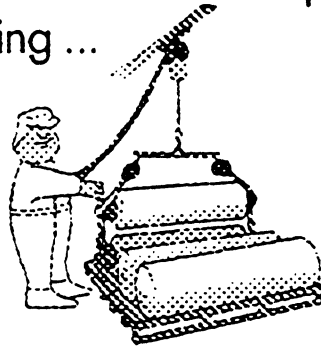


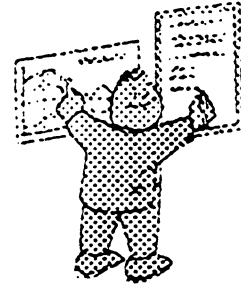


Our objective: the health and safety  
of people at work

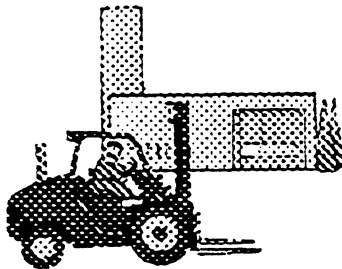
encompassing ...



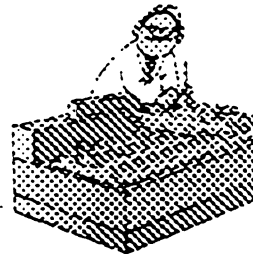
the work station



work organisation



work sites and premises



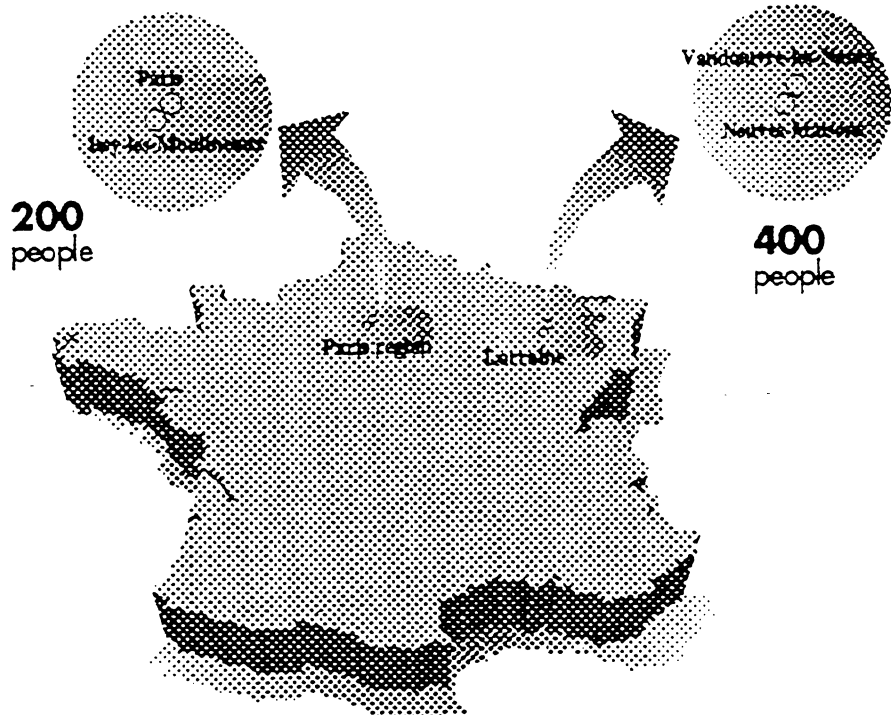
production processes and tools

LA LIGNE PRÉVENTION

Tous droits réservés. Toute réimpression ou utilisation non autorisée sans la permission écrite de la LIGNE PRÉVENTION est formellement interdite.



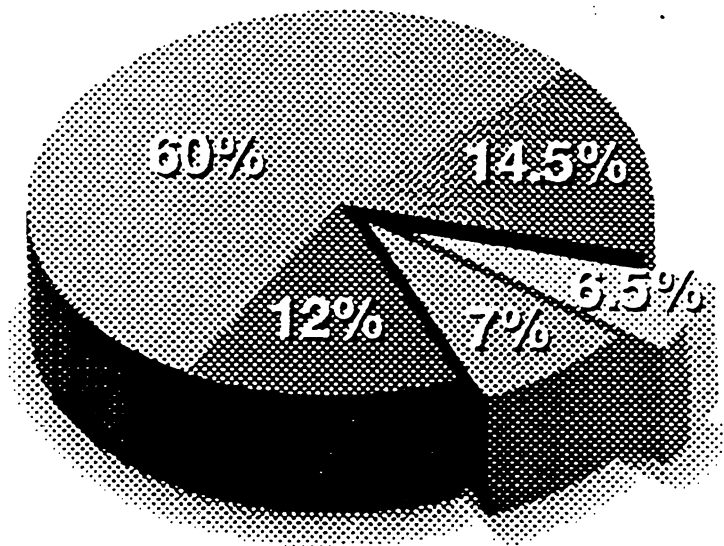
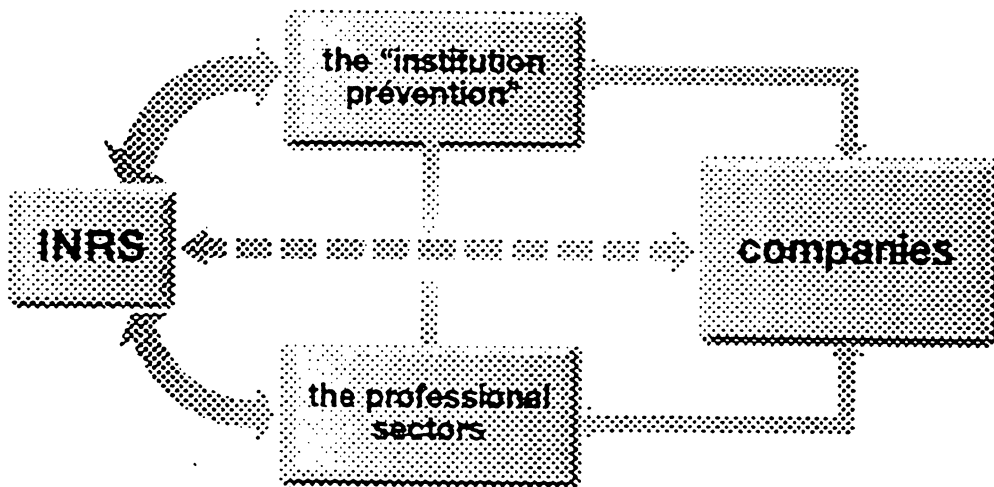
Nearly 600 people spread over four sites



LA LIGNE PRÉVENTION

Tous droits réservés. Toute réimpression ou utilisation non autorisée sans la permission écrite de la LIGNE PRÉVENTION est formellement interdite.

INRS - 1111 - 1111 - 1111



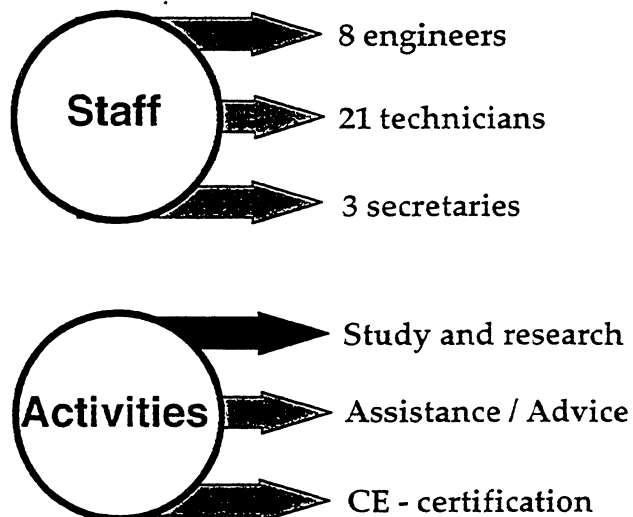
Harmful effects of chemical agents  
 Harmful effects of physical agents

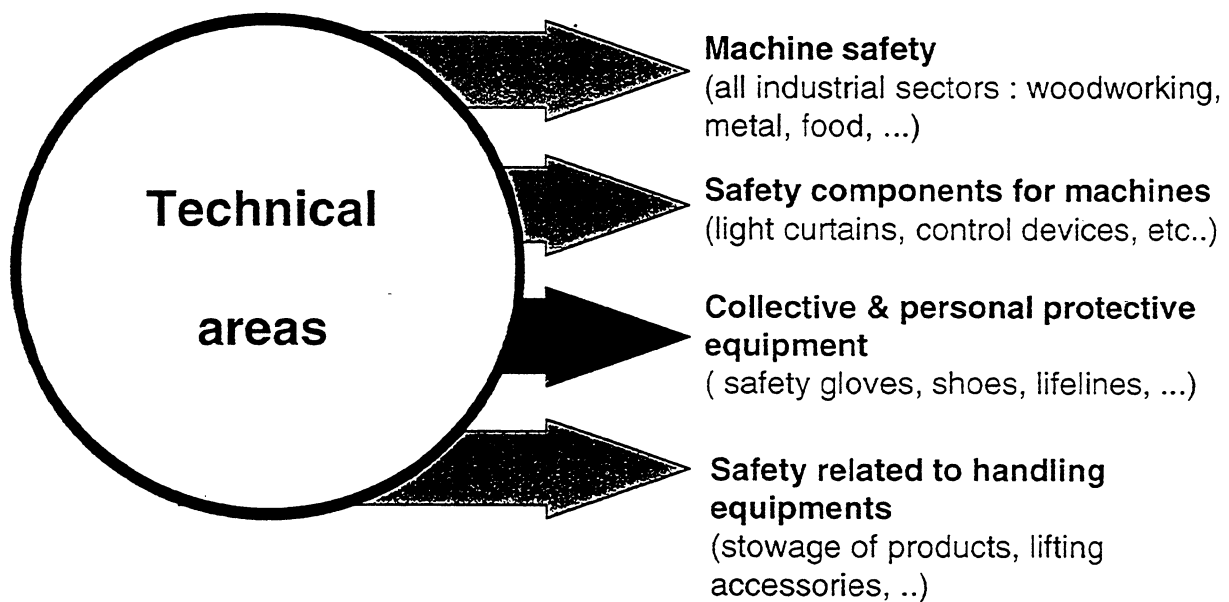
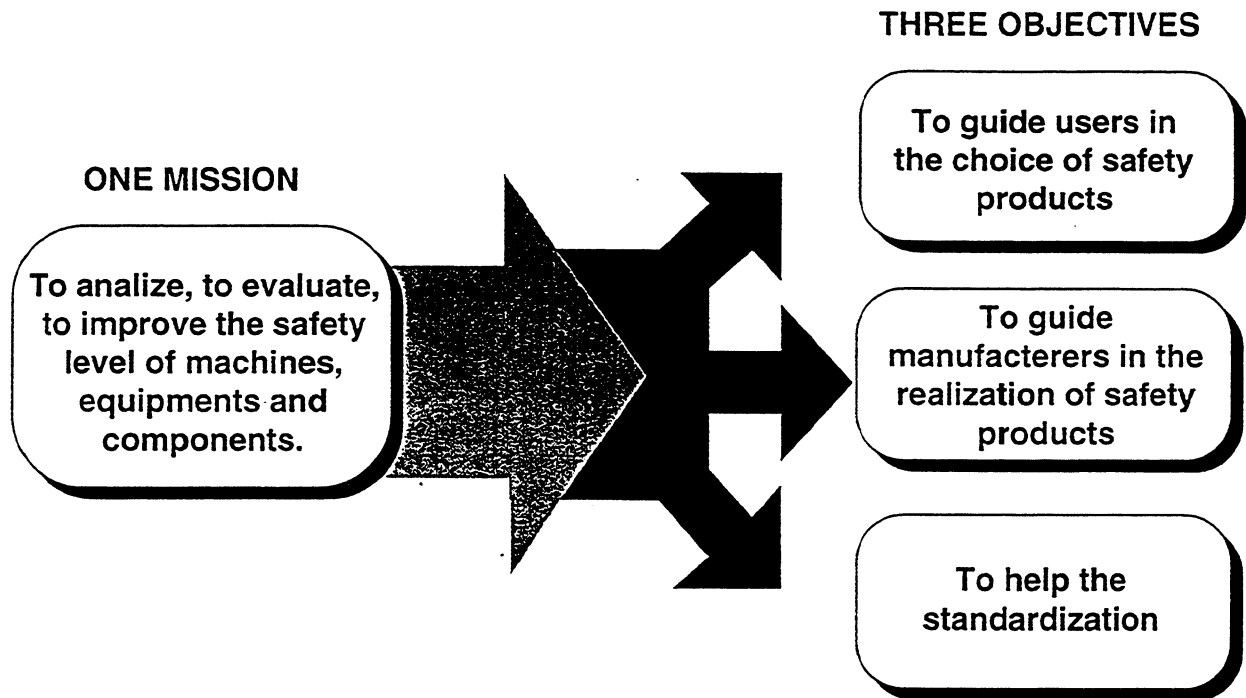
Accident risks  
 Pollutant capture  
 Ergonomics, work load and work conditions

✓ **Mechanic, Accoustic and Vibration department**  
(réduction of seat vibration on fork lift truck)

✓ **Machine and Protective Device department**

- ⇒ Simulate falls from heights (ADAMS /Androïd)
- ⇒ Improve mechanical device (saw band protector)
- ⇒ Improve the stowing of truck loading

**MACHINERY AND PROTECTIVE DEVICES  
DEPARTMENT**



## Some examples of current studies

Safety improvements  
of band saw machines

Study on control circuit diagrams  
for persons elevating devices

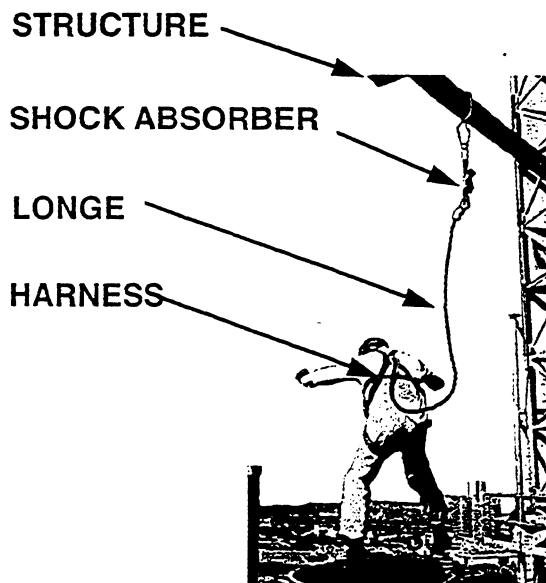
Development of a heat protective  
glove for protection against  
extremely high temperatures

Study and evaluation  
of cam programmer

Safety improvements  
in the operation of semi automatic  
woodworking machines

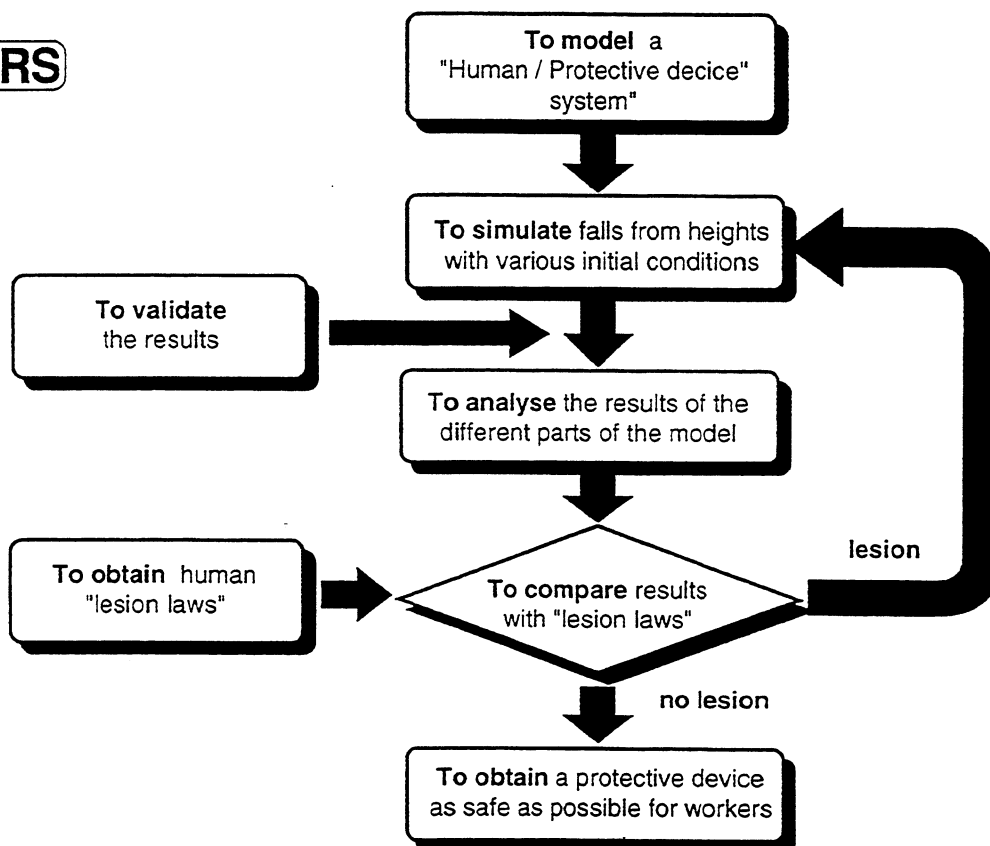
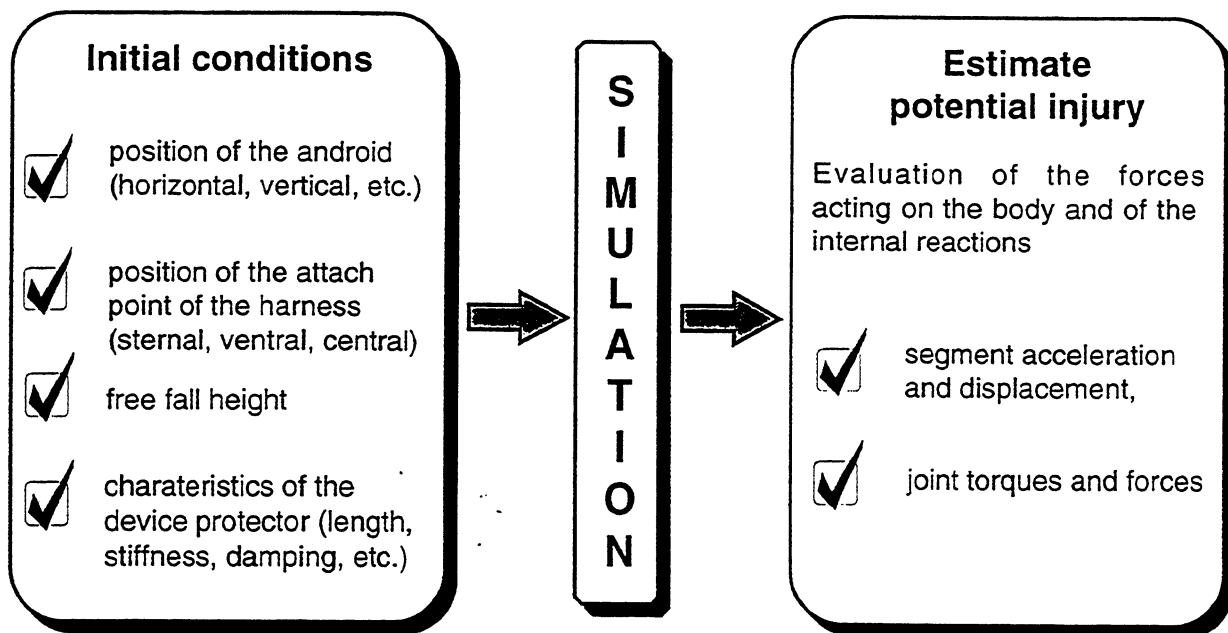
Falls from heights  
Simplified modeling of man /  
protective device systems

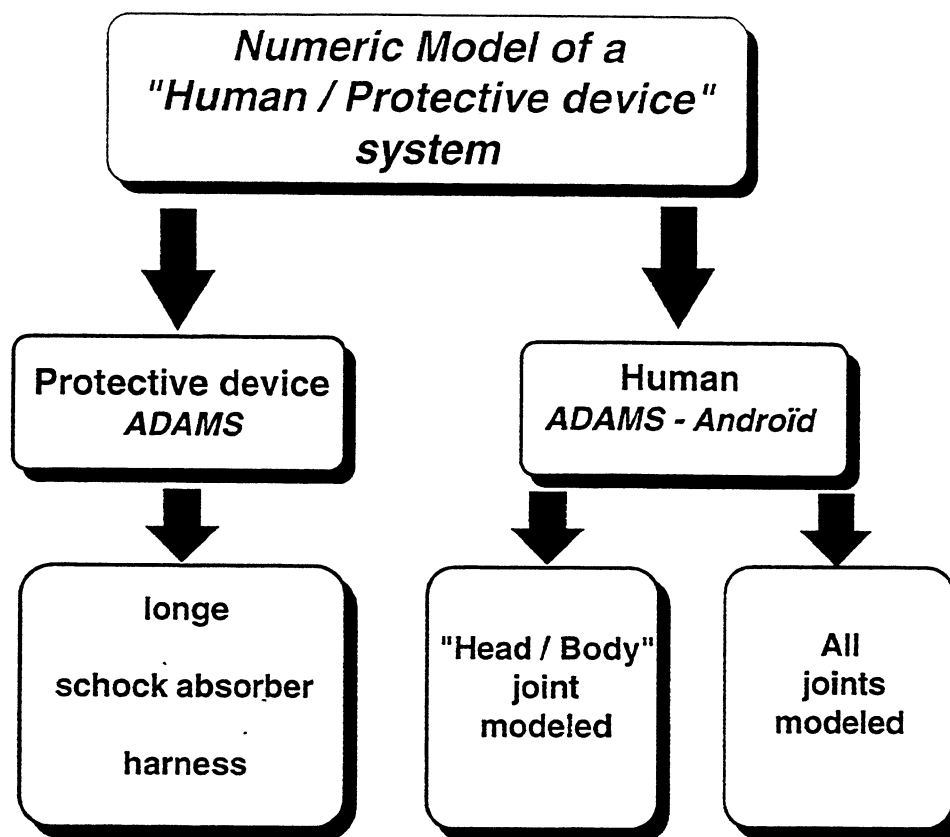
Study and evaluation of  
double bodied solenoid valves



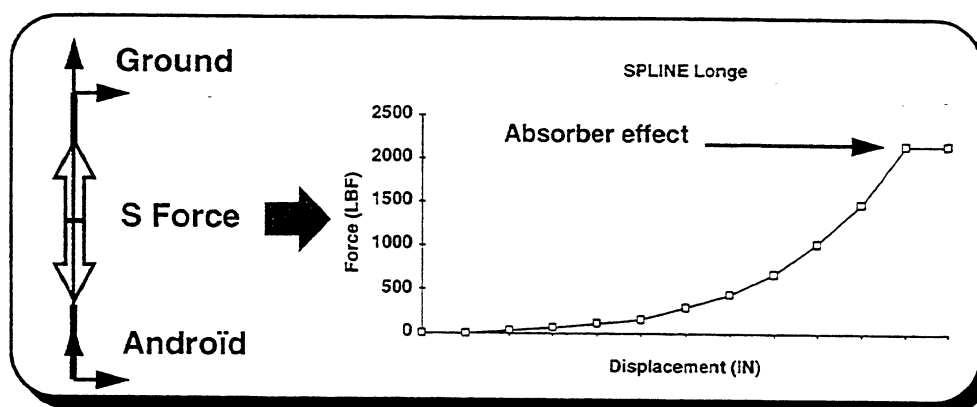
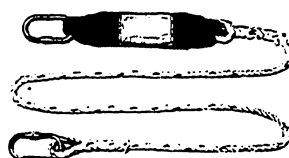
### OBJECTIVE

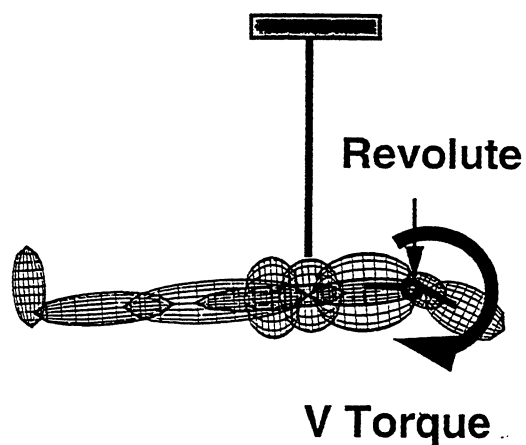
Optimize " Human /  
Protective devices "  
systems in order to  
make them as safe  
as possible for  
workers.



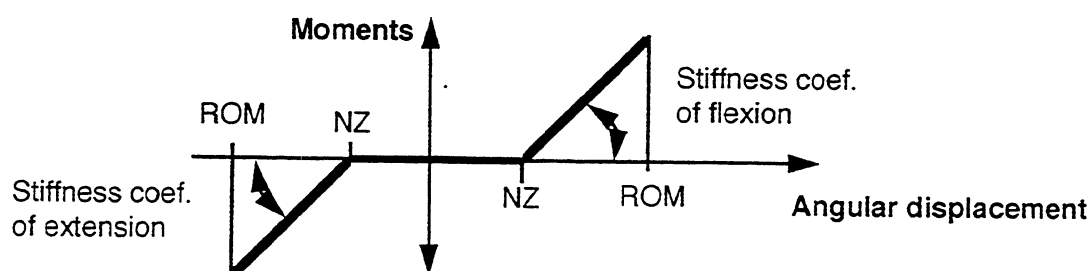


## LONGE & SCHOCK ABSORBER





- ✓ Uniaxial fall : body remains horizontal during the fall.
- ✓ One of the most unfavourable conditions of fall.
- ✓ Compare results of numeric simulation with those obtained from Analytical model

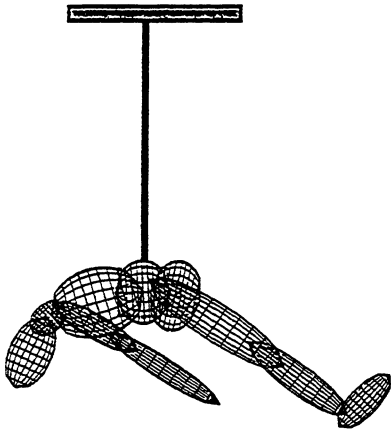


F.S.U	Moments Stiffness coef. (Nm/deg)		Neutral Zone (deg)	Range of Motion (deg)
	Flexion	Extension	Flexion / Extension	Flexion / Extension
Cervical	0,43	- 0,73	+ / - 9,2	+ / - 90

Data from A.A WHITE III & M.M PANJABI "Clinicals Biomechanics of the spine"



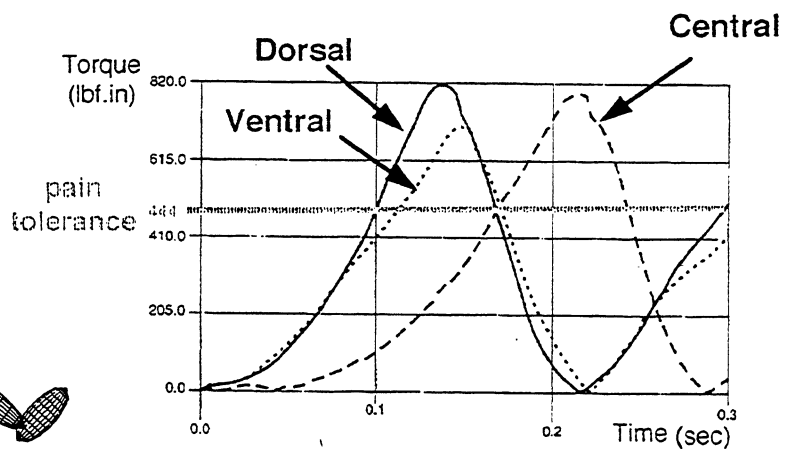
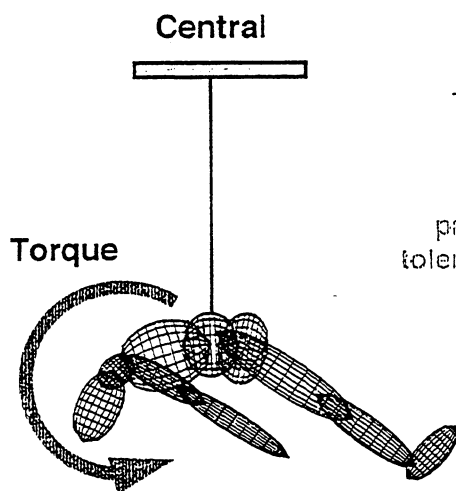
## Virtual / Human Passive Strength Toolset



- ✓ Derived from HYBRID III Crash dummy
- ✓ Biomechanical data for 14 human joints (3 DoF)
- ✓ May be scaled based on sex, age, and size
- ✓ Any combination of joint / DoF may be specified
- ✓ Includes both non-linear resistance torques and motion limits.

## Examples of results

### Comparison of the upper neck torque



***Advantages of the use of  
ADAMS / Androïd***

- ☒ Study falls from heights with **various initial conditions**
- ☒ Improve the protective device with a **better accuracy**
- ☒ **Save time** in the improvement of the protective device