Dottorato di Ricerca in Meccanica Applicata

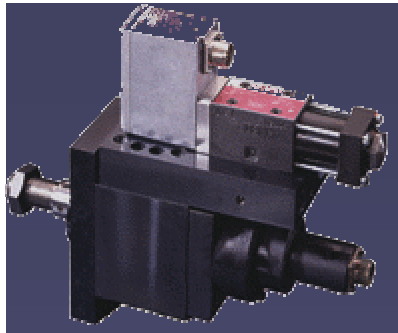
XX ciclo

Attività III anno - a.a. 2006/2007

Daniela Amadori

TITOLO:

Disegno di sistemi a supportazione idrostatica ed azionamento oleoidraulico in presenza di forti sollecitazioni vibrazionali



MOOG

Moog Italiana azienda leader nel settore dei servosistemi per l'automazione industriale sviluppa - produce – commercializza motori e azionamenti

Sviluppo sistemi di controllo
per l'Automazione Industriale e Applicazioni Speciali

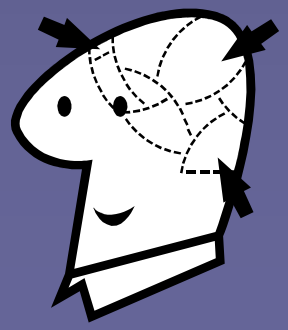
RUOLO

Risorsa progetto Maxitavole

Razionalizzazione progettazione

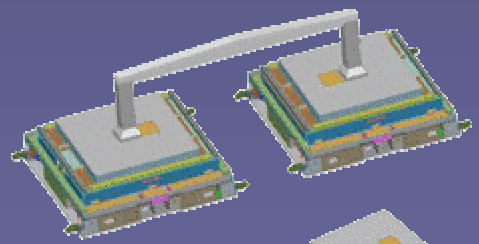
Meccanica

Olioidraulica

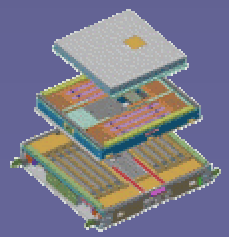


Applicazioni laboratorio → Condizioni lavoro gravose

CENTROTECNICA

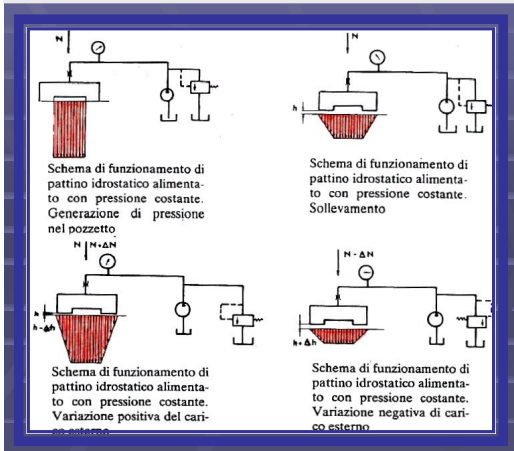


uni BS



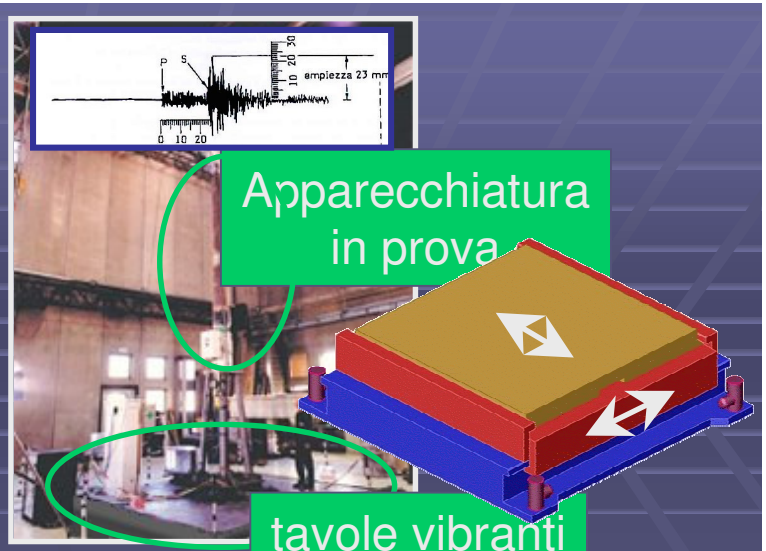
COLGAR

Sostentamento idrostatico



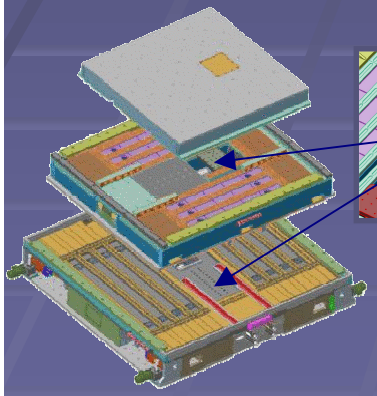
- Abbattimento attrito
- continuità film a v basse
- adattamento p-carico
- no slip-stick

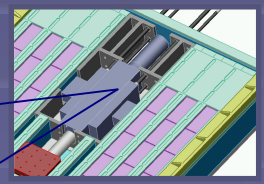
- **Corsa mx : +/- 250 mm**
- **Max peso campione : 20 t**
- **Velocità max: 1 m/s**
- **Accelerazione max: 1 g**



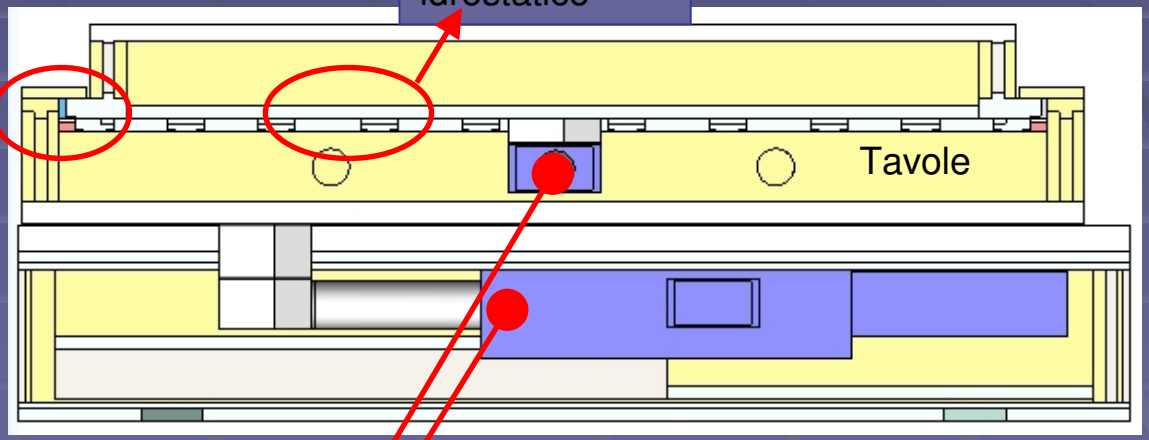
Tecnologia nota → Macchine pesanti
Moti lenti, lunghi, continui

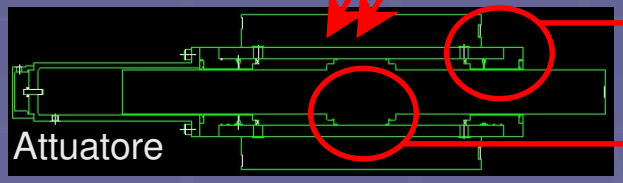
Applicazione insolita → Vibrazioni ad alta frequenza





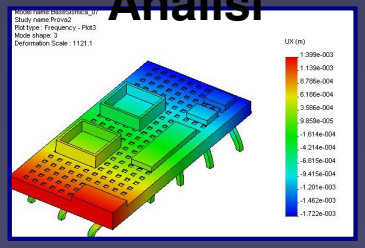
- pattini/tasche
- dimensioni
- precisioni ▱ // ◎
- controllo p,q
- materiali



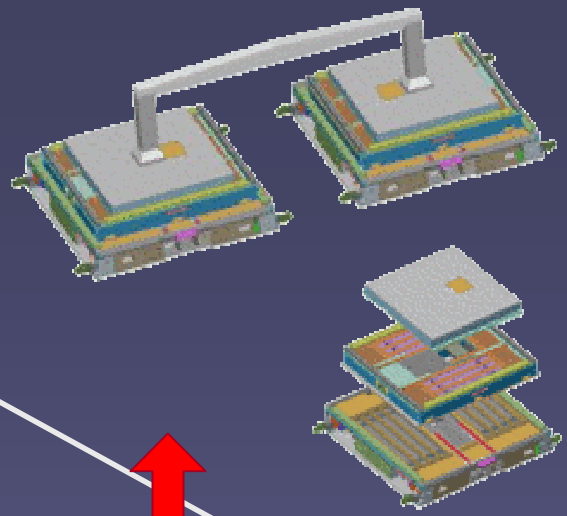


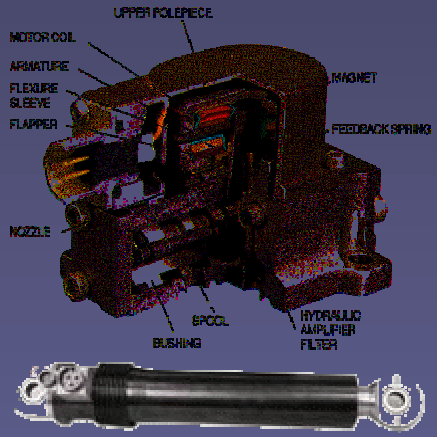
Misura e verifica

Analisi



Maxitavole



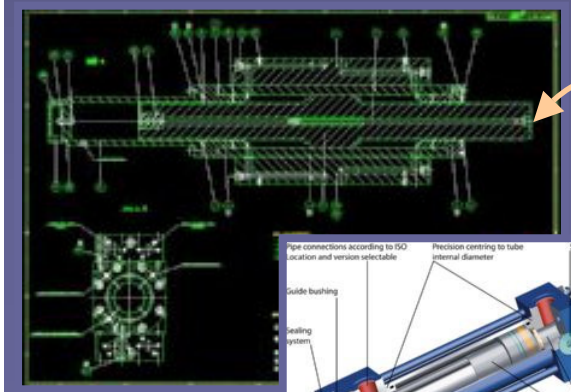


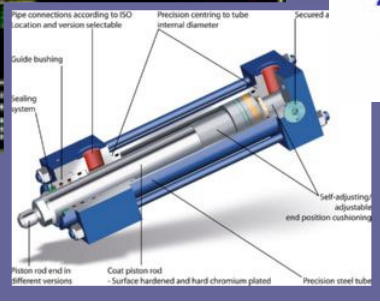
MOOG

Disegno

Algoritmo

CAD

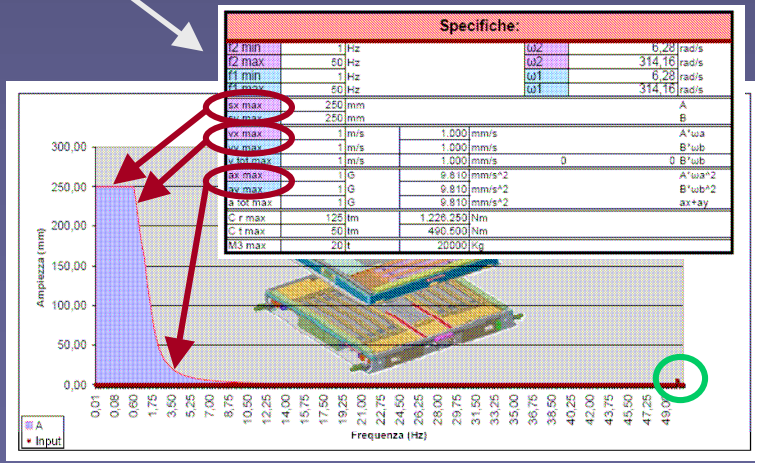




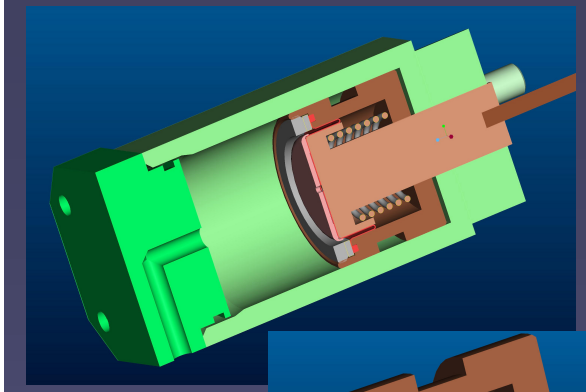
SolidWorks

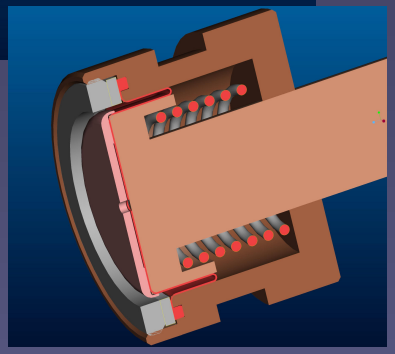
UGS
Transforming the process of Innovation

PTC
The Product Development Company

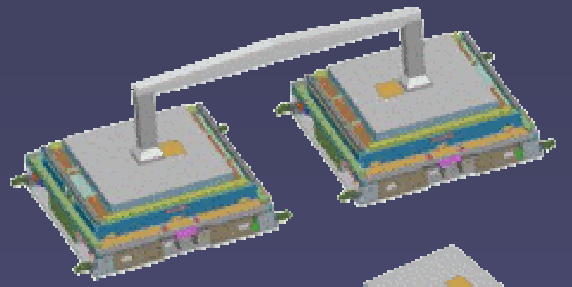


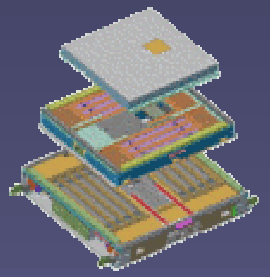
Momento ribaltante: 125 ton-m
Momento di imbardata: 50 ton-m



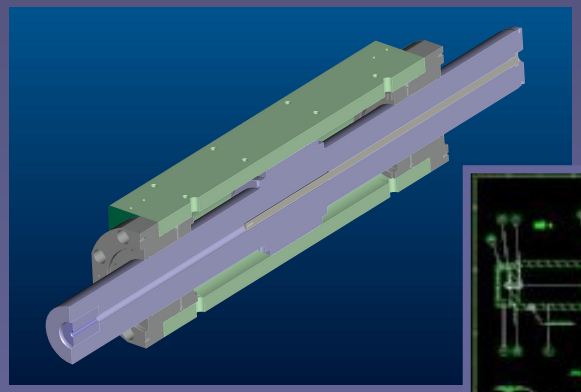


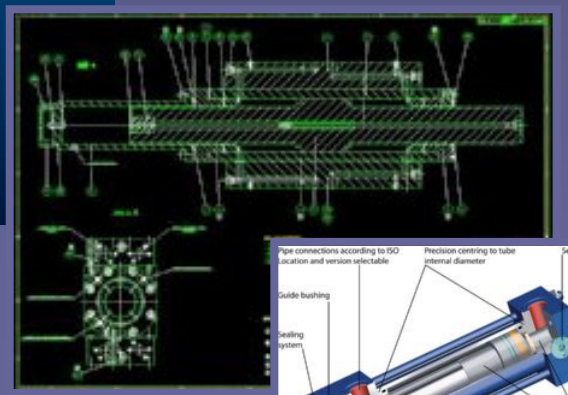
Maxitavole

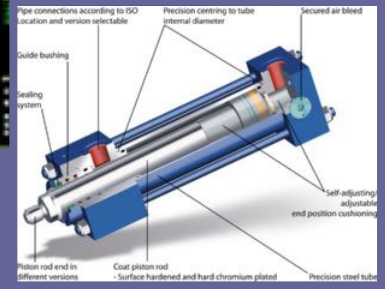




MOOG

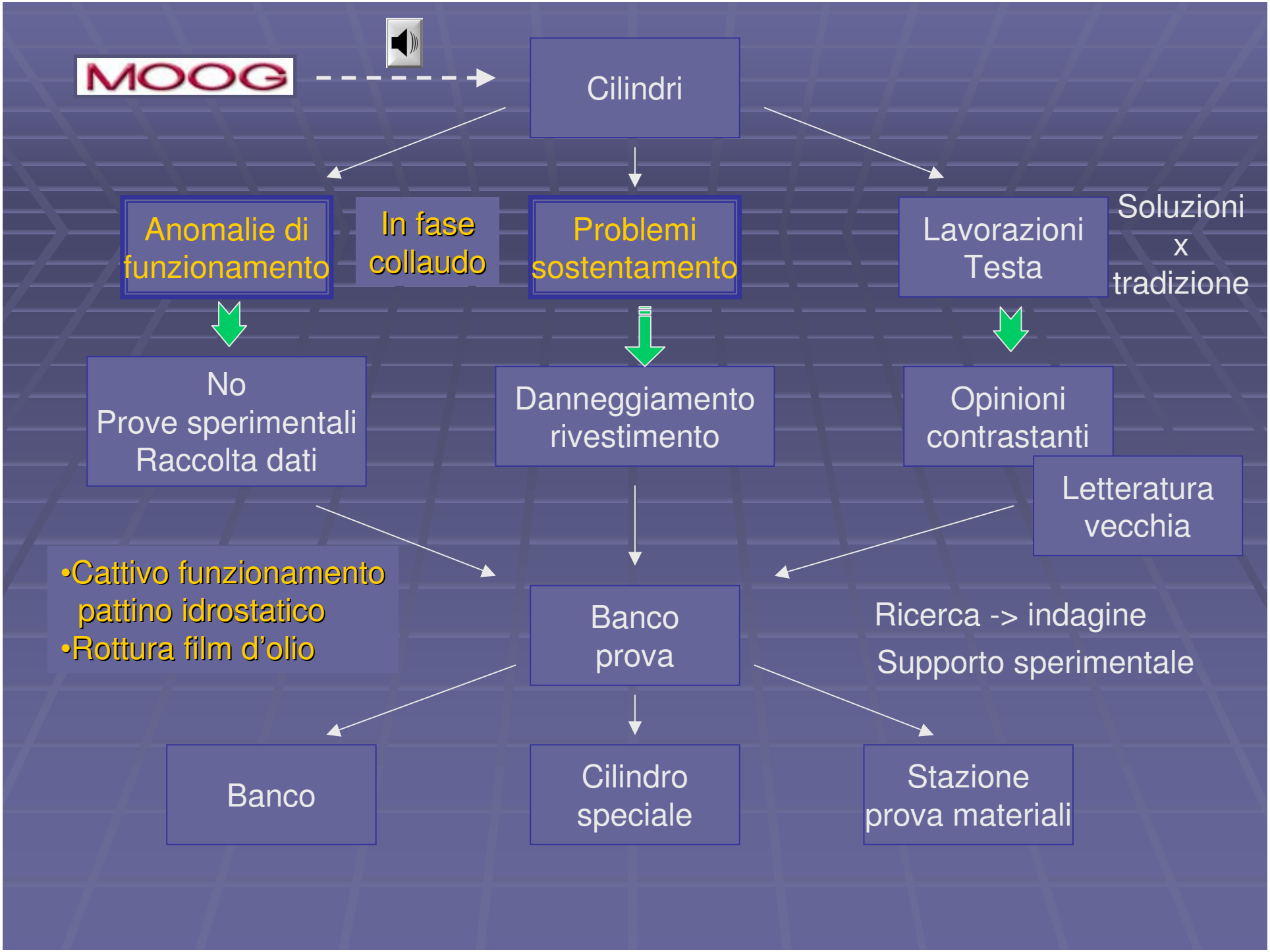


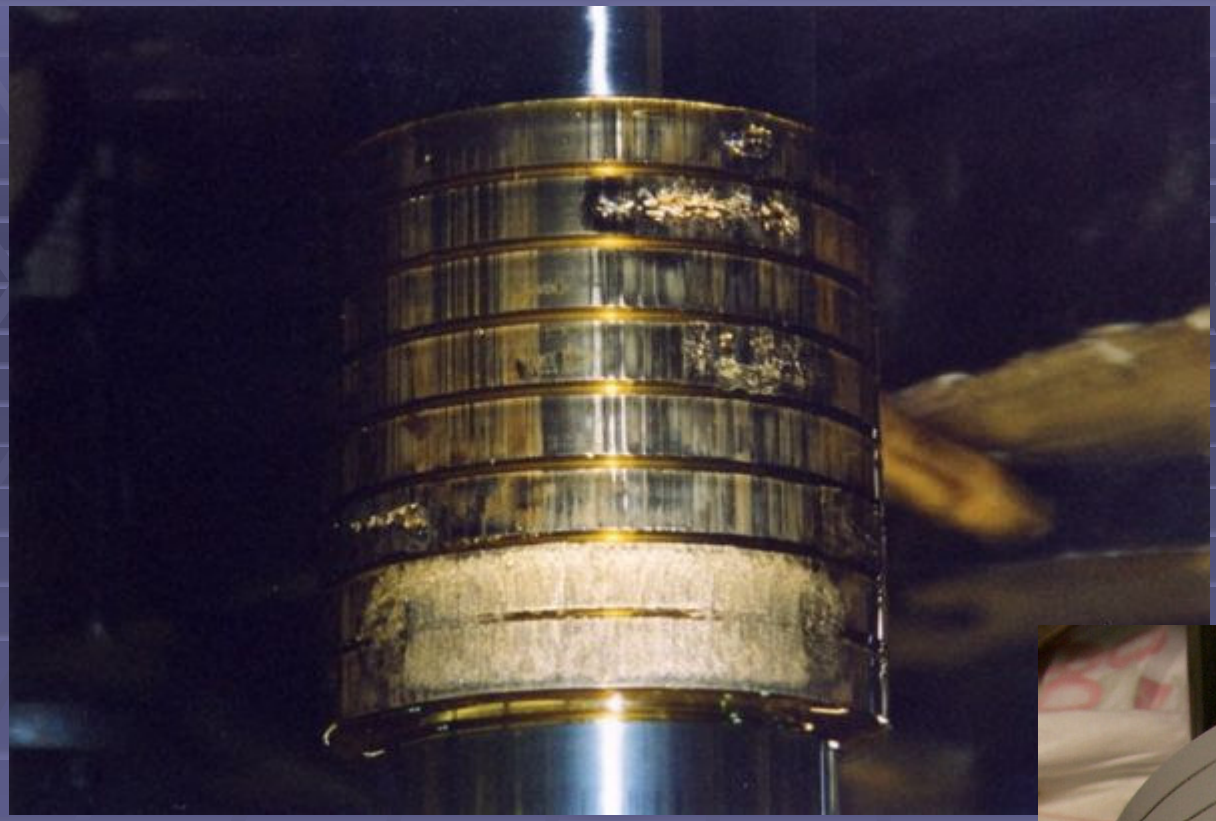


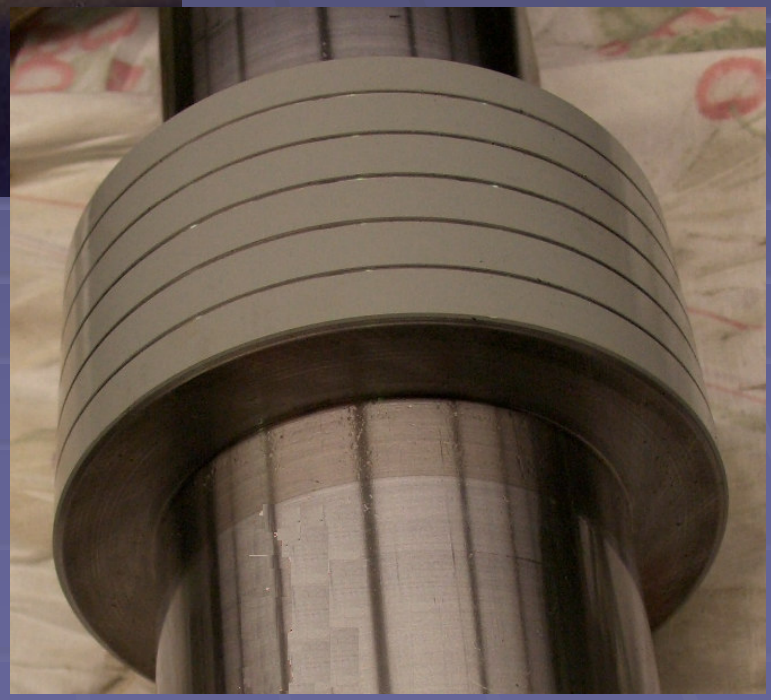


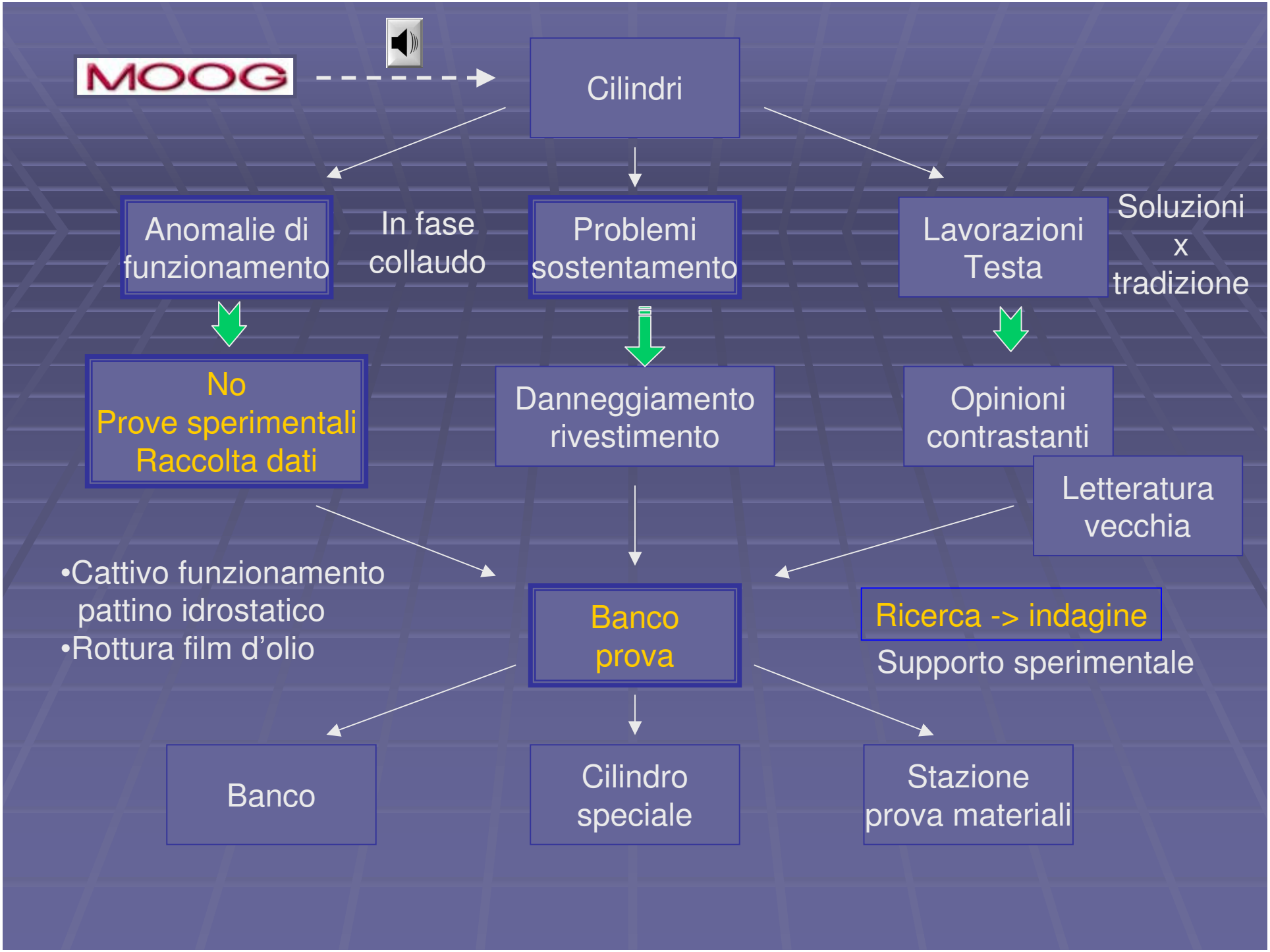
Razionalizzazione mediante SW:
- Raccolta informazioni
- Norme
- Formule teoriche/pratiche

=>dimensionamento
=>componenti
Metodologia di modellazione
Modello robusto semiautomatico
Modello semplice x preventivazione


MOOG
Cilindri
Anomalie di funzionamento
In fase collaudo
Problemi sostentamento
Lavorazioni Testa
Soluzioni x tradizione
No Prove sperimentali Raccolta dati
Danneggiamento rivestimento
Opinioni contrastanti
Letteratura vecchia
•Cattivo funzionamento pattino idrostatico
•Rottura film d'olio
Banco prova
Ricerca -> indagine
Supporto sperimentale
Banco
Cilindro speciale
Stazione prova materiali



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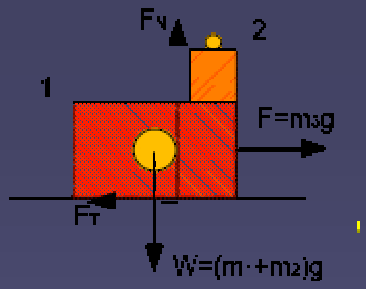
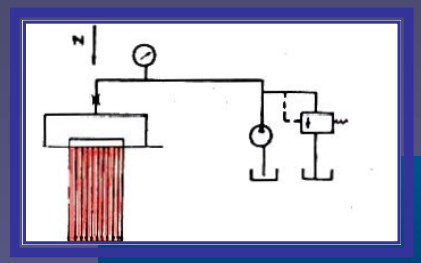
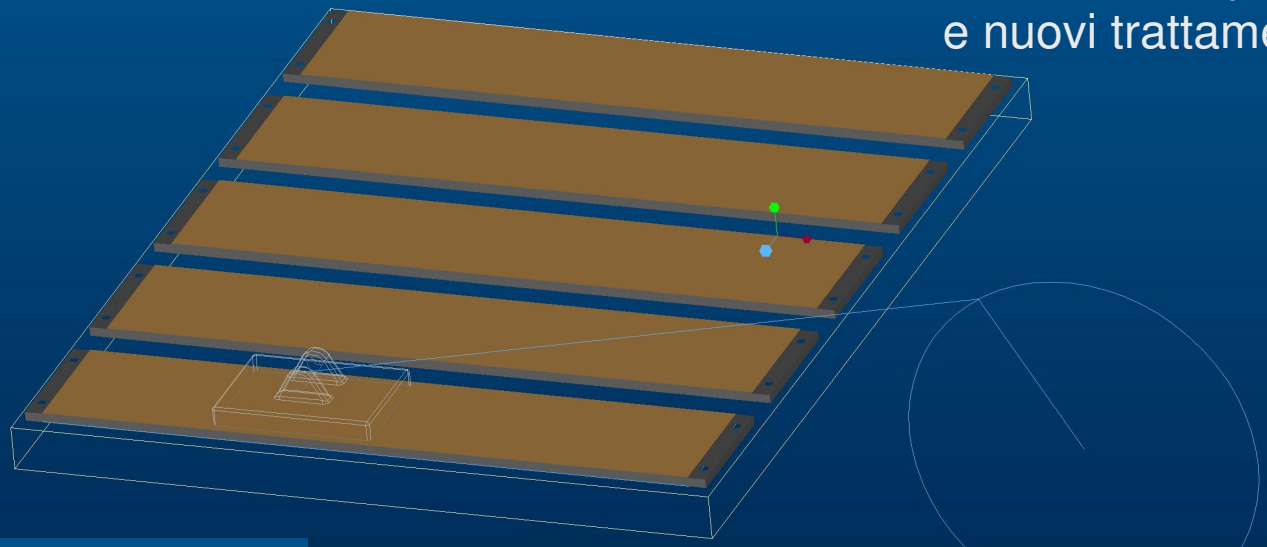
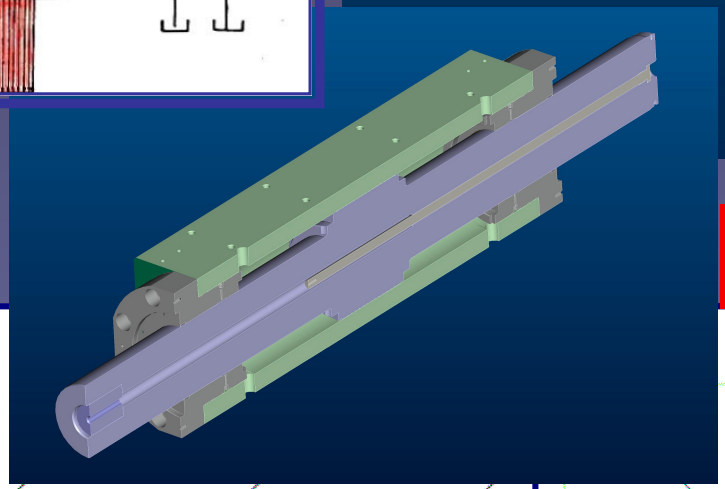


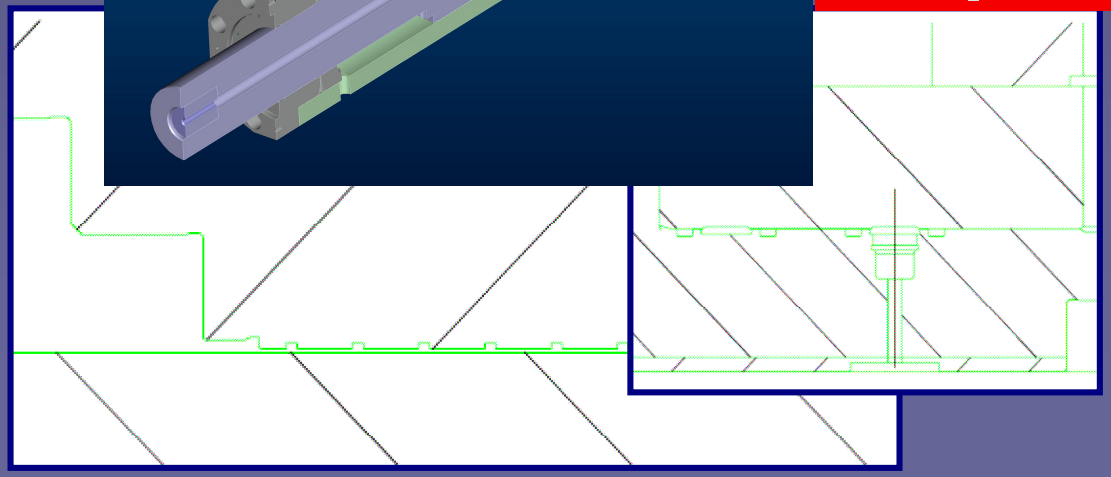


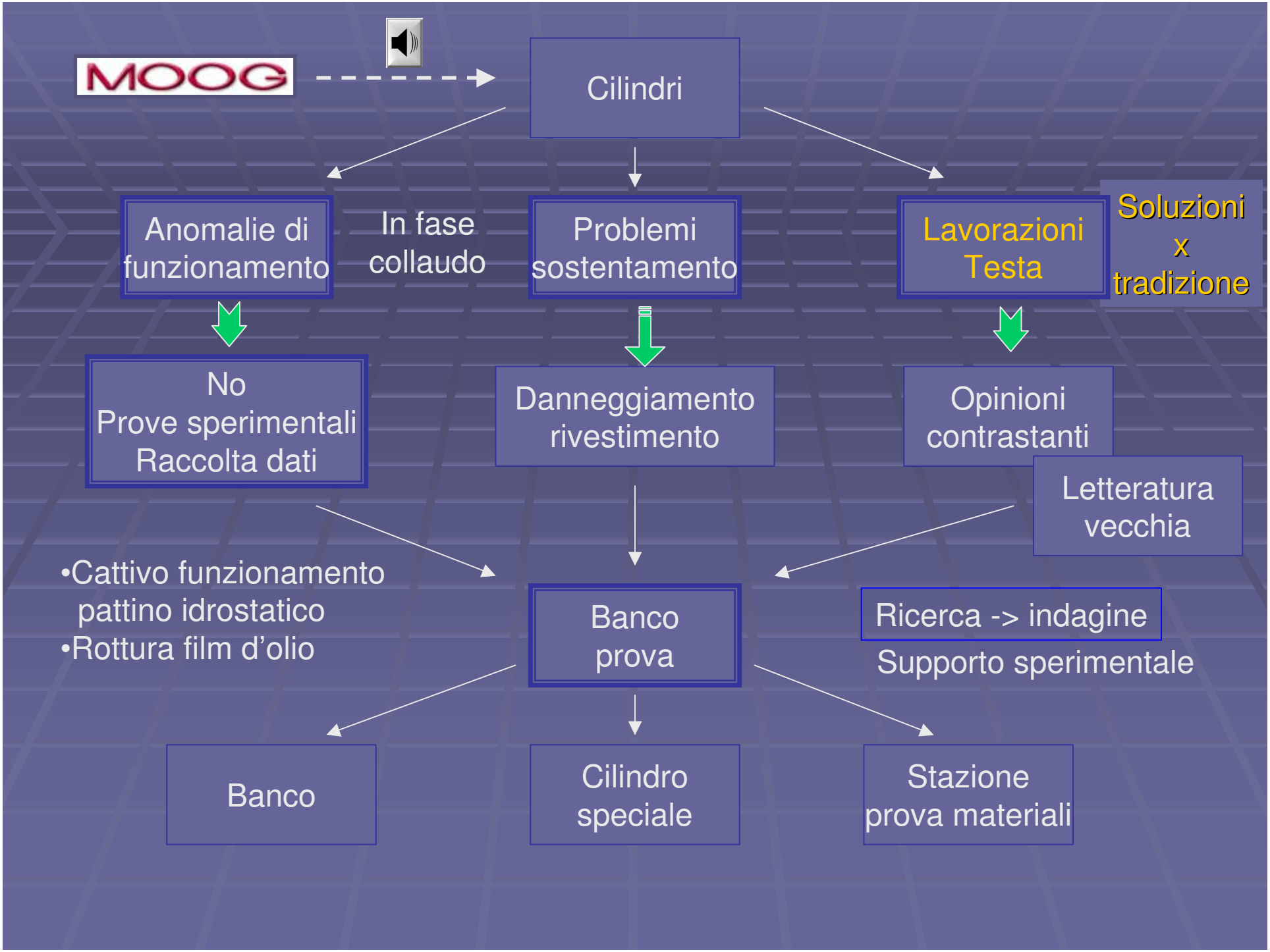
Ricerca di nuovi materiali di riporto
e nuovi trattamenti





Test cilindri

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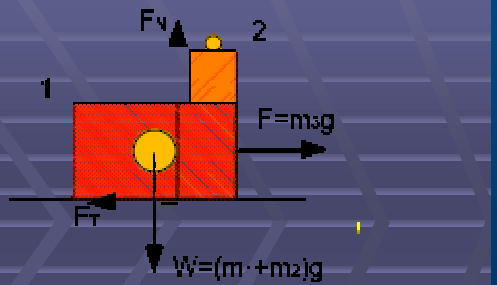
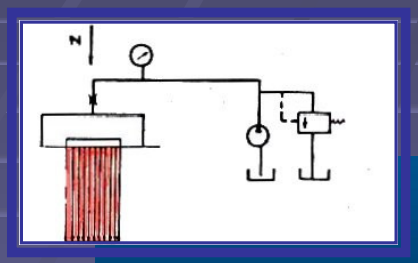
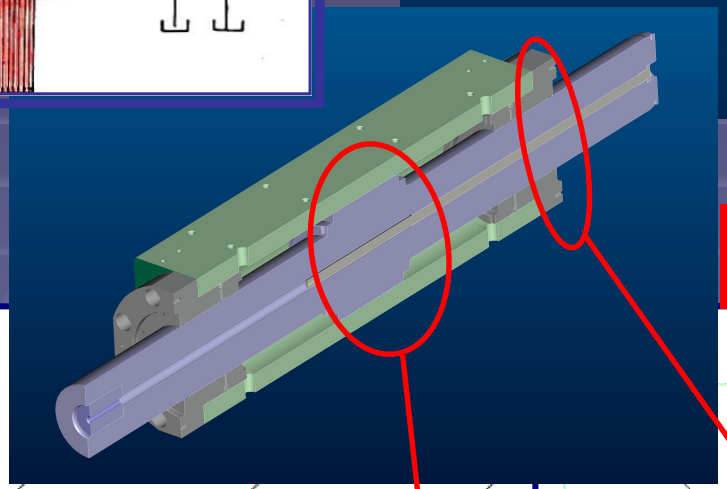
Banco prova
Ricerca -> indagine
Supporto sperimentale
Banco
Cilindro speciale
Stazione prova materiali

Banco prova



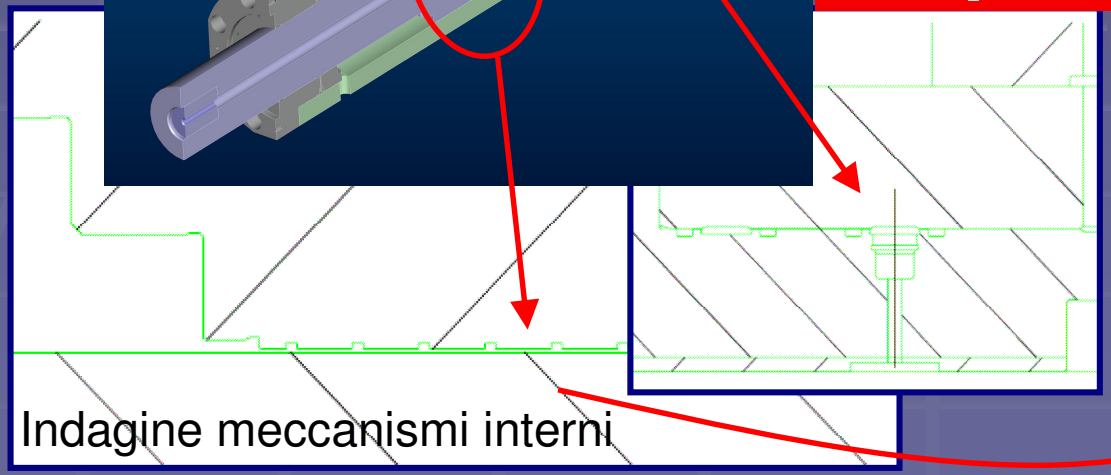


Ricerca di nuovi materiali di riporto
e nuovi trattamenti

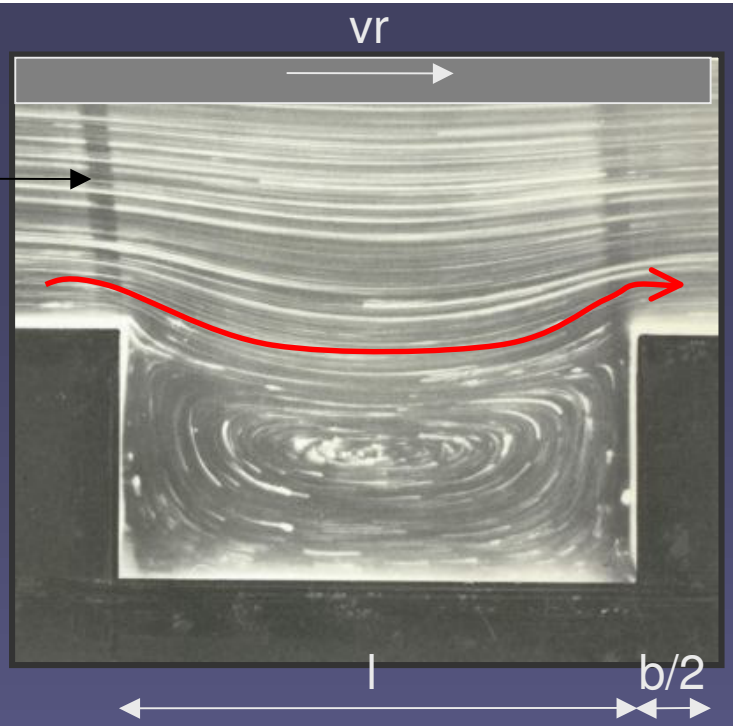


Test cilindri

Perdita di carico
No guarnizioni

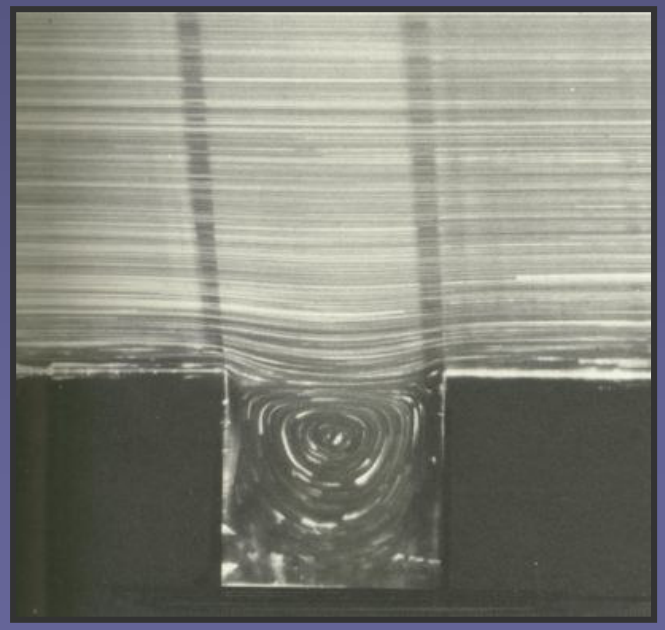


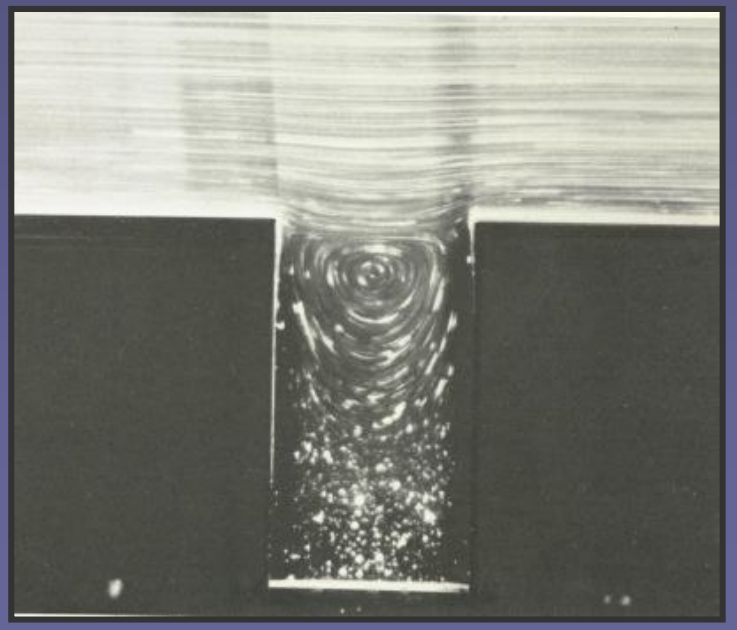
Indagine meccanismi interni



$\mathcal{R}e$

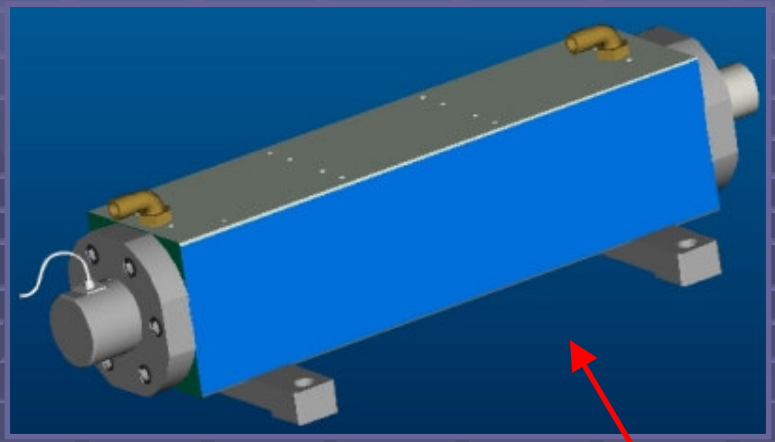
$J=\lambda v^2 / 2 g D \quad \lambda=(b/m,h/m,l/m,Re)$



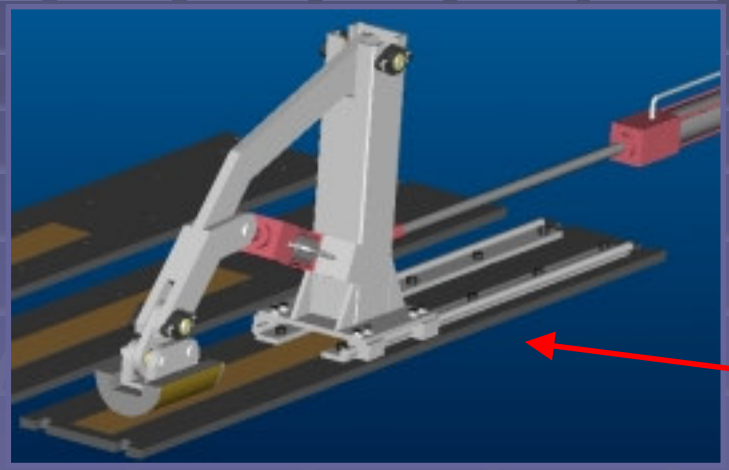


Banco prova

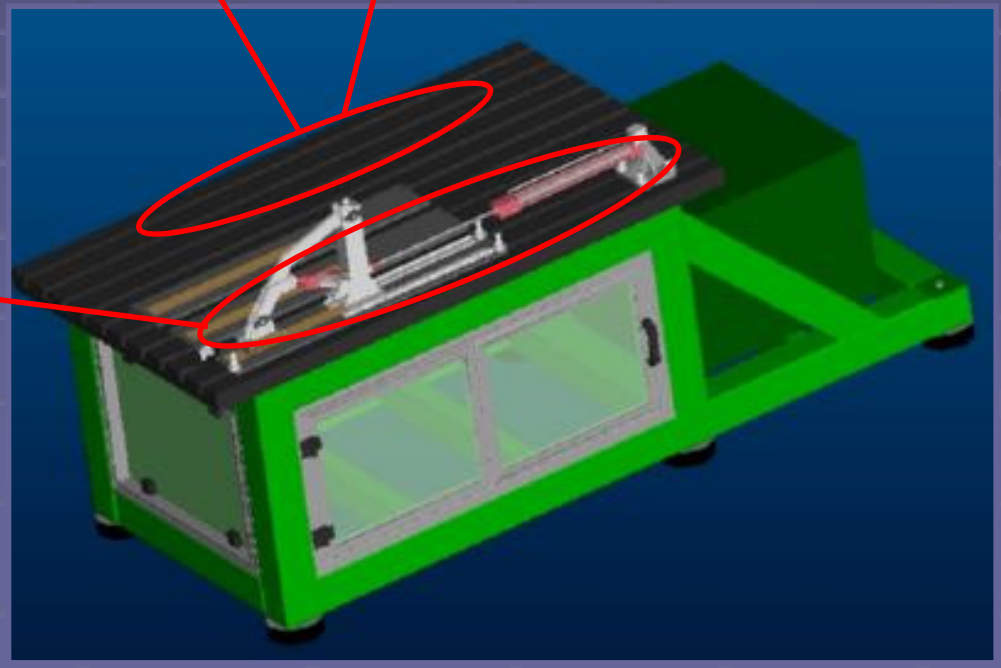
Le stazioni del banco

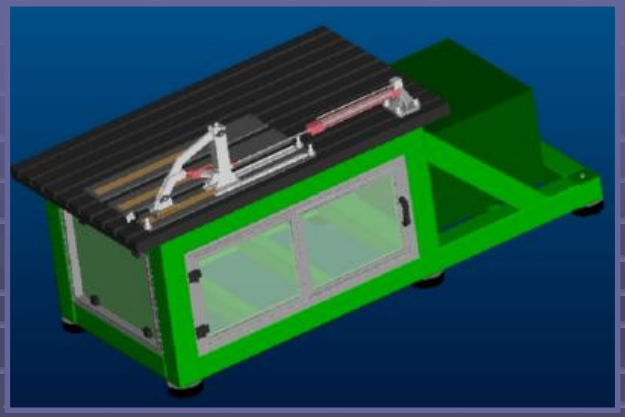


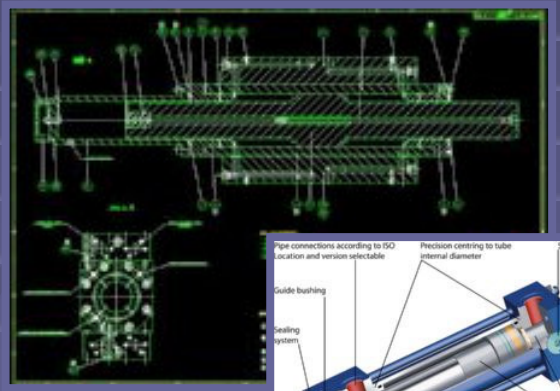
Prova cilindri

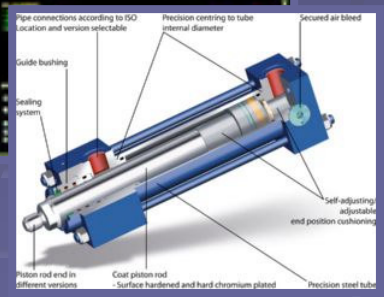


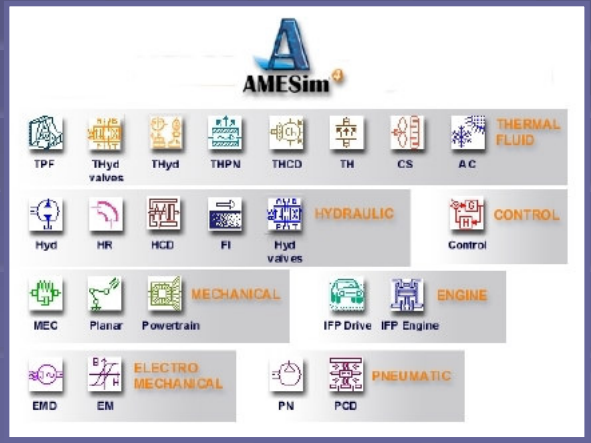
Prova materiali





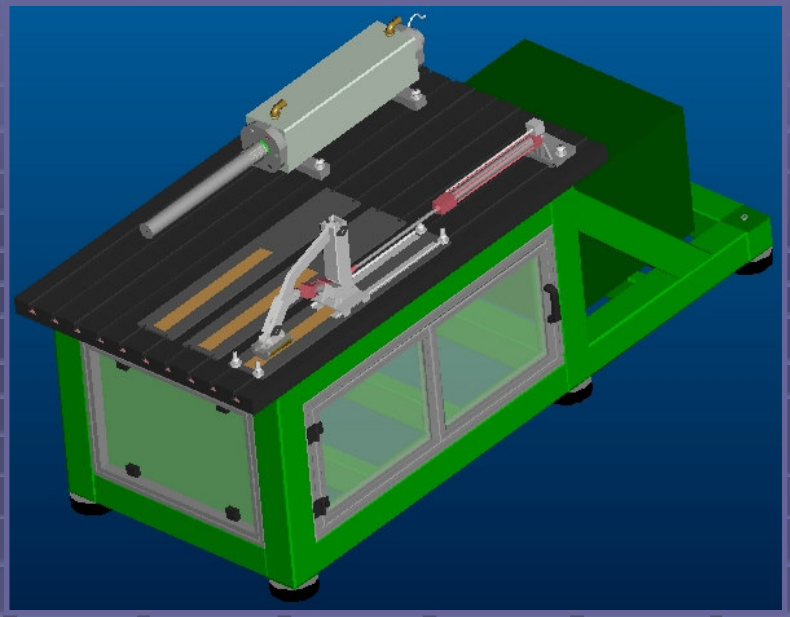


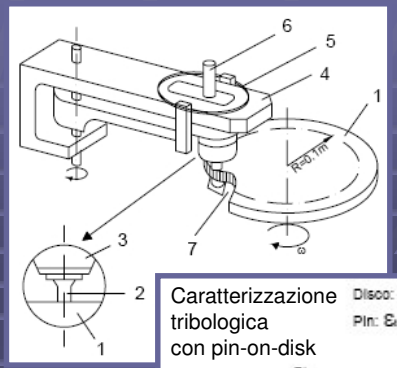

Pipe connections according to ISO
Location and version selectable
Precision centring to tube
internal diameter
Secured air bleed
Guide bushing
Sealing
system
Self-adjusting
adjustable
end position cushioning
Piston rod end in
different versions
Coat piston rod
- Surface hardened and hard chromium plated
Precision steel tube


AMESim
TPF
THyd valves
THyd
THPN
THCD
TH
CS
AC
THERMAL FLUID
Hyd
HR
HCD
FI
Hyd valves
HYDRAULIC
Control
CONTROL
MEC
Planar
Powertrain
MECHANICAL
IFP Drive
IFP Engine
ENGINE
EMD
EM
ELECTRO MECHANICAL
PN
PCD
PNEUMATIC

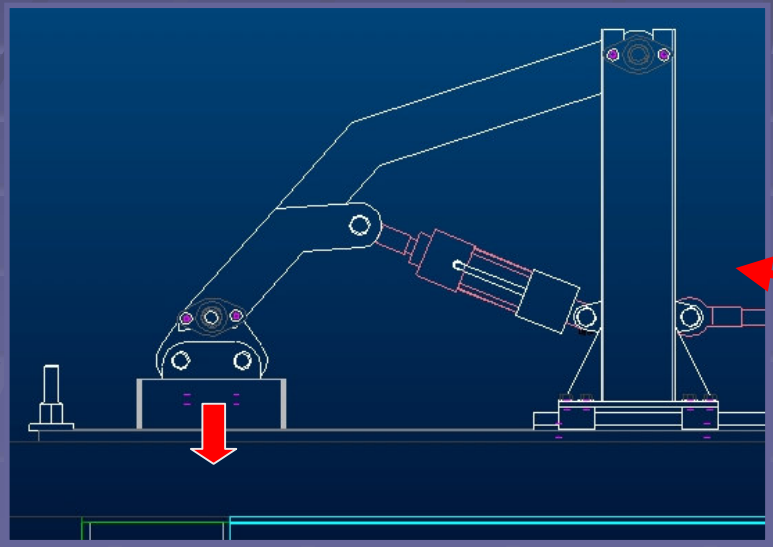

Università

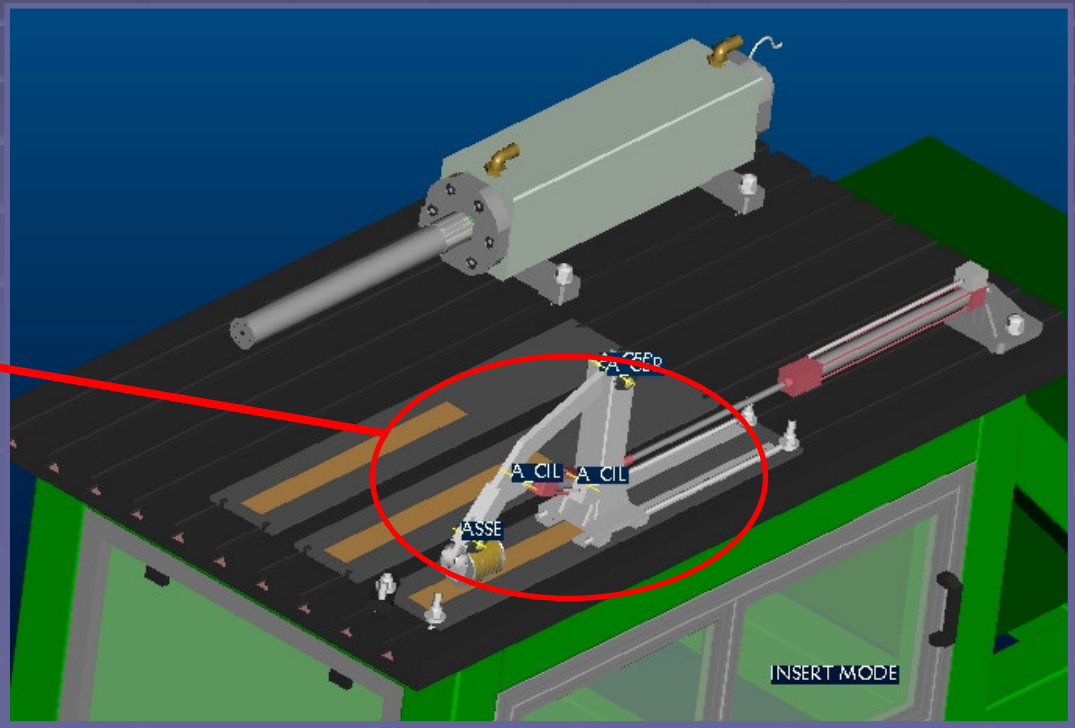
Banco prova

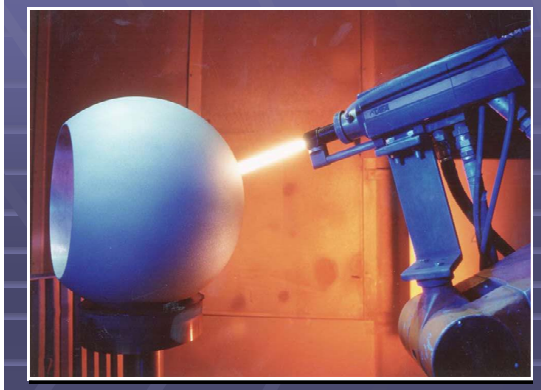




Caratterizzazione tribologica con pin-on-disk







Thermal spray technology

Carbo Flam H coating

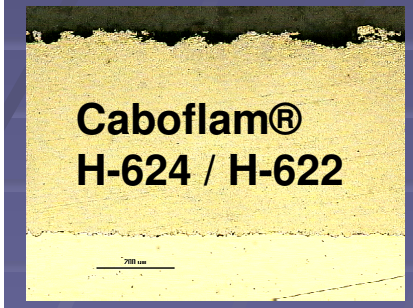
Conventional Carbide coating

WC 86% HP/HVOF
Co 10%
Cr 4%

1100÷1200 HV
0.02 Ra
Porosity < 1%
Bond strength> 60 MPa

(Cr_2O_3) 99.5%

900-11 00H V
4+7 Ra
0.1R a
Porosità 3-60/o



WC 88%
Co 12%

1200÷1400 HV
0.02 Ra
Porosity < 1%
Bond strength > 60 MPa

W-MOLY®
Molibdeno
99.9%

Macrodurezza 40 HRC
Microdurezza> 600 HV
Resistenza carico assiale 25 MPa

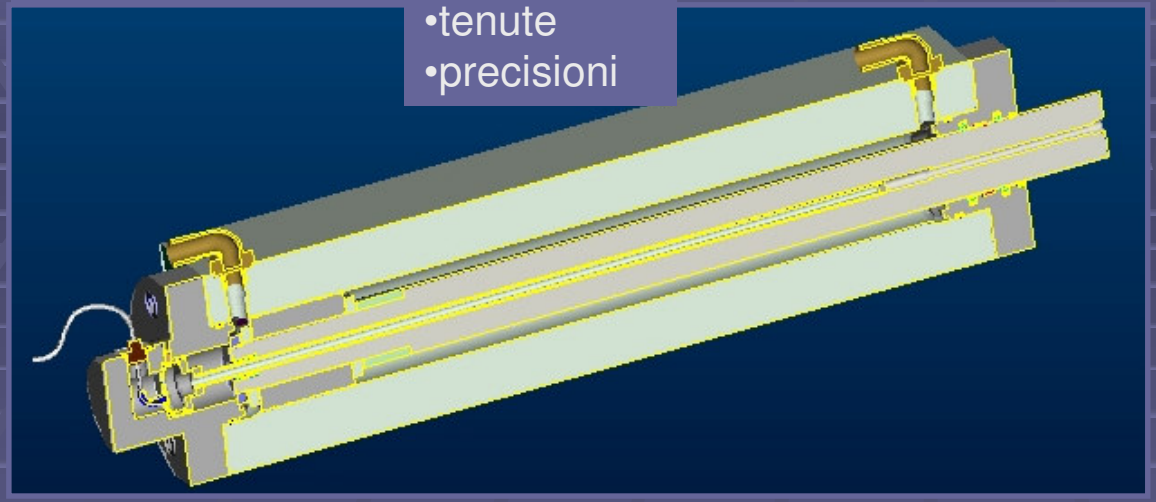
Composito: fase dura a porosità controllata impregnata con composto organico.
Resistenza ad usura pari a quella della fase dura
Effetto antiaderente e autolubrificante assicurato dal polimero assorbito dalla porosità e dalla rugosità della fase dura.

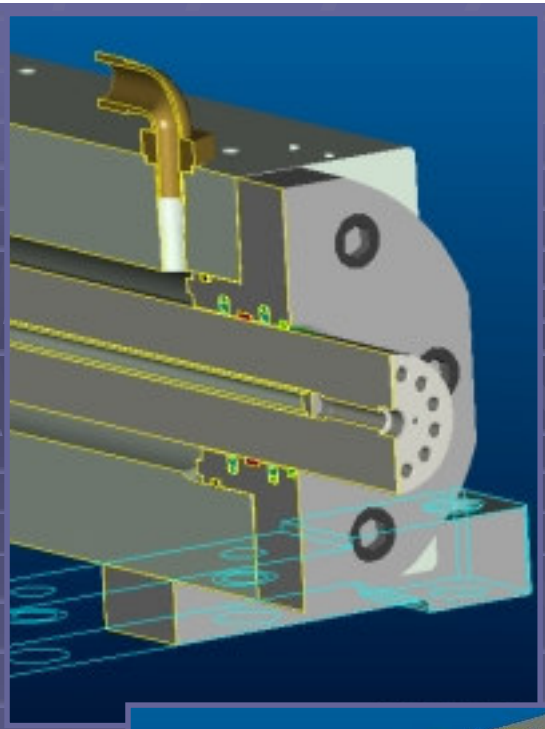
I materiali

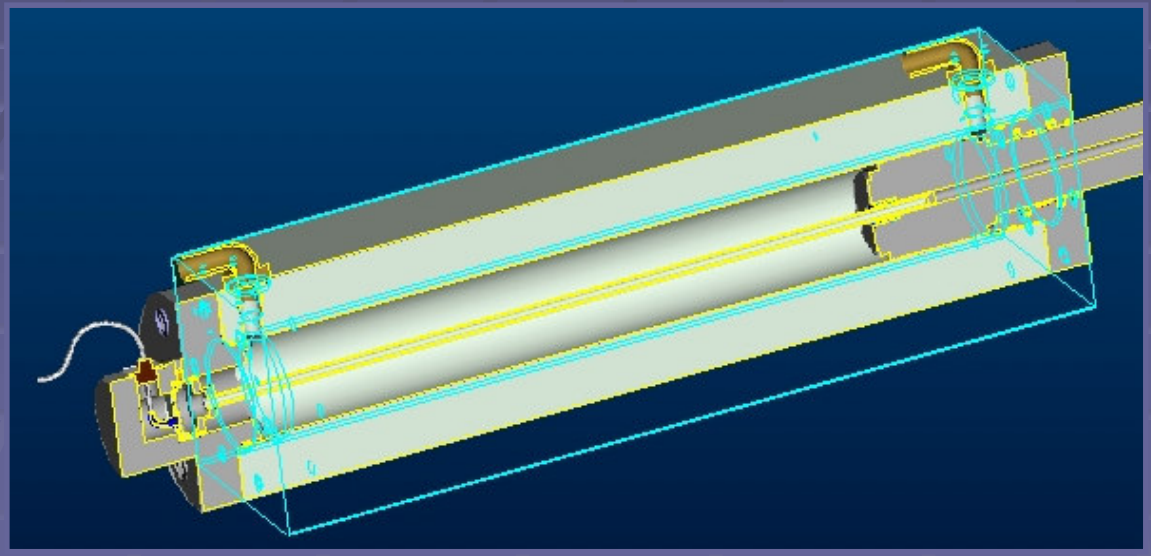
Cilindro prova

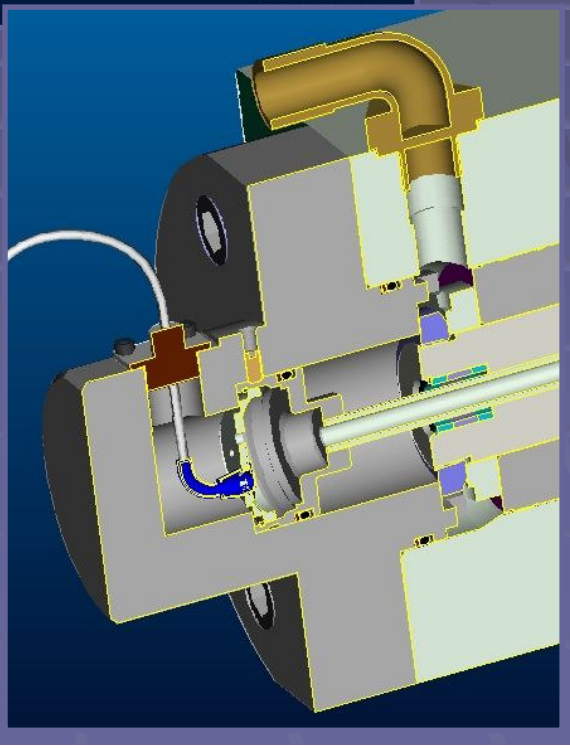
Progetto cilindro speciale

Intercambiabilità =>
- più pezzi
- tenute
- precisioni



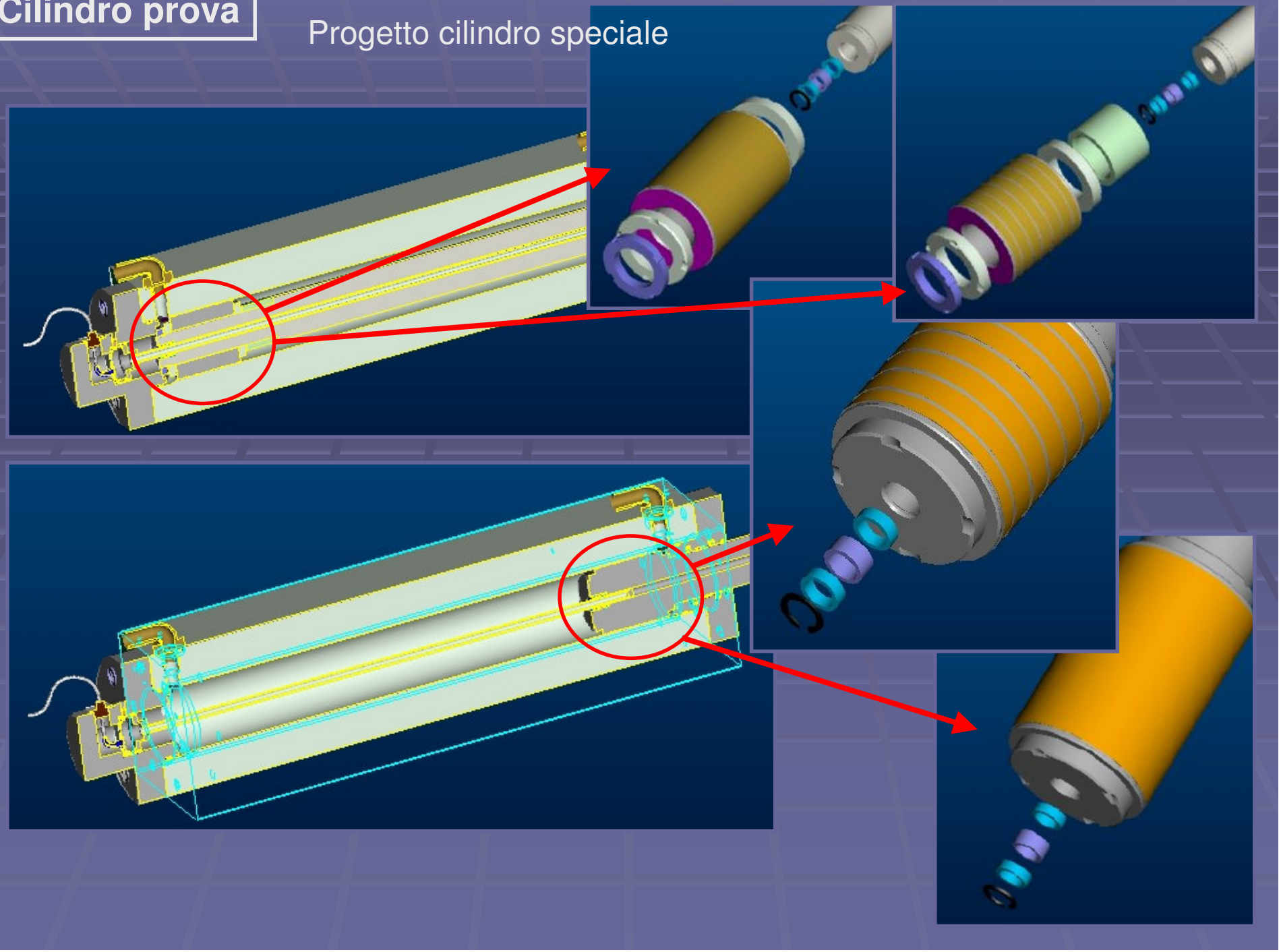




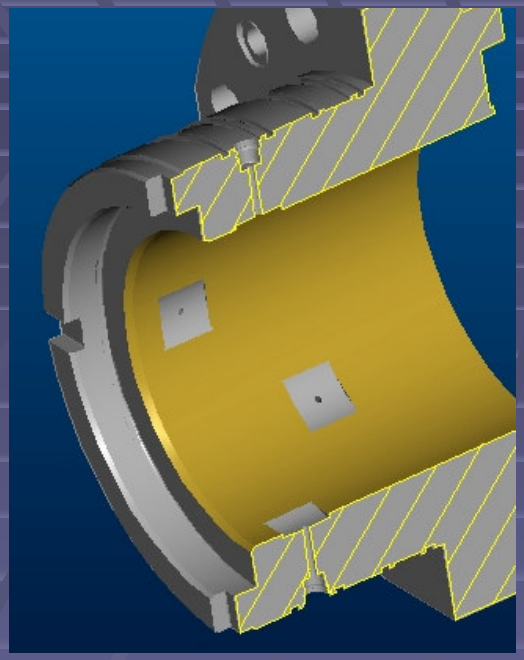


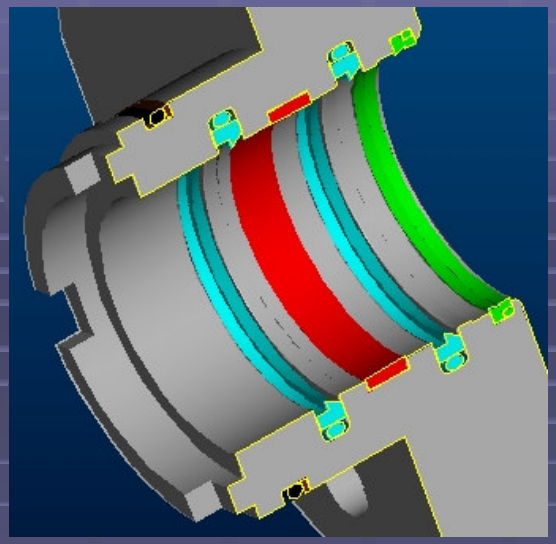
Cilindro prova

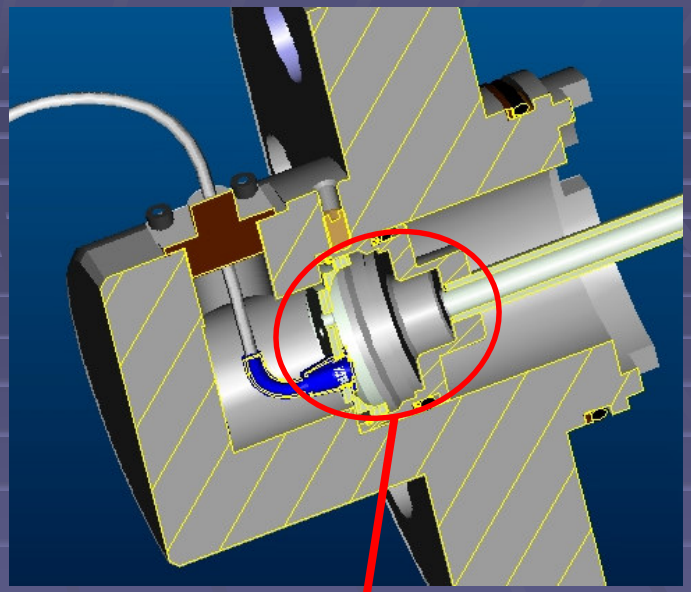
Progetto cilindro speciale

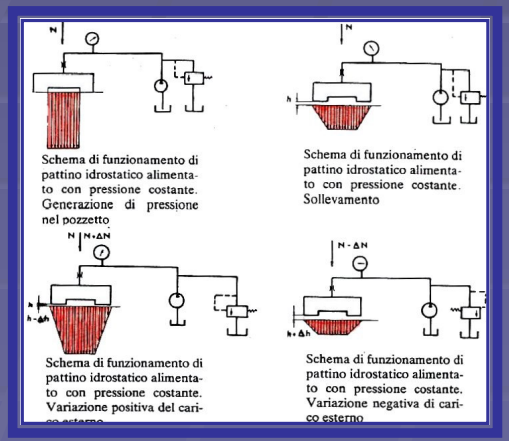


Cilindro prova

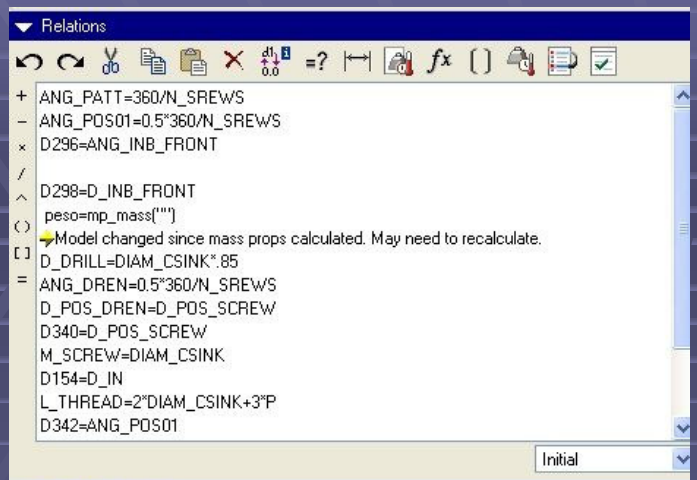


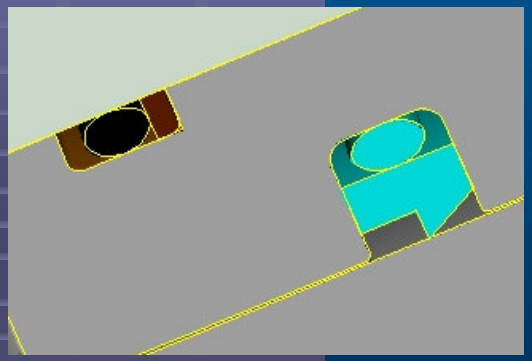


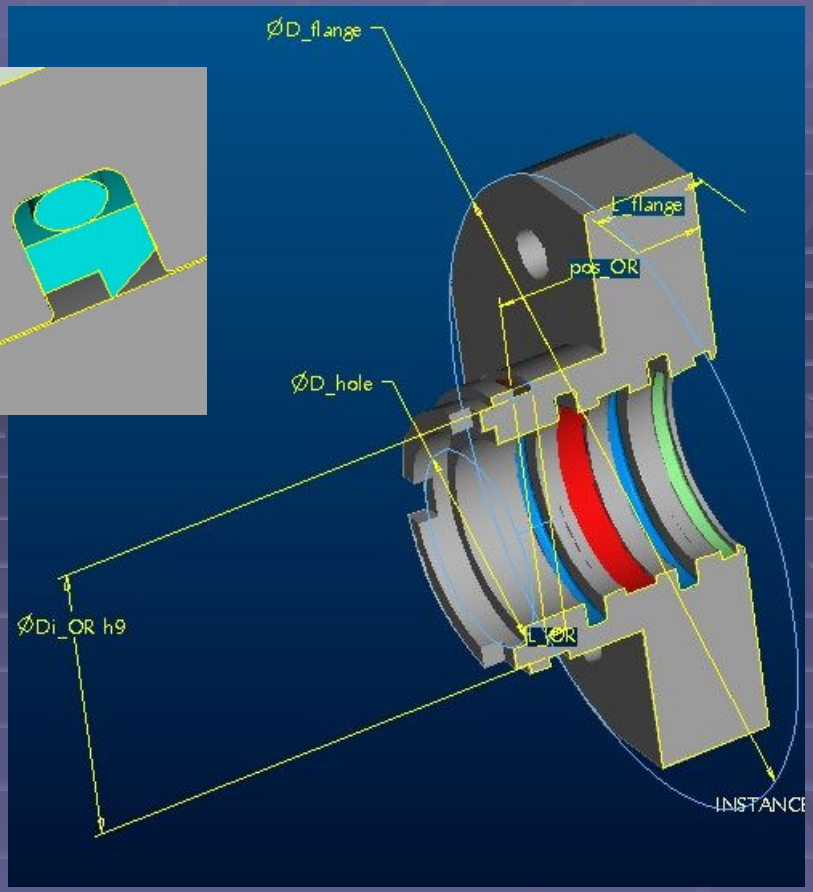


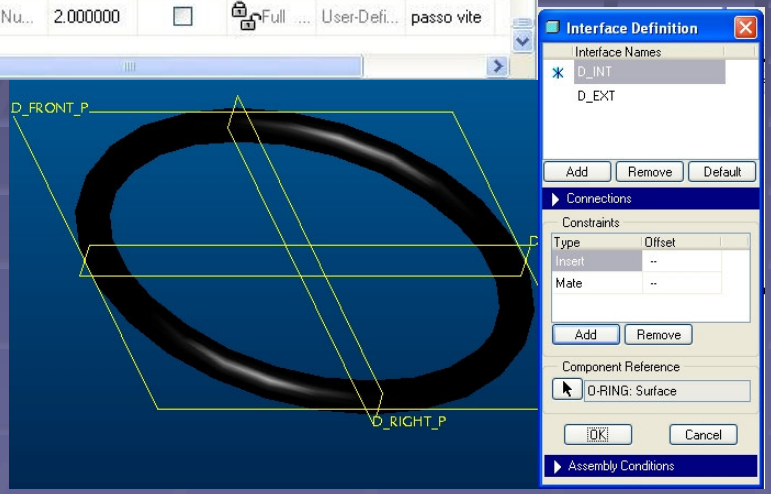


Modello

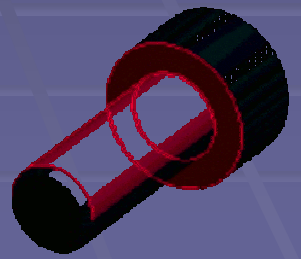








Advanced Family tables
Flexible objects
Component interfaces



Type	Instance Name	d54 D_BODY	d6 W_BODY	S	F10459 [COSMETIC]	d294 D_INB_FRONT	d291 L_INB_FRONT	d308 DIAM_CSINK	N_SREWS	P
	C46YYY-001	80.00	170.00	10.0	N	85.000	33.000	14.000	6.0	2.0
	C46YYY-001_D120	120.00	160.00	12.5	*	125.000	50.500	16.000	8.0	2.0
	C46YYY-001_D080	80.00	170.00	10.0	Y	82.000	50.500	14.000	6.0	2.0
	C46YYY-001_D220	220.00	360.00	25.0	*	230.000	50.500	22.000	10.0	2.5

Software

Materia	E	v	R	G	Rp	A%
Acciaio	[N/mm^2]	[-]	MPa	N/mm^2	MPa	
C40 bor	206.000	0,3	670	80.000	470	16
σFA=	0,3	* σR=	201	[N/mm^2]		
σFA=	0,4	* σR=	268	[N/mm^2]		
1MPa=	10bar=	1N/mm^2				
Corsa	600	[mm]	ΔL	0,00	[mm]	Corsa+ΔL

								v	a			
								[m/s]	[m/s^2]			
								1,50	9,81			
								[mm/s]				
							600	1.500				

Standard welded cylinders

Bore	Rod	φ	De min	Sp.	Diff.	Apist [mm^2]	F [N]	q [l/min]	v' [m/s]	Astelo [mm^2]	Acorona [mm^2]	F' [N]
Diametri						0,00	0,00	6,00E-05				
8	18	-0,25	10	1	-10	50,27	1.055,58	4,52E+00	-3,69E-01	254,47	-204,20	-4.288,27
10	18	-0,45	12	1	-8	78,54	1.649,34	7,07E+00	-6,70E-01	254,47	-175,93	-3.694,51
12	20	-0,56	14	1	-8	113,10	2.375,04	1,02E+01	-8,44E-01	314,16	-201,06	-4.222,30
16	25	-0,69	20	2	-9	201,06	4.222,30	1,81E+01	-1,04E+00	490,87	-289,81	-6.086,05
20	28	-1,04	24	2	-8	314,16	6.597,34	2,83E+01	-1,56E+00	615,75	-301,59	-6.333,45
25	32	-1,57	31	3	-7	490,87	10.308,35	4,42E+01	-2,35E+00	804,25	-313,37	-6.580,85
32	36	-3,76	38	3	-4	804,25	16.889,20	7,24E+01	-5,65E+00	1.017,88	-213,63	-4.486,19
40	36	5,26	48	4	4	1.256,64	26.389,38	1,13E+02	7,89E+00	1.017,88	238,76	5.013,98
50	45	5,26	60	5	5	1.963,50	41.233,40	1,77E+02	7,89E+00	1.590,43	373,06	7.834,35
[illegible]	45	2,29	70	5	15	2.827,43	59.376,10	2,54E+02	3,43E+00	1.590,43	1.237,00	25.977,04
63	50	2,70	75	6	13	3.117,25	65.462,15	2,81E+02	4,05E+00	1.963,50	1.153,75	24.228,75
70	56	2,78	82	6	14	3.848,45	80.817,47	3,46E+02	4,17E+00	2.463,01	1.385,44	29.094,29
80	56	1,96	94	7	24	5.026,55	105.557,51	4,52E+02	2,94E+00	2.463,01	2.563,54	53.834,33
90	63	1,96	106	8	27	6.361,73	133.596,23	5,73E+02	2,94E+00	3.117,25	3.244,48	68.134,08
100	63	1,66	118	9	37	7.853,98	164.933,61	7,07E+02	2,49E+00	3.117,25	4.736,74	99.471,46
110	63	1,49	128	9	47	9.503,32	199.569,67	8,55E+02	2,23E+00	3.117,25	6.386,07	134.107,52

Stelo - Carico di punta
stelo pieno

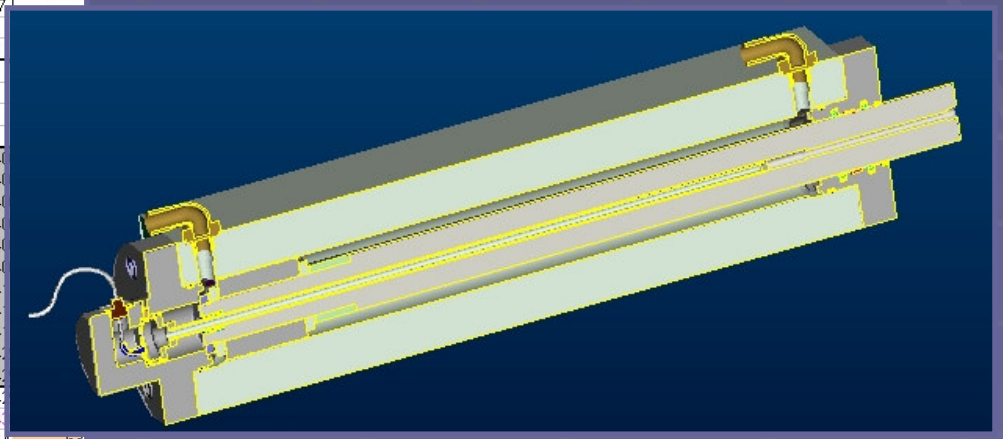
F	σcr			
λp acc.=	90	Imin	Pcr	λ
Lo=L*	1	2	0,5	0,707107
k				
3,5	α-----Δ	▒-----	▒-----=	▒----Δ
L	dmin			
[mm]	[mm]			

L [mm]	dmin [mm]			
600	11	16	8	10
600	13	18	9	11
600	14	20	10	12
600	16	23	11	14
600	18	25	13	15
400	16	23	12	14
600	23	32	16	19
600	25	36	18	21
600	28	40	20	24
600	31	44	22	26
600	32	45	23	27
600	34	48	24	28
600	36	51	25	30
600	38	54	27	32
600	40	57	28	34
600	42	60	30	35
600	44	62	31	37

Stelo - Carico di punta
stelo cavo

F	σcr			
λp acc.=	90	Imin	Pcr	λ
Lo=L*	1	2	0,5	0,707107
k				
3,5	α-----Δ	▒-----	▒-----=	▒----Δ
d foro	dmin			
[mm]	[mm]			
40				

d foro [mm]	dmin [mm]				
40	40	40	40	40	40
40	40	40	40	40	40
40	40	41	40	40	40
40	40	41	40	40	40
40	40	42	40	40	40
40	40	41	40	40	40
40	41	44	40	41	40
40	42	45	40	41	40
40	42	48	41	41	40
40	43	50	41	42	40
40	44	51	41	42	40
40	44	53	41	42	40
40	45	55	42	43	40
40	46	58	42	44	40
40	48	60	42	44	40
40	49	62	43	45	40
40	50	65	43	46	40



AmeSim

The *Mode Operations* Toolbar changes depending on the mode you are workin
on. The available features of each mode are different (see Figure 2.26 to Figur
2.29).

In *Sketch* mode, you can build your sketch using the components that ar
available in the categories. The categories are displayed in a vertical too
bar on the left of the main window of **AMESim**.

In *Submodel* mode, you can choose the submodels you want to attach t
each component.

In *Parameter* mode, you can set the parameters of the submodels. You
can save the parameters from one submodel to use them for another sub
model. I

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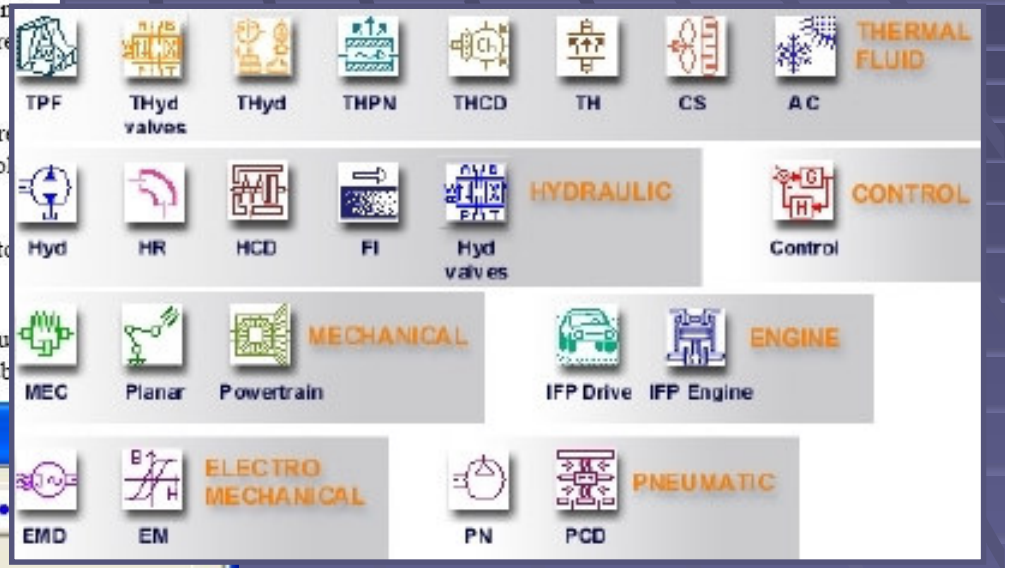
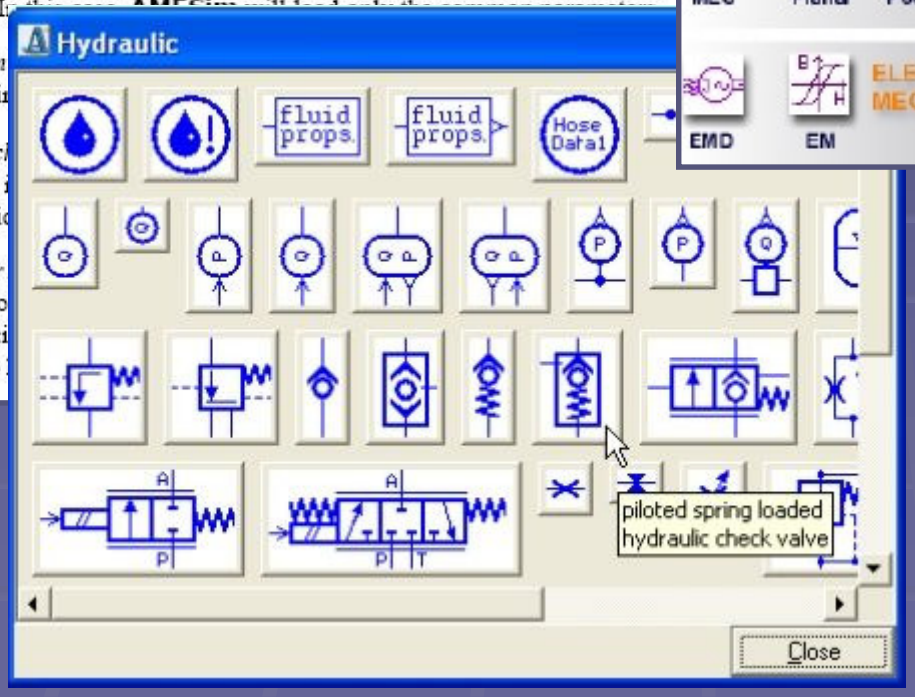
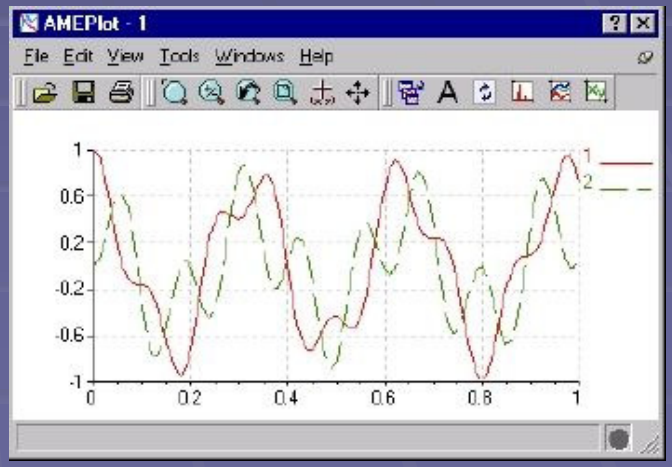
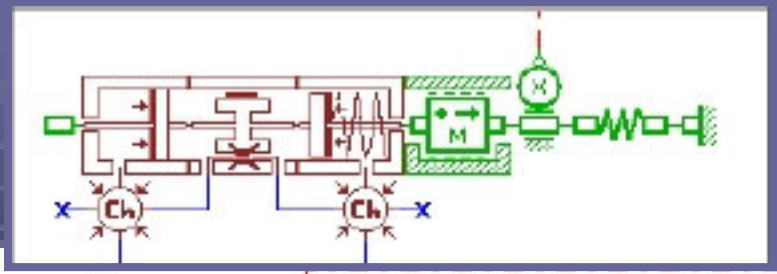
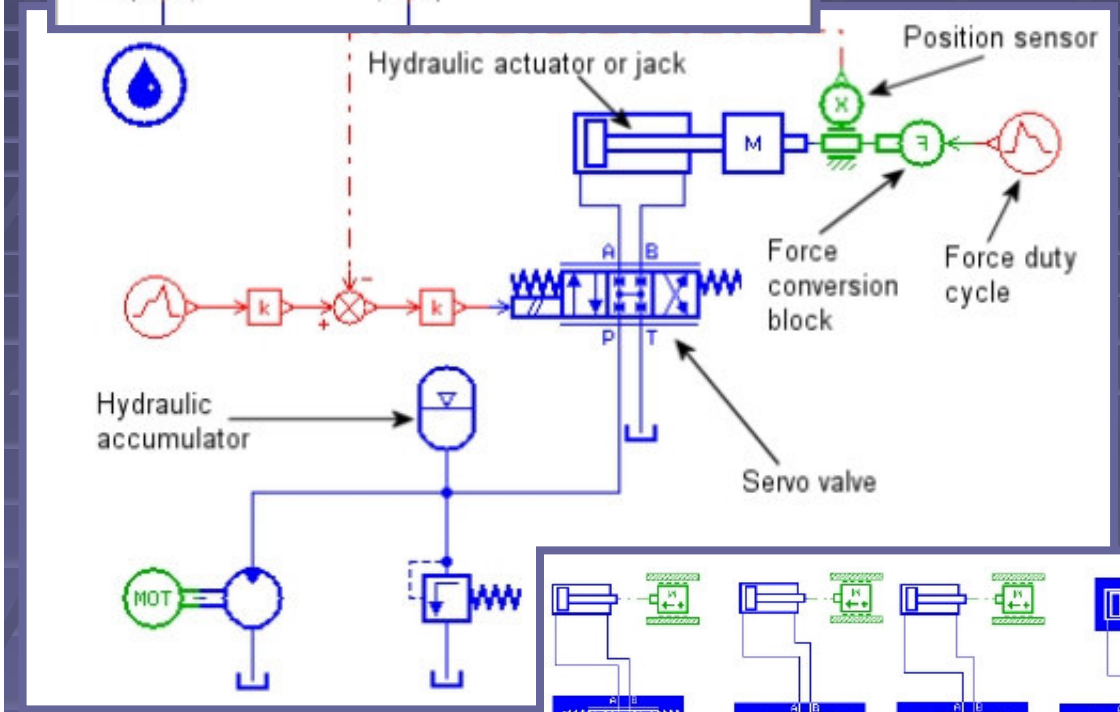


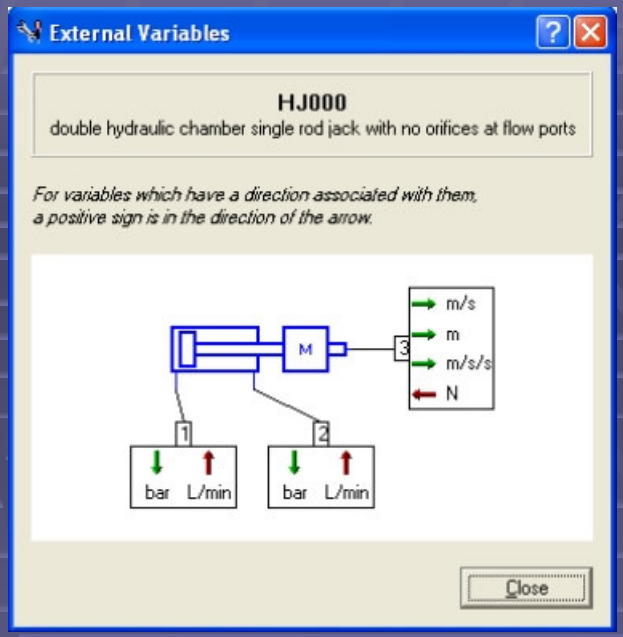


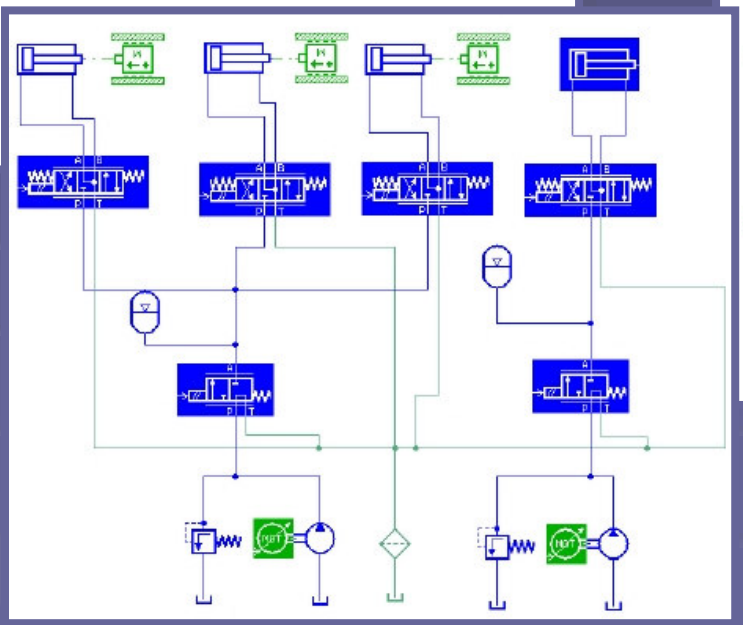


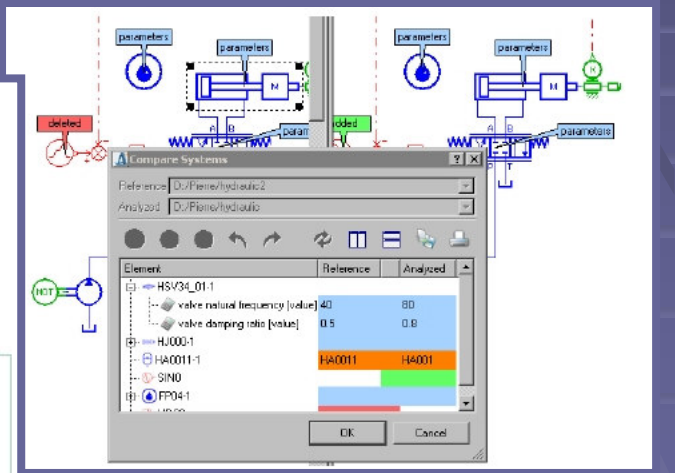
AmeSim



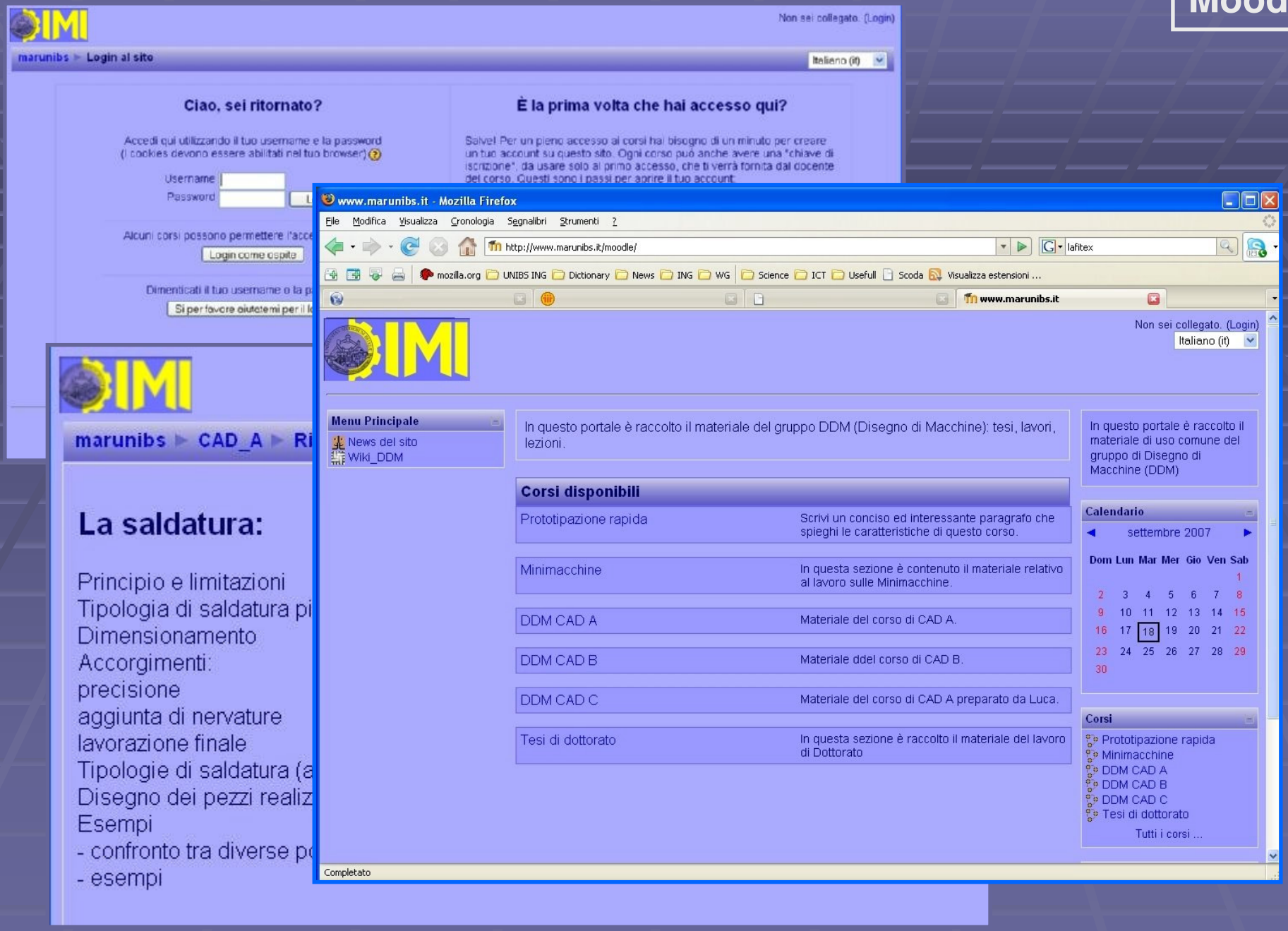

Hydraulic actuator or jack
Position sensor
Force conversion block
Force duty cycle
Hydraulic accumulator
Servo valve
MOT


External Variables
HJ000
double hydraulic chamber single rod jack with no orifices at flow ports
For variables which have a direction associated with them, a positive sign is in the direction of the arrow.
m/s
m
m/s/s
N
bar L/min
bar L/min
Close




Compare Systems
Element
Reference
Analyzed
OK
Cancel

Moodle


Non sei collegato. (Login)
marunibs ▶ Login al sito
Italiano (it)
Ciao, sei ritornato?
Accedi qui utilizzando il tuo username e la password
(I cookies devono essere abilitati nel tuo browser)
Username
Password
Login come ospite
È la prima volta che hai accesso qui?
Salve! Per un pieno accesso ai corsi hai bisogno di un minuto per creare un tuo account su questo sito. Ogni corso può anche avere una "chiave di iscrizione", da usare solo al primo accesso, che ti verrà fornita dal docente del corso. Questi sono i passi per aprire il tuo account:
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File Modifica Visualizza Cronologia Segnalibri Strumenti ?
http://www.marunibs.it/moodle/
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mozilla.org UNIBS ING Dictionary News ING WG Science ICT Usefull Scoda Visualizza estensioni ...
www.marunibs.it
Non sei collegato. (Login)
Italiano (it)
Menu Principale
News del sito
Wiki_DDM
In questo portale è raccolto il materiale del gruppo DDM (Disegno di Macchine): tesi, lavori, lezioni.
In questo portale è raccolto il materiale di uso comune del gruppo di Disegno di Macchine (DDM)
Corsi disponibili
Prototipazione rapida
Scrivi un conciso ed interessante paragrafo che spieghi le caratteristiche di questo corso.
Minimacchine
In questa sezione è contenuto il materiale relativo al lavoro sulle Minimacchine.
DDM CAD A
Materiale del corso di CAD A.
DDM CAD B
Materiale ddel corso di CAD B.
DDM CAD C
Materiale del corso di CAD A preparato da Luca.
Tesi di dottorato
In questa sezione è raccolto il materiale del lavoro di Dottorato
Calendario
settembre 2007
Dom Lun Mar Mer Gio Ven Sab
Corsi
Prototipazione rapida
Minimacchine
DDM CAD A
DDM CAD B
DDM CAD C
Tesi di dottorato
Tutti i corsi ...
Completato
marunibs ▶ CAD_A ▶ Ri
La saldatura:
Principio e limitazioni
Tipologia di saldatura pi
Dimensionamento
Accorgimenti:
precisione
aggiunta di nervature
lavorazione finale
Tipologie di saldatura (a
Disegno dei pezzi realiz
Esempi
- confronto tra diverse p
- esempi

... thank you