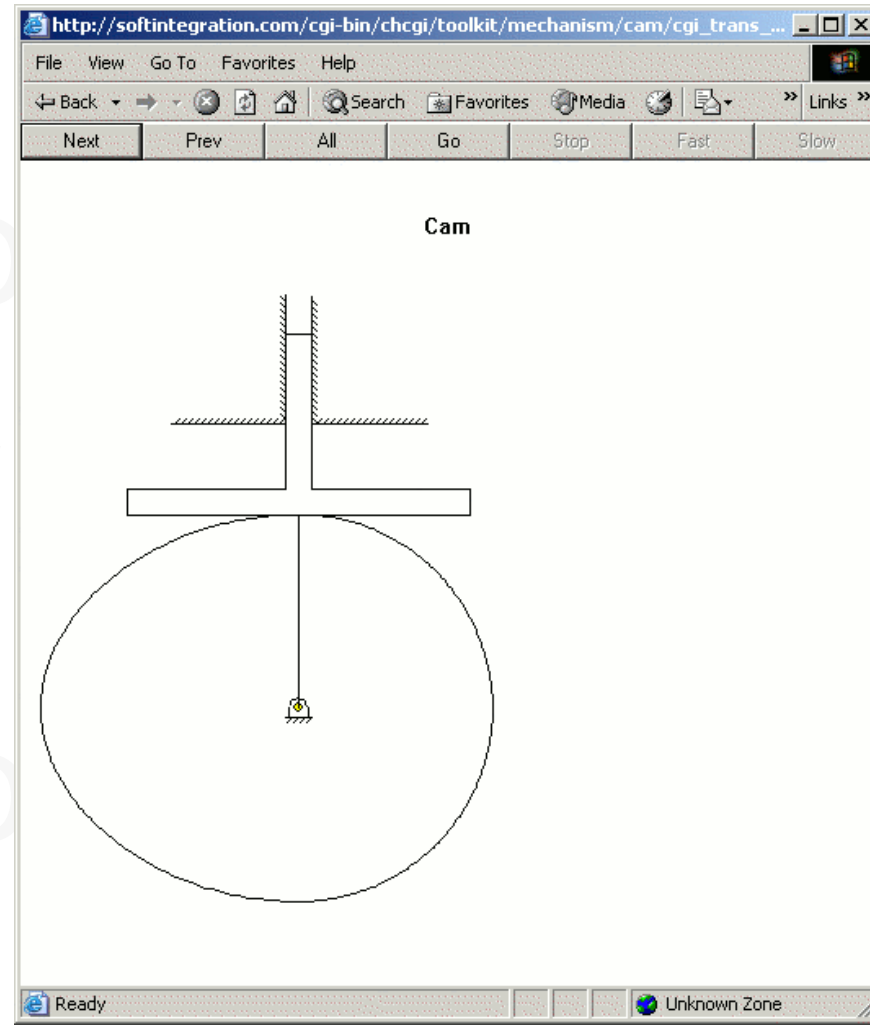
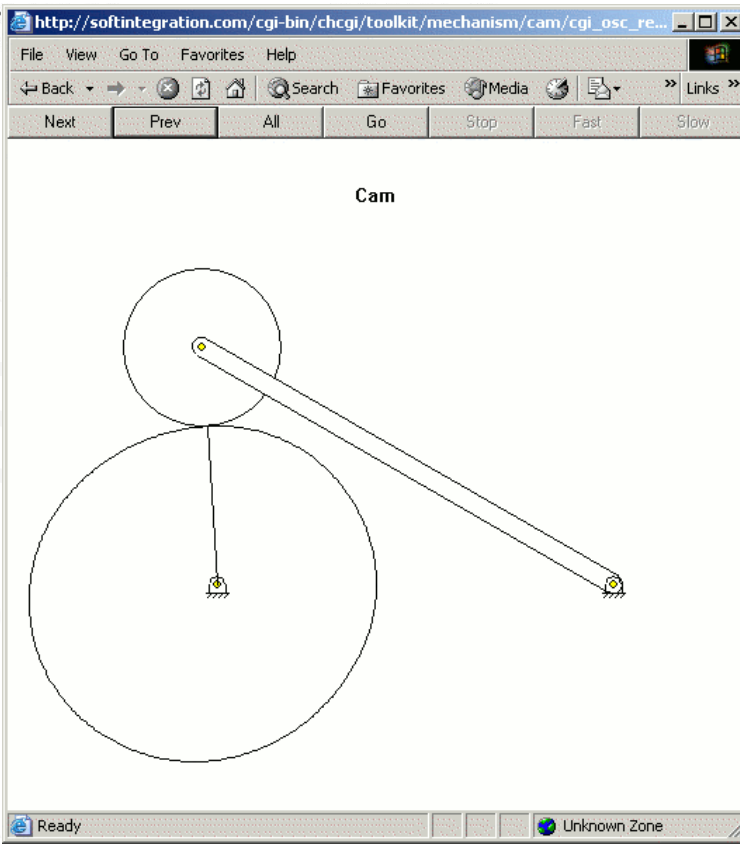
(a) Flat-faced, Translating Follower



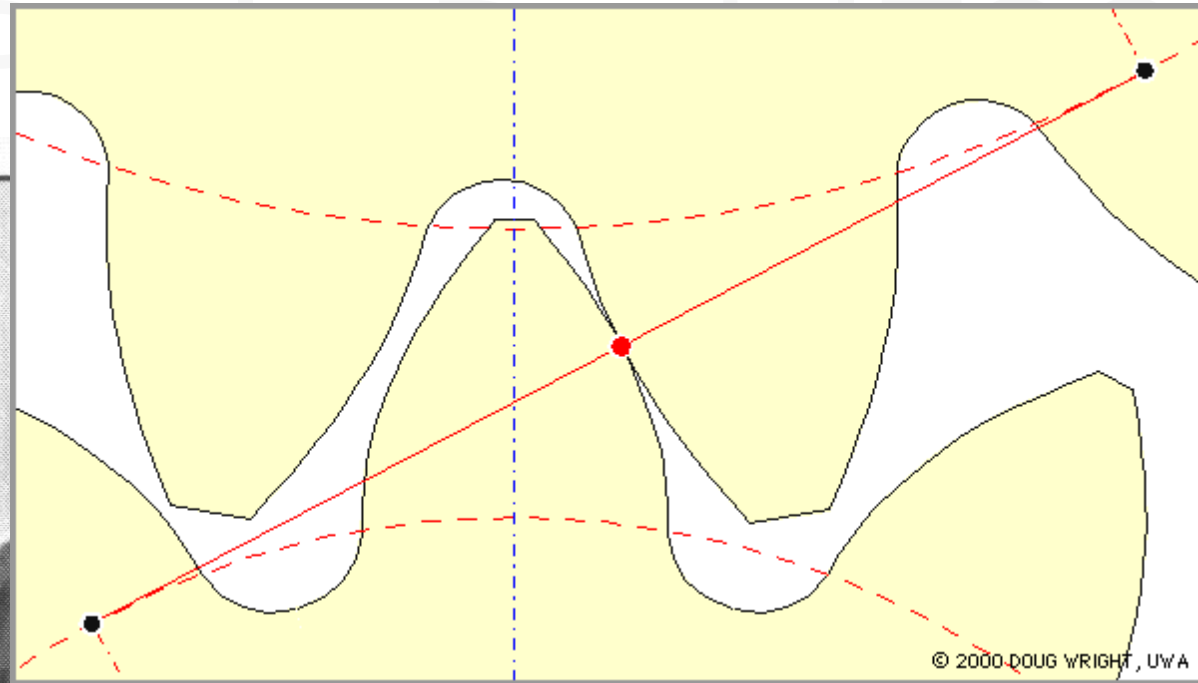
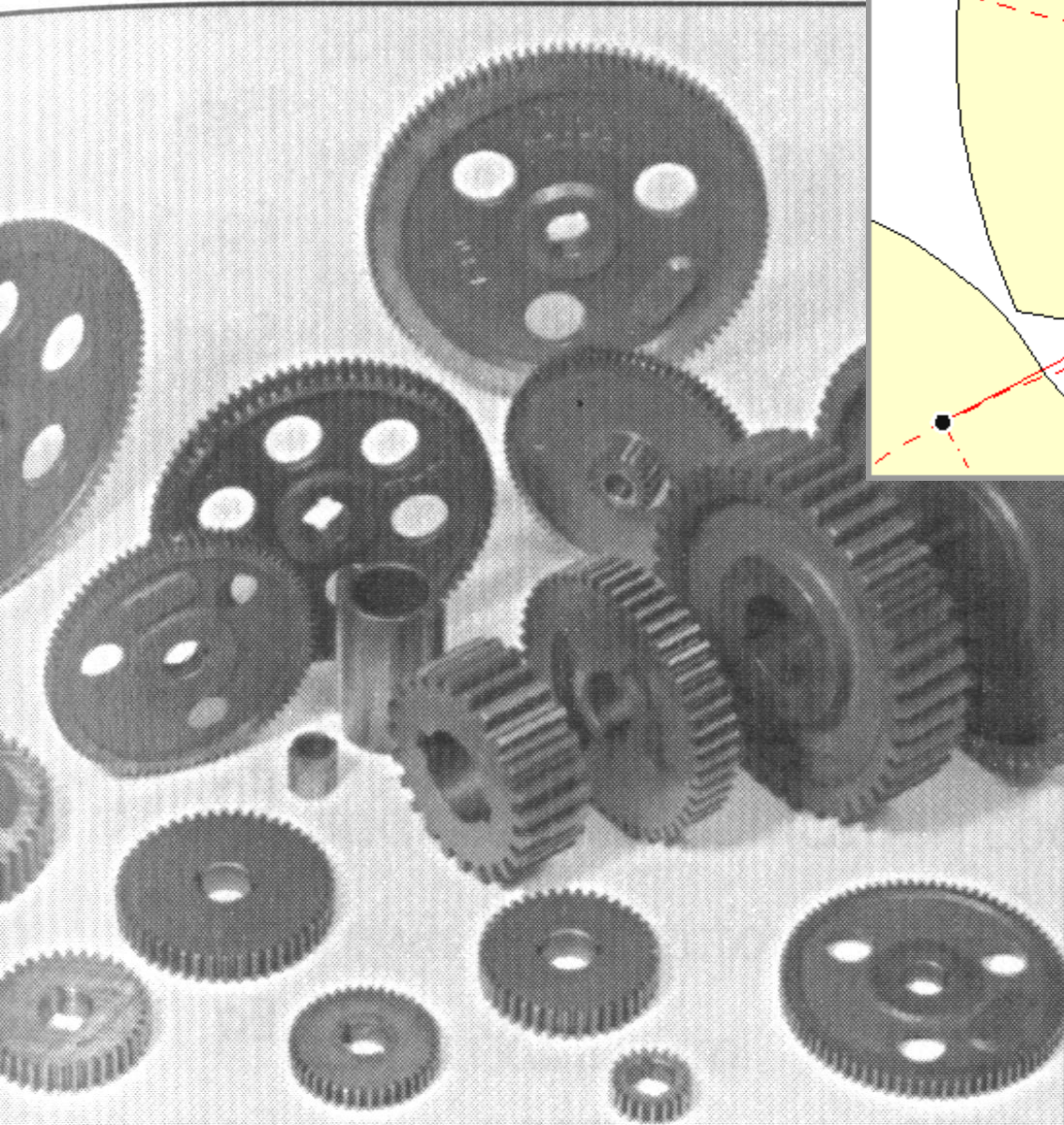
(b) Flat-faced, Pivoted Follower



(c) 0
FIGURE



Engrenagens



Engrenagens

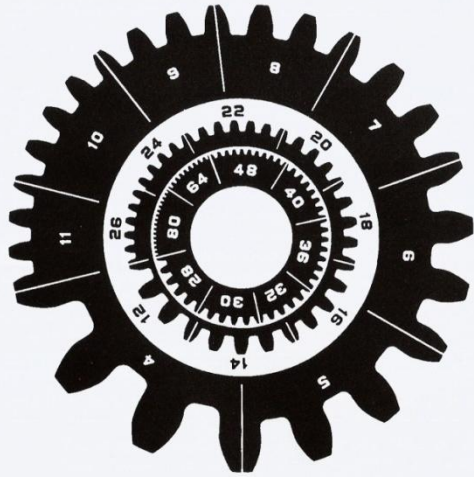


FIGURA 11-10

Tamanhos verdadeiros de dentes de engrenagem para vários passos diametraes de referênciã. (Cortesia da Barber-Colman Co, Loves Park, Ill.)

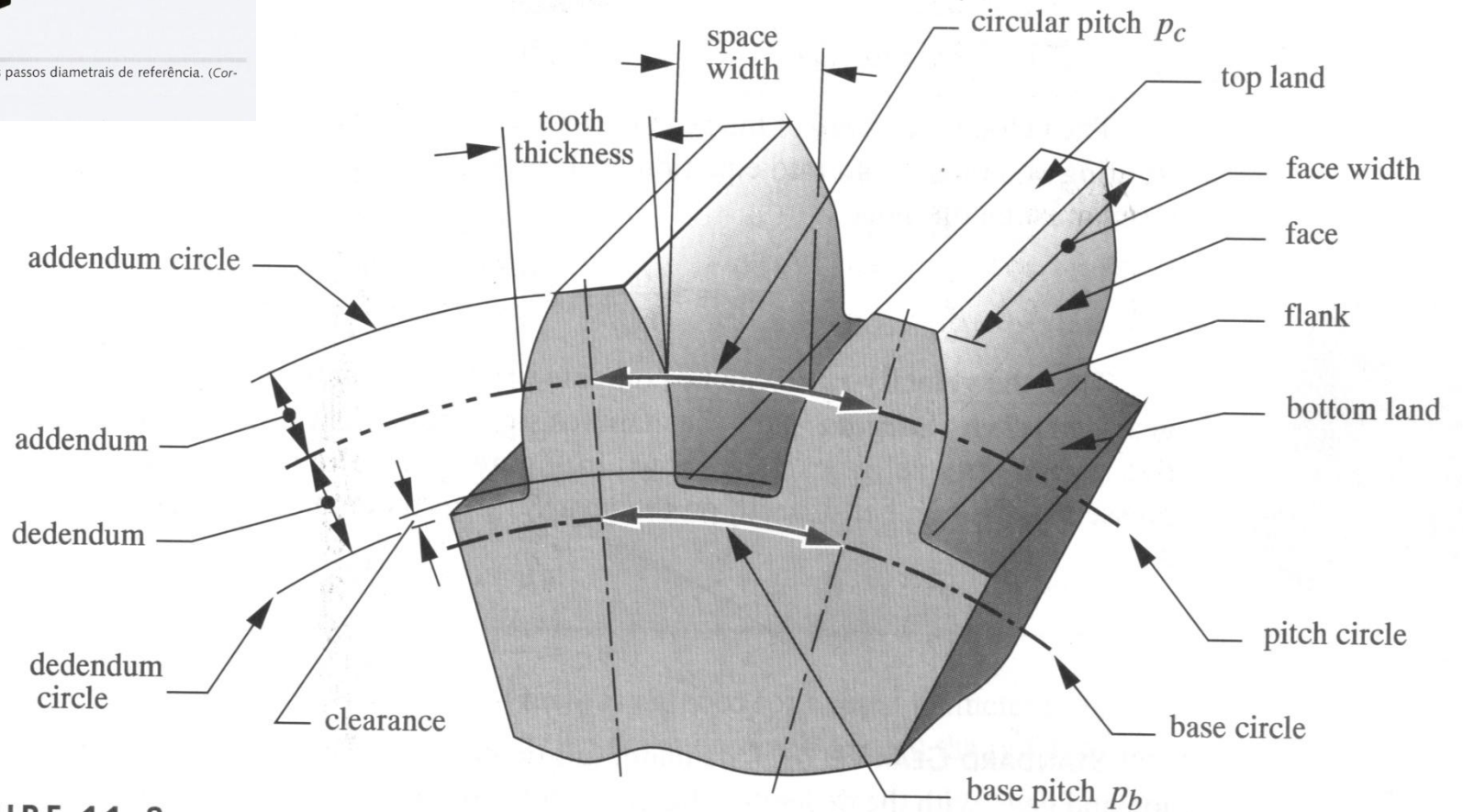
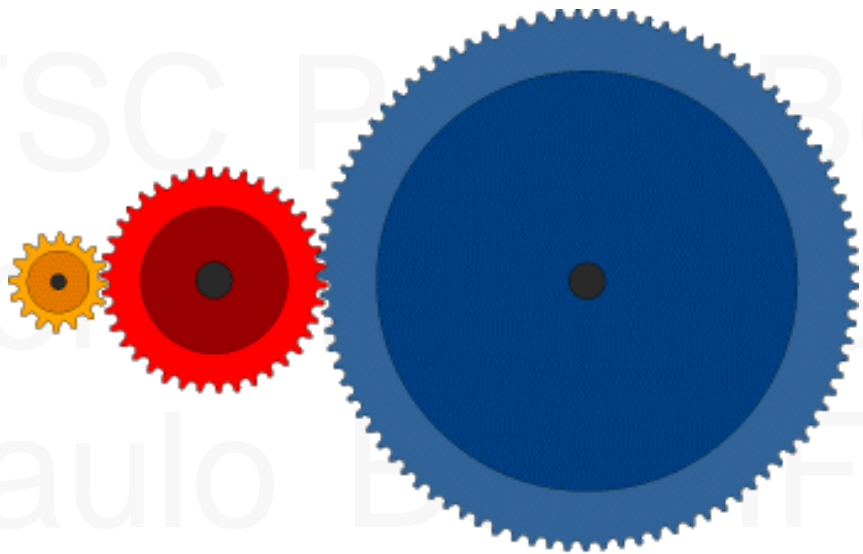


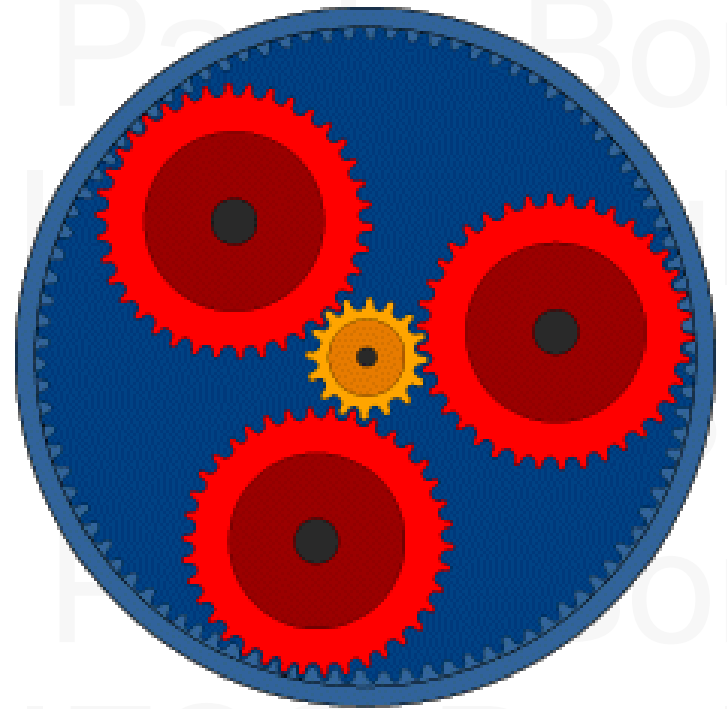
FIGURE 11-8

Gear Tooth Nomenclature

Engrenagens



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©2000 How Stuff Works

Avaliações

- Avaliações
- 5 Avaliações Escritas
- 1 Avaliação através de seminário

Horário do professor

	TURNO	Seg	Ter	Qua	Quin	Sex
	TARDE					
(18:15 - 20:20) Intervalo (20:40 - 22:45)	NOITE (18:15 - 20:22) (20:40 - 22:45)			Matemática	Mecanismos e Dinâmica de Máquinas	DESENHO II (Cláudio)
			MEC 2	MEC 1	Matemática	MEC 1

Plano de Aula

Unidade Curricular: Mecanismos e dinâmica das máquinas	Carga horária: 40h	Módulo VI
Código: MDM62		
Competências	Habilidades	
Analisar cinematicamente e dinamicamente mecanismos.	Reconhecer, analisar, especificar e sintetizar mecanismos.	
Bases Científicas e Tecnológicas		
<ul style="list-style-type: none">- Conceitos e notações aplicadas a mecanismos;- Tipos de mecanismos;- Conceitos elementares de síntese dimensional de mecanismos articulados- Análise cinemática de cames planos e engrenagens de dentes retos e helicoidais;- Análise gráfica de velocidades;- Análise gráfica de acelerações;- Dinâmica dos cames;- Análise cinemática e síntese.- Dinâmica de Máquinas		

Material de apoio

- **Bibliografia**

Cinemática e Dinâmica dos Mecanismos, Mc Graw Hill
ROBERT L. NORTON

Mecanismos e Dinâmica das Máquinas. IE-WILEY ,1987.
HAMINTON H. MABIE e FRED W. O.

Theory of machines and mechanisms. Oxford USA Trade, 2003.
SHIGLEY, J. E.; UICKER JR., J. J.; PENNOCK, G.

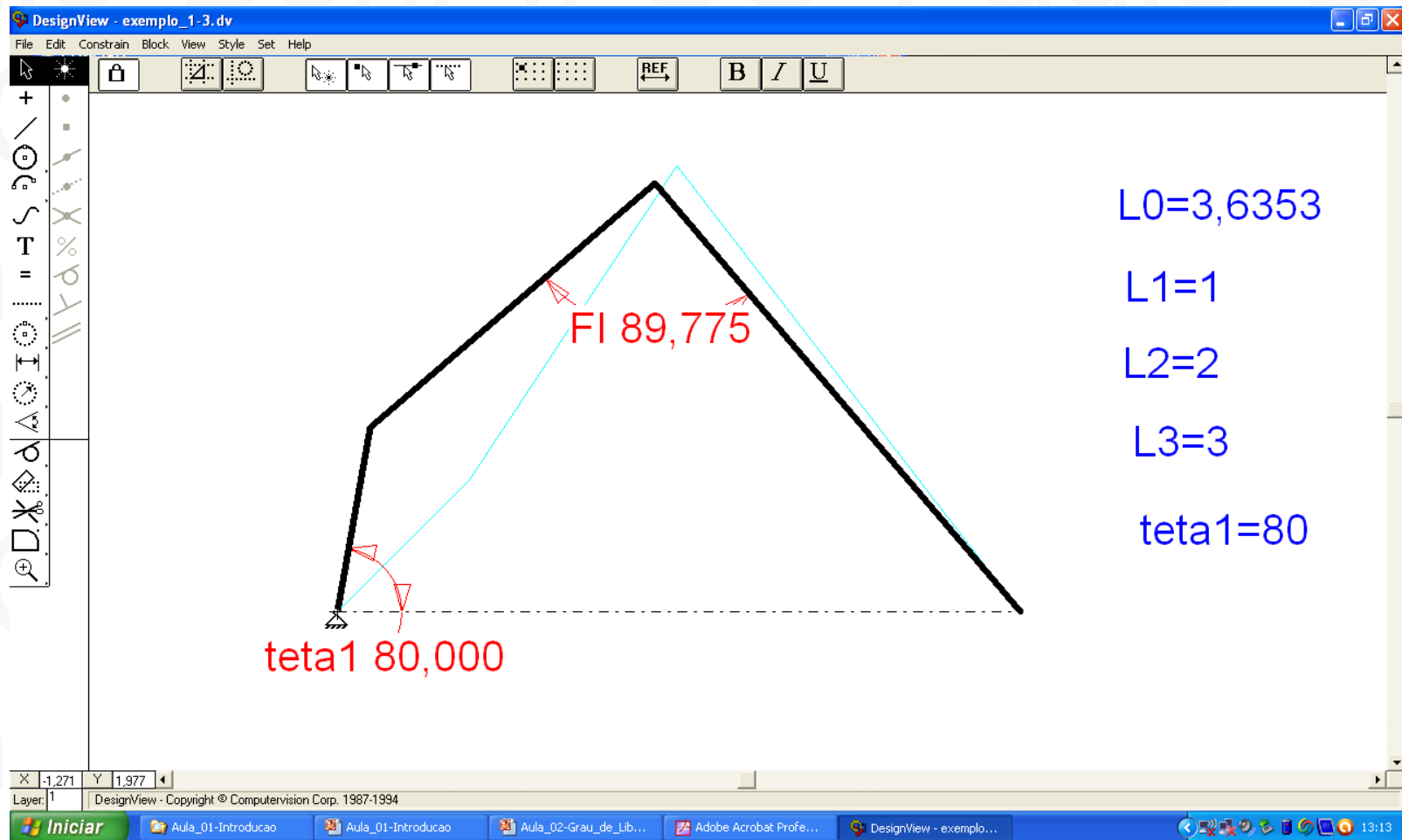
Vibrações Mecânicas, [Pearson Education - Br](#)
SINGIRESU S. RAO

Vibrações Mecânicas
Arthur Palmeira Ripper Neto

- **Internet**

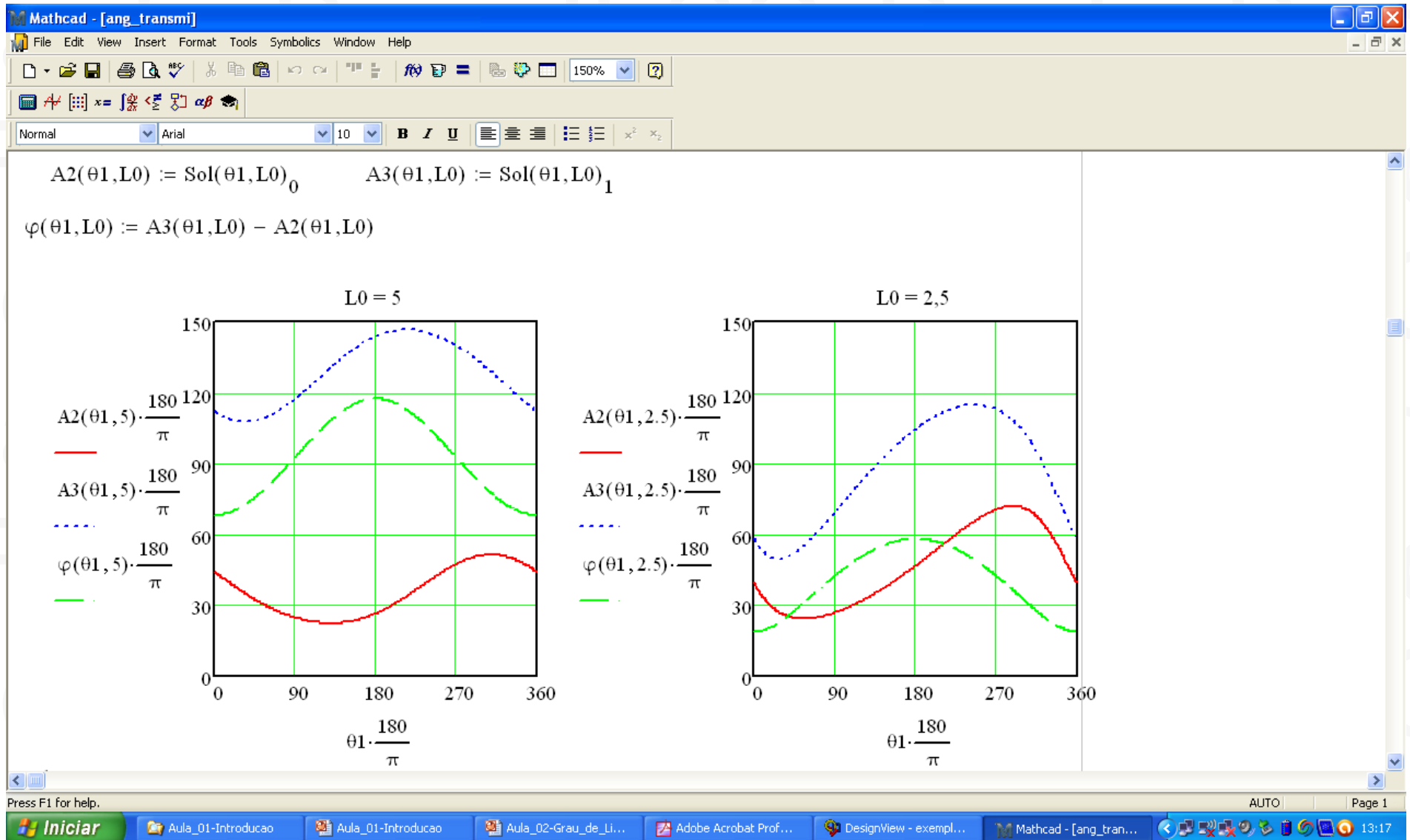
Programas genéricos

Design View

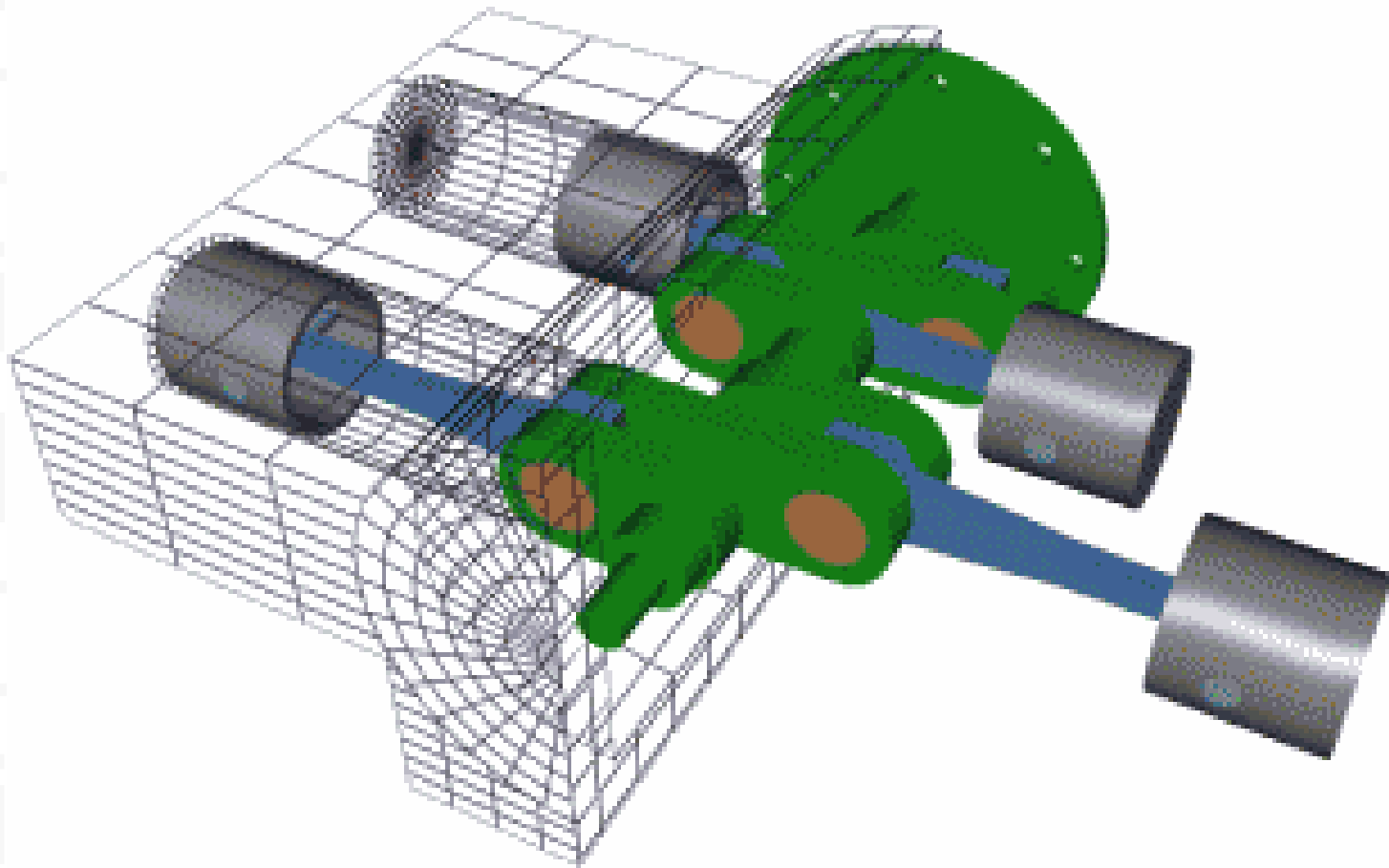


Programas genéricos

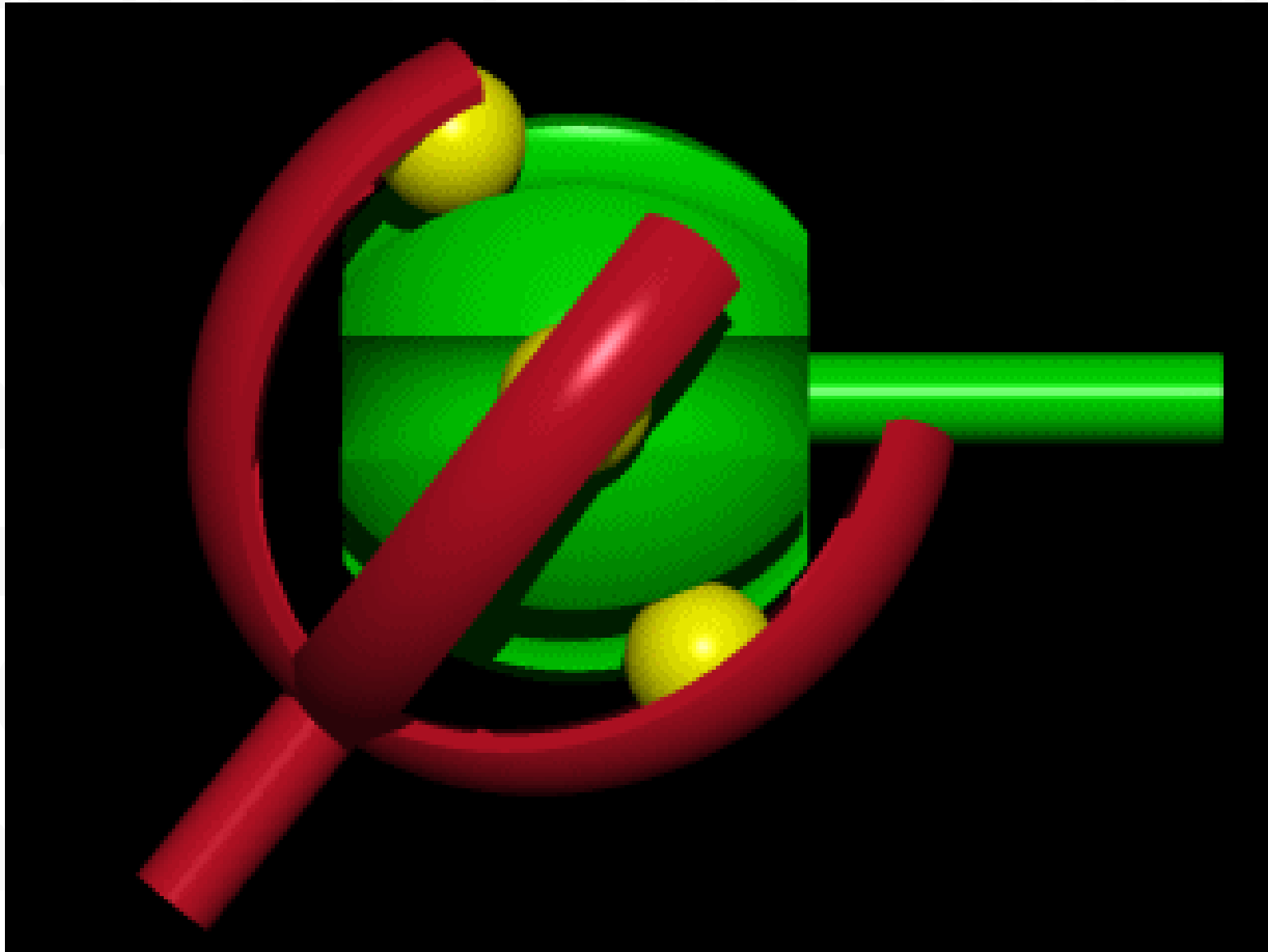
Mathcad



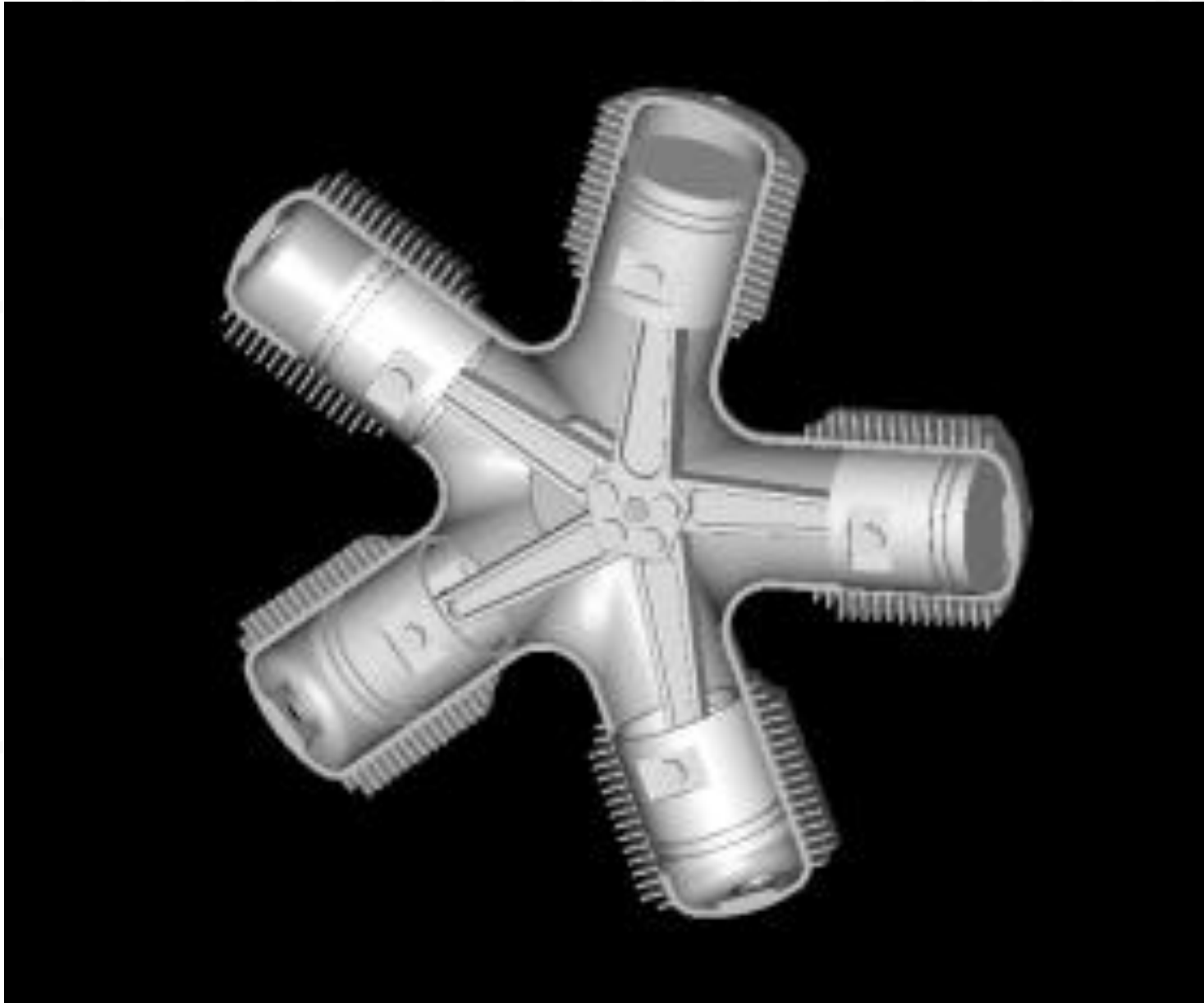
Programas de modelagem 3D



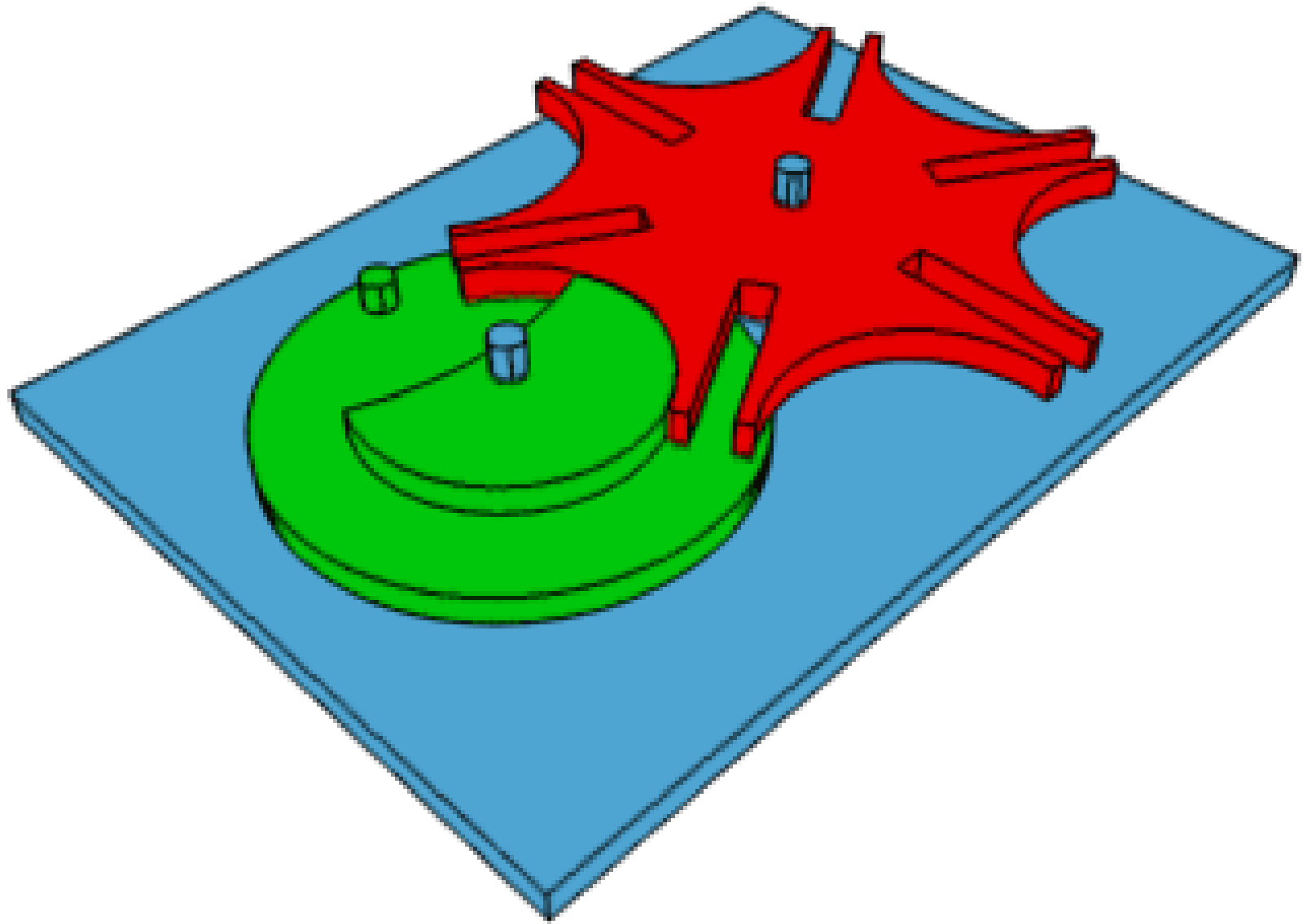
Programas de modelagem 3D



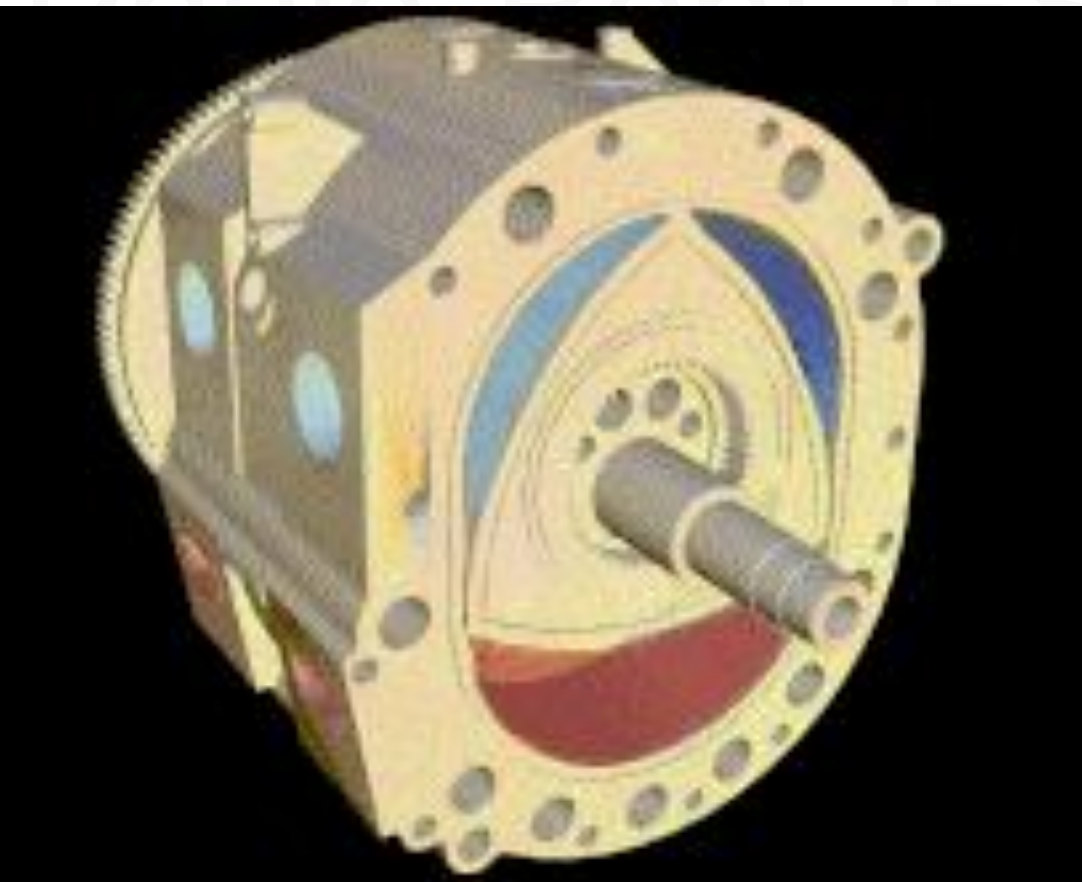
Programas de modelagem 3D



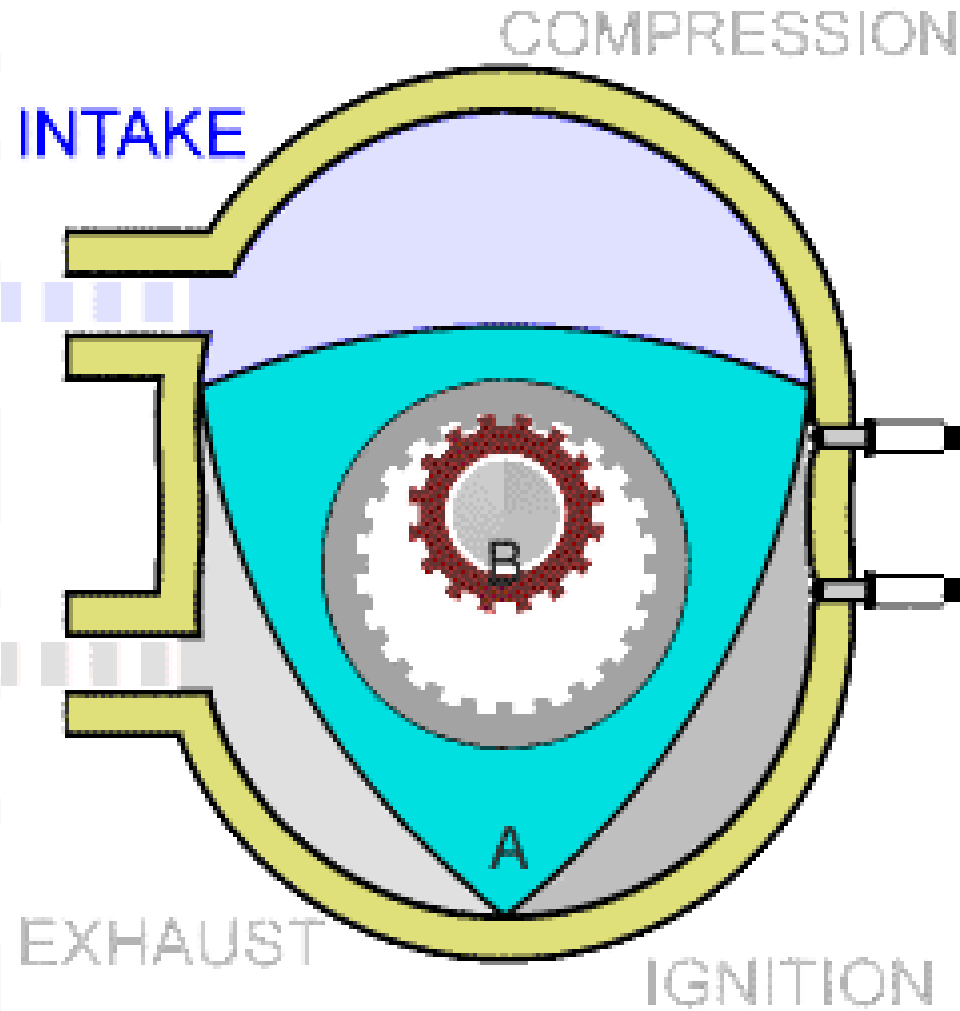
Programas de modelagem 3D



Visualização simplificada



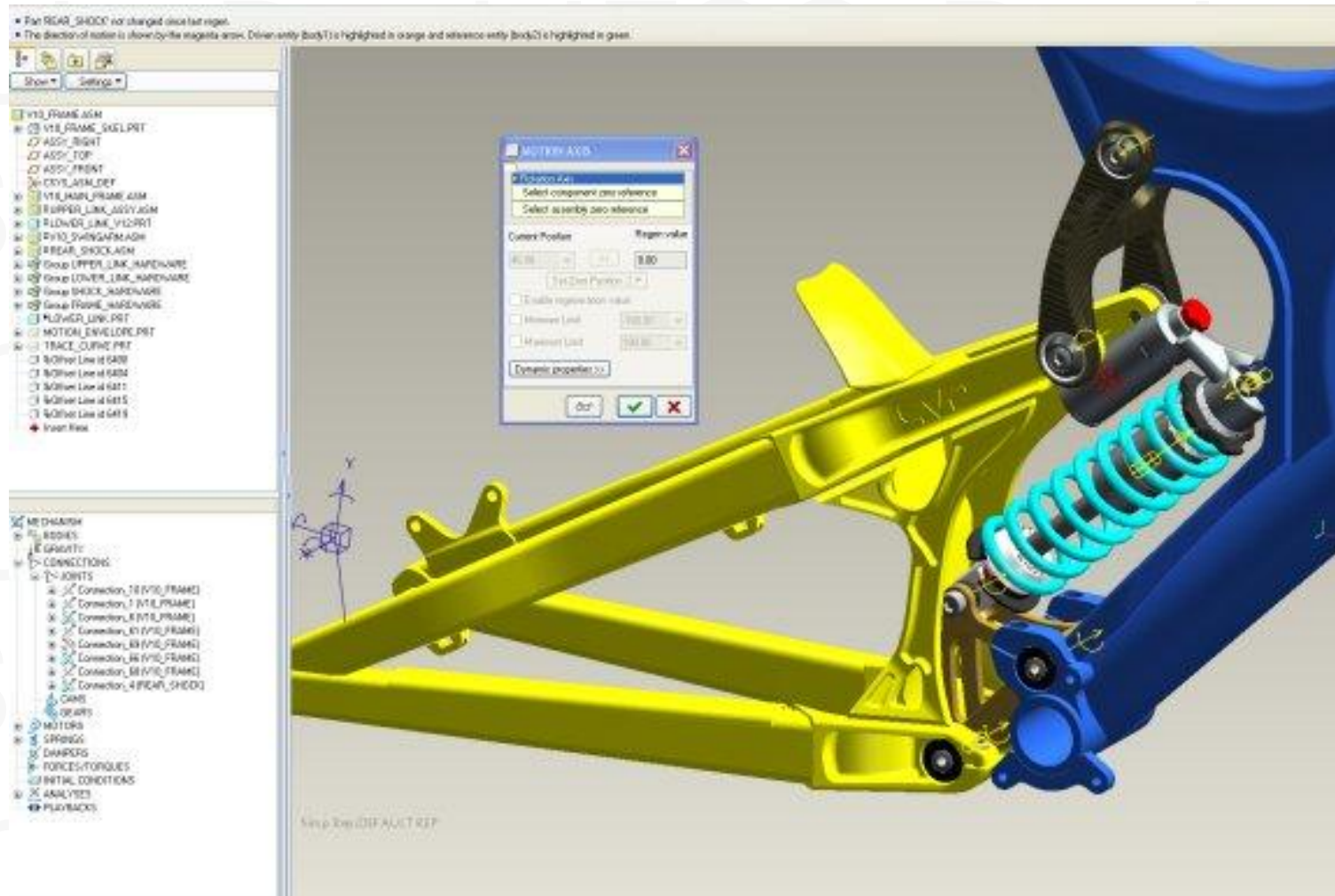
3D



2D

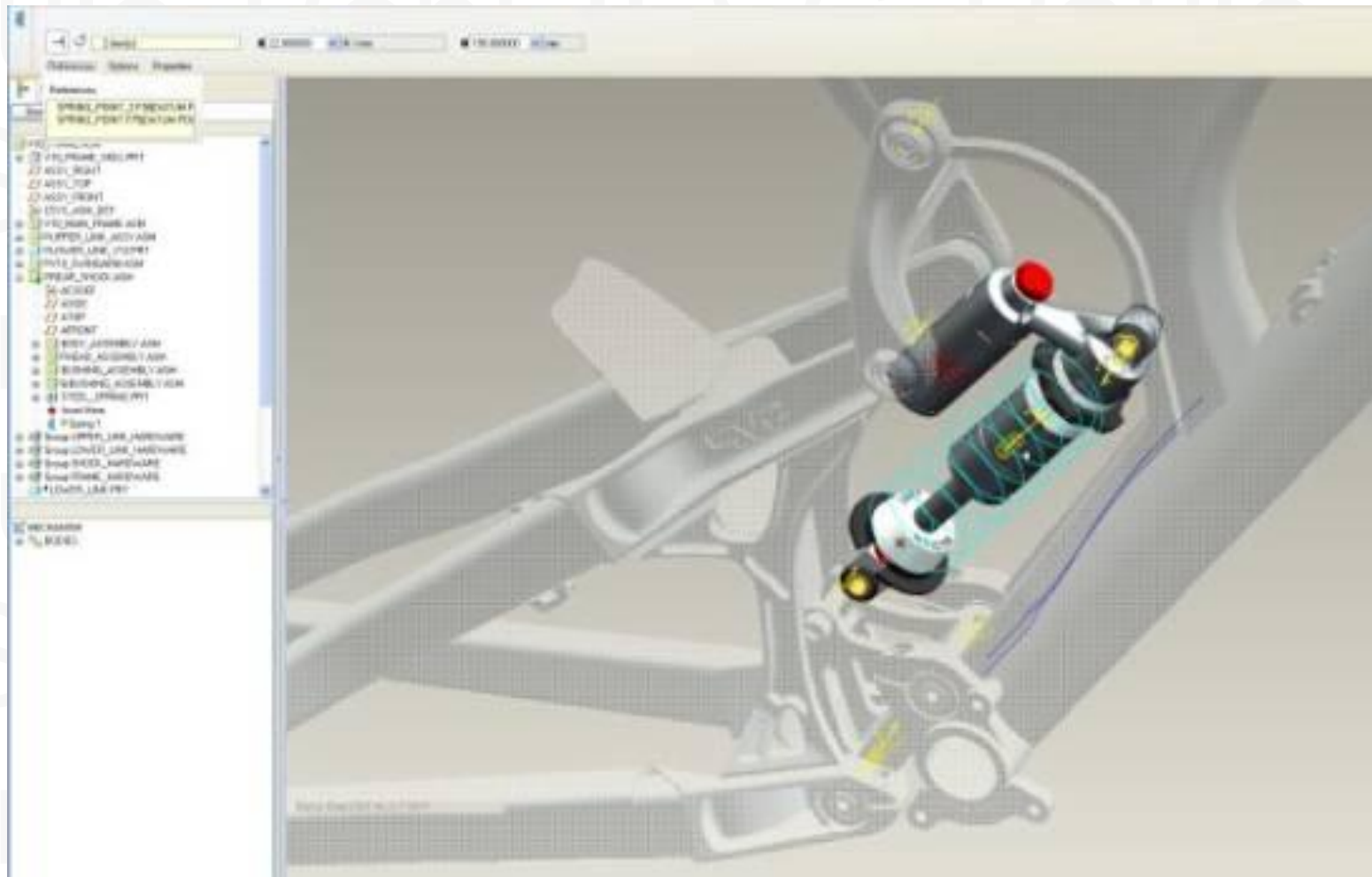
Processo de análise

1-Definição do mecanismo e das juntas



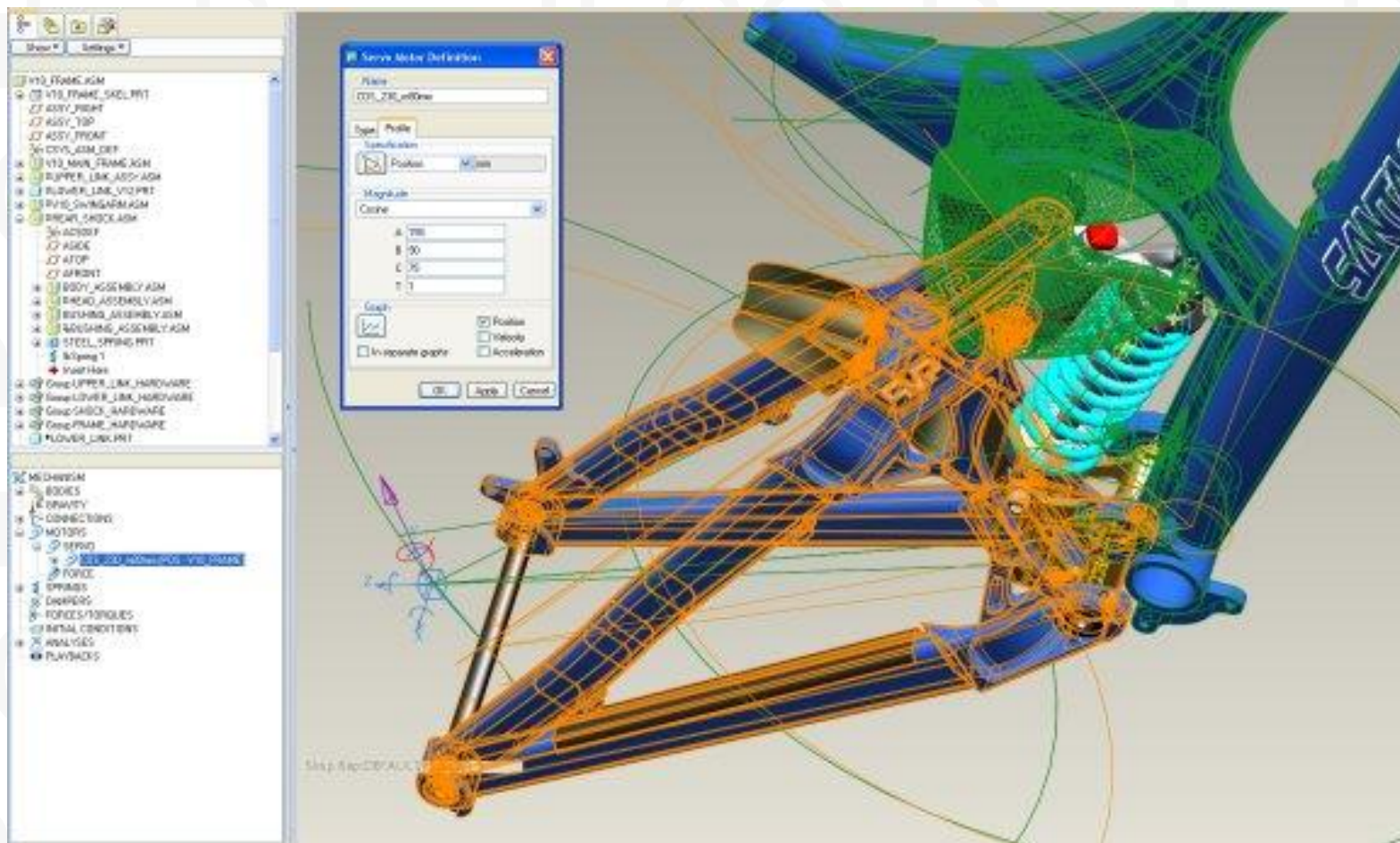
Processo de análise

2-Definição das entidades dinâmicas:
molas, amortecedores, gravidade, atrito ...



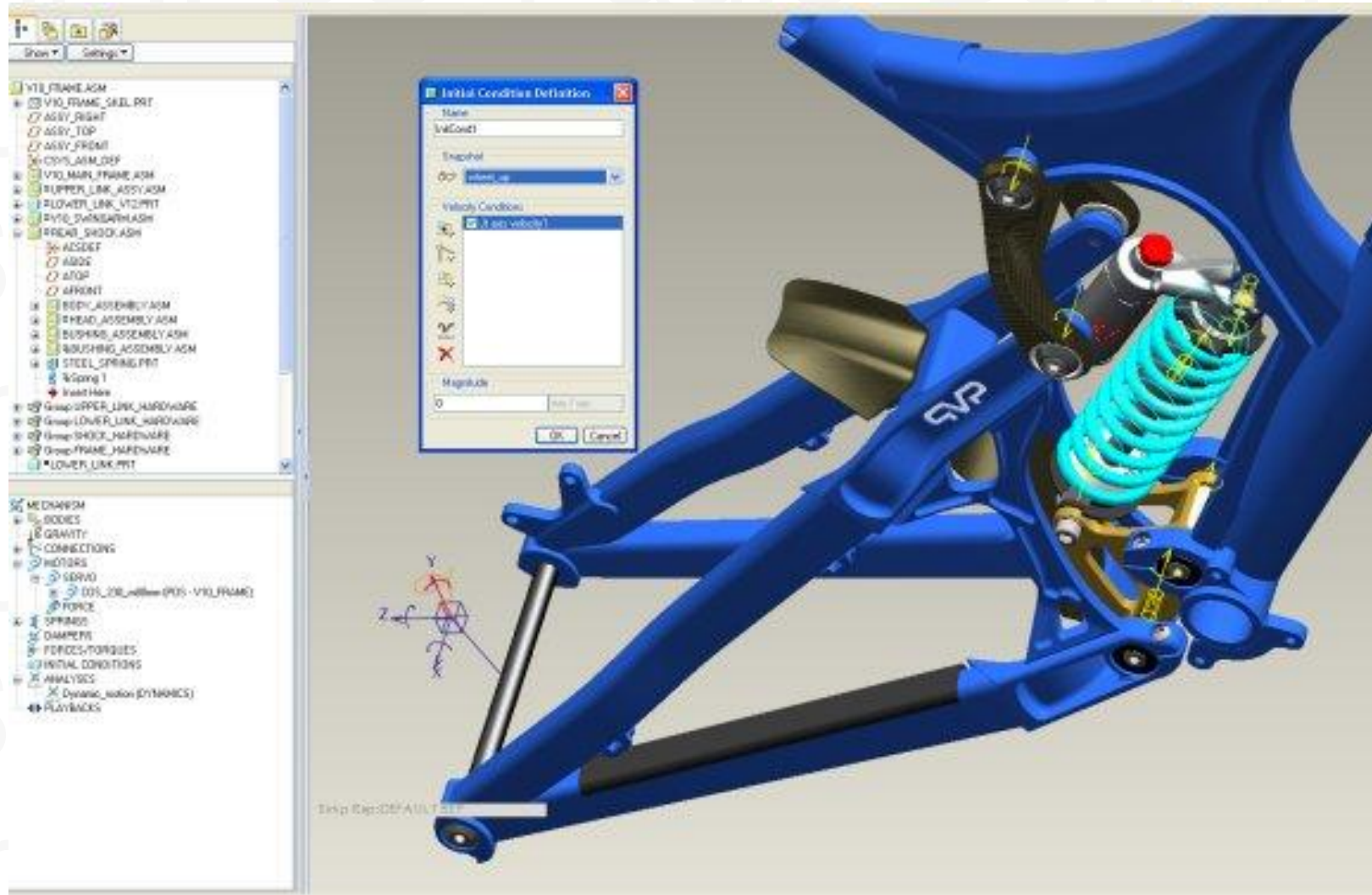
Processo de análise

3-Definição dos acionamentos: motores, atuadores ...



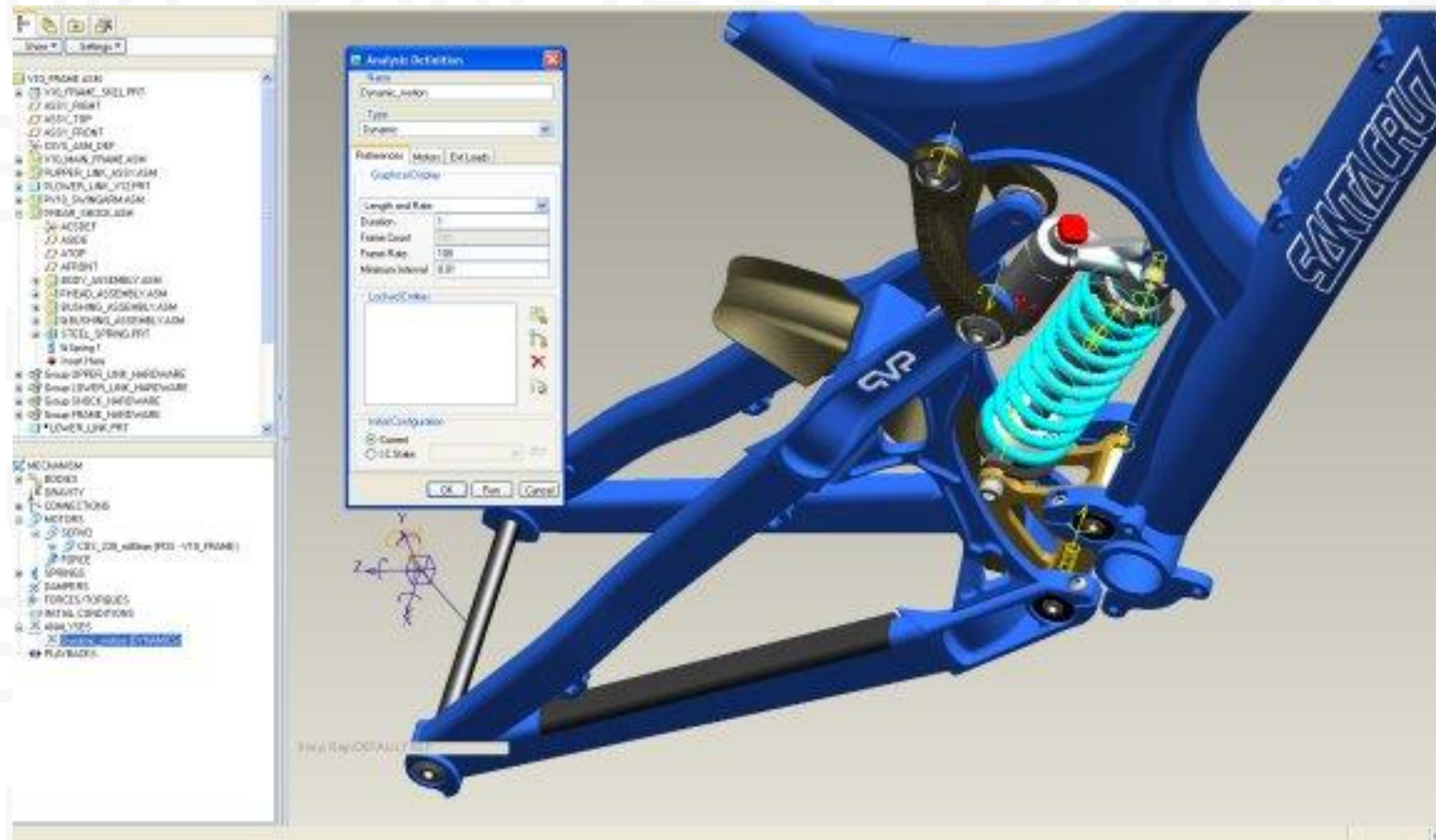
Processo de análise

4-Definição das condições iniciais: posição, velocidade, aceleração



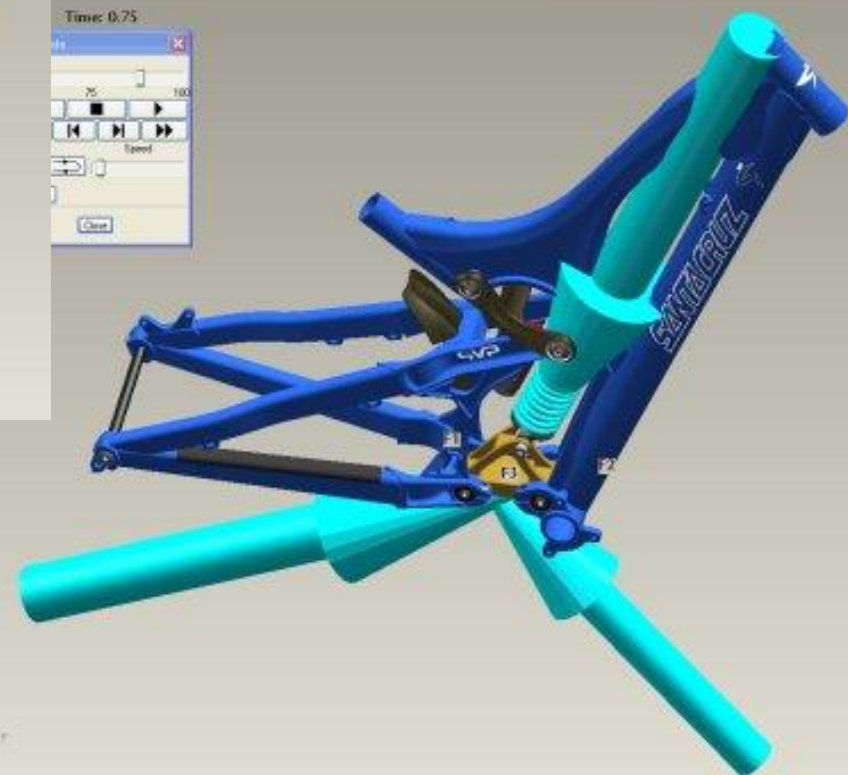
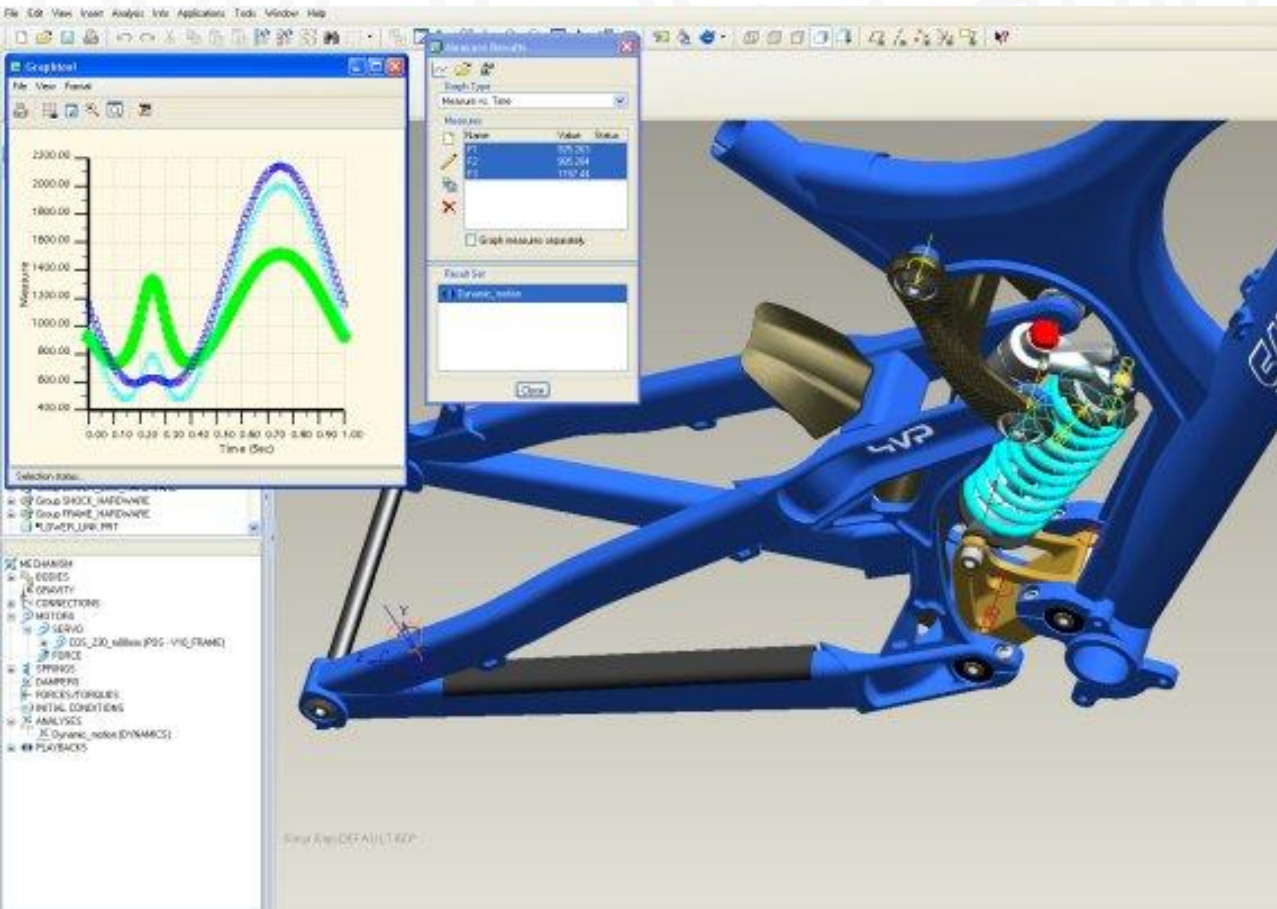
Processo de análise

5-Definição da análise: duração, intervalo de tempo, ...



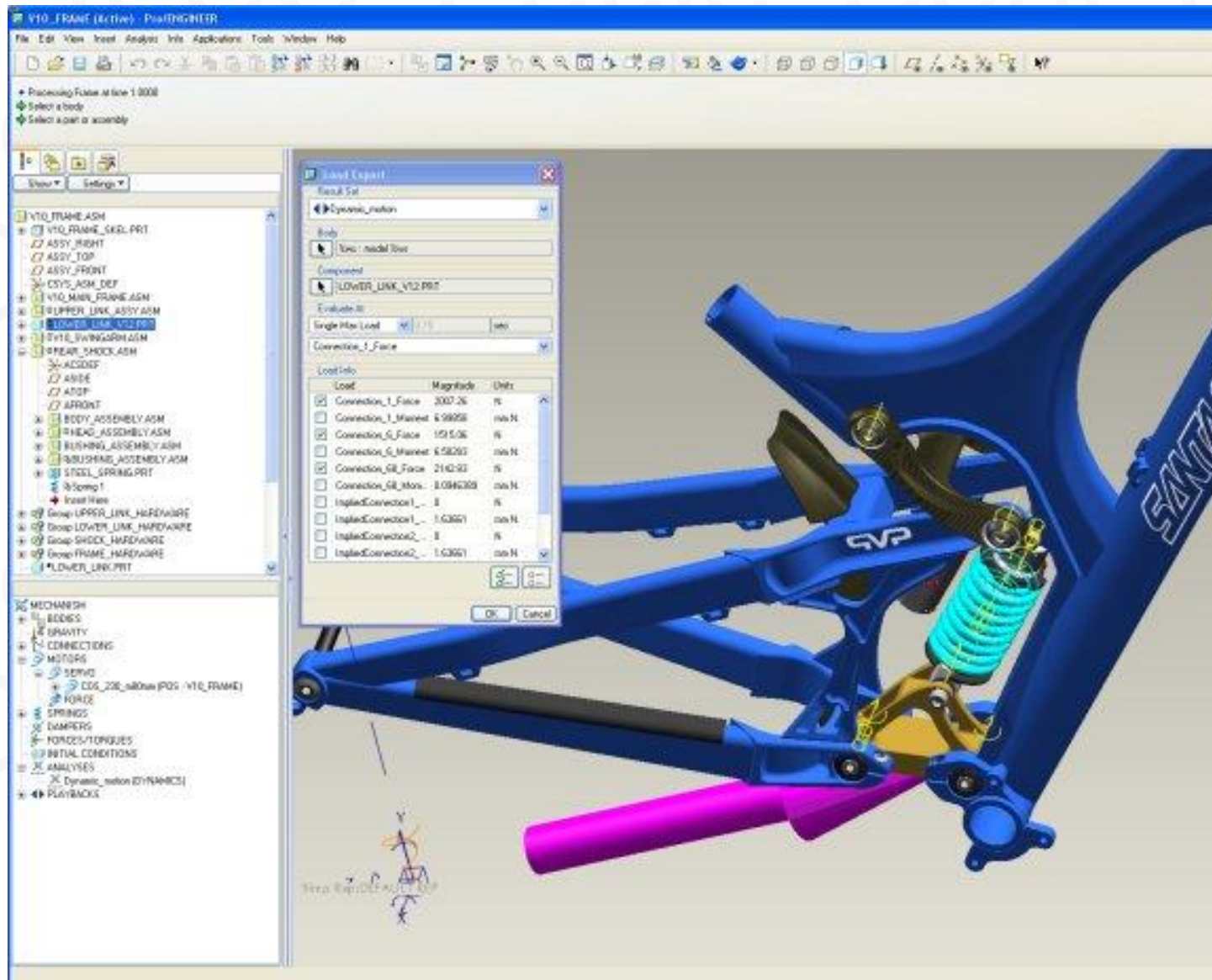
Processo de análise

6-Resultado da análise: movimento, forças atuantes



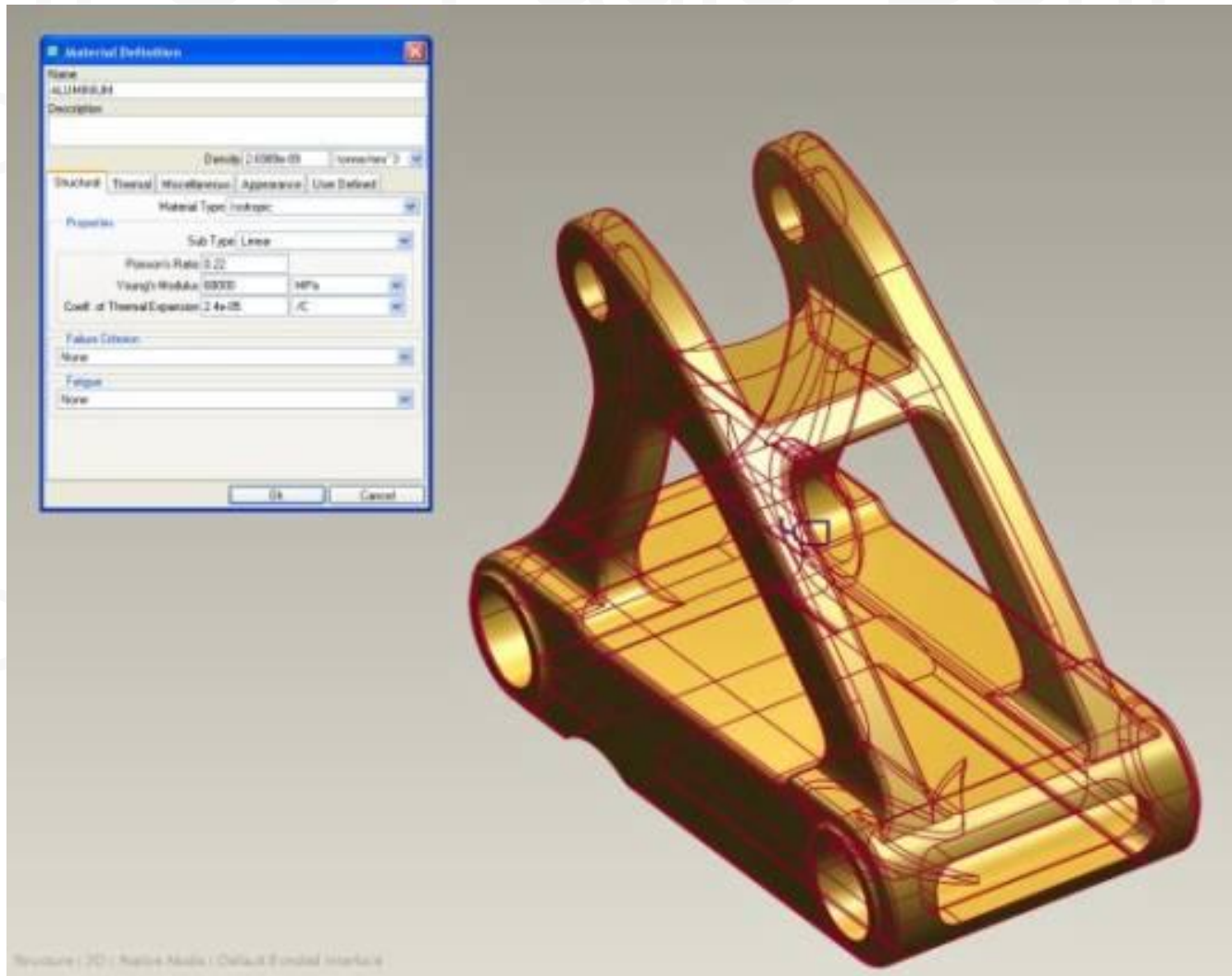
Processo de análise

7-Componente de interesse: cargas de pico, cargas de fadiga



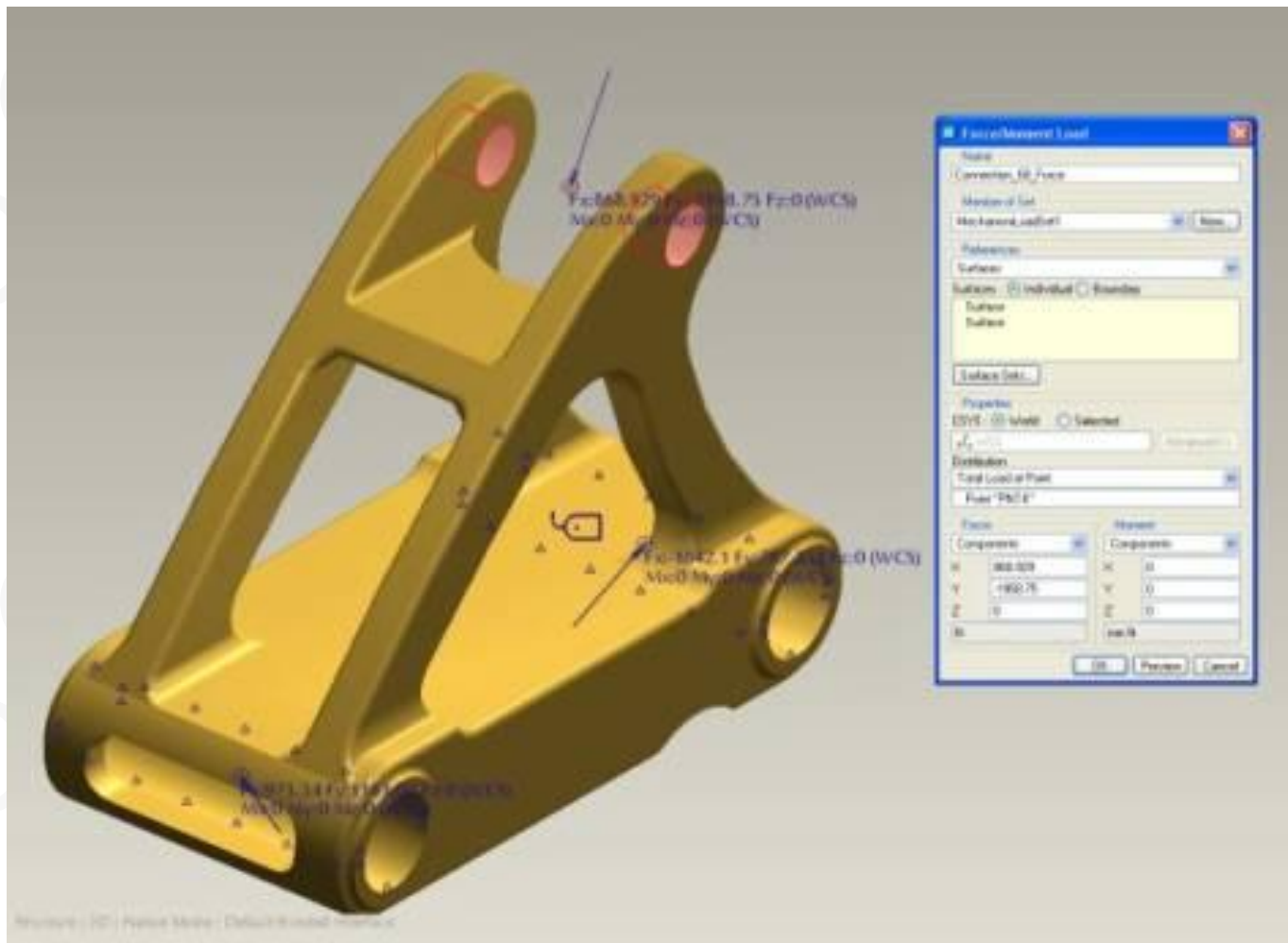
Processo de análise

8-Componente de interesse: propriedades do material



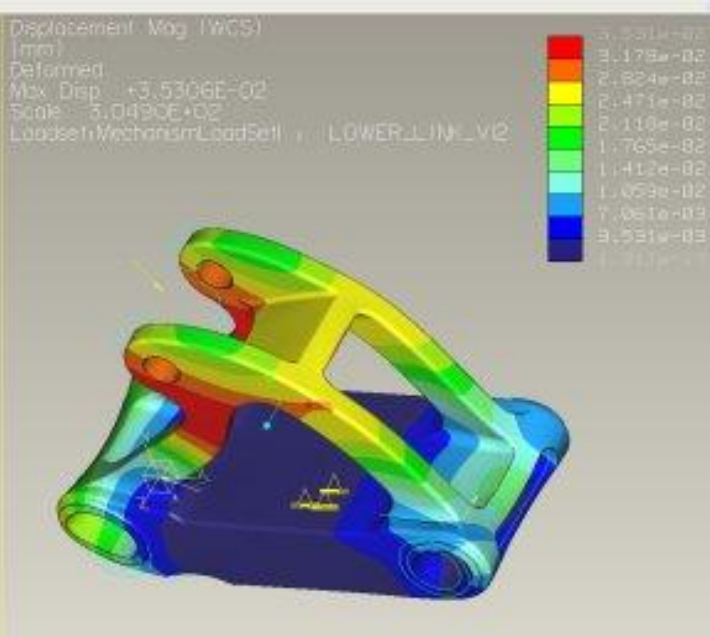
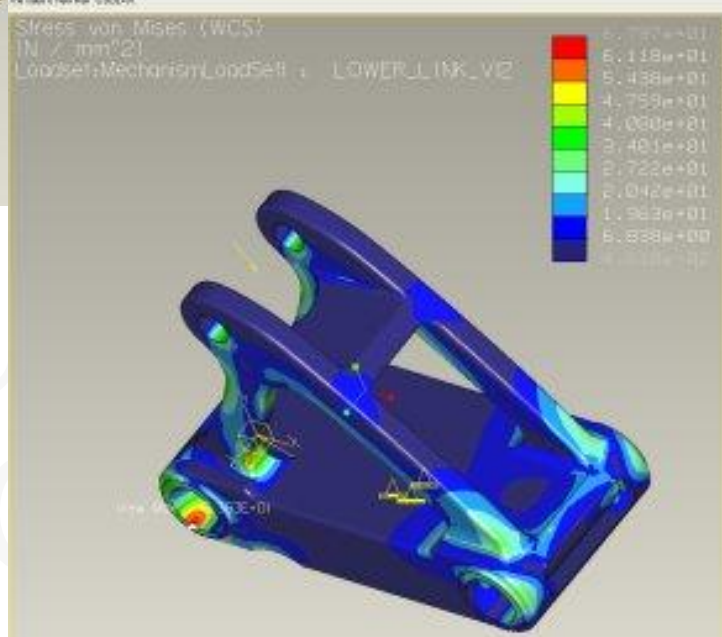
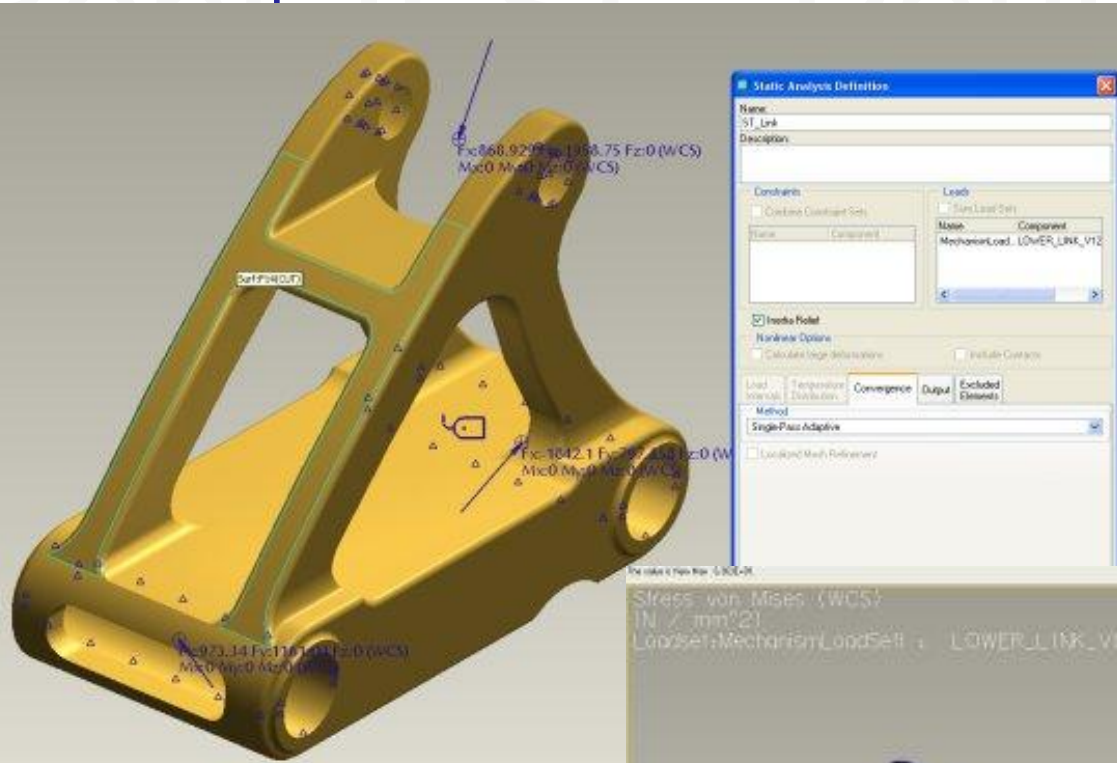
Processo de análise

9-Componente de interesse: refino do carregamento



Processo de análise

10-Componente de interesse: tensões e deslocamentos



Canais de comunicação

- Email da Turma
- Horários destinados para atendimento