

Cobotics: human – robot collaboration

using powerful yet user-friendly
industrial robots

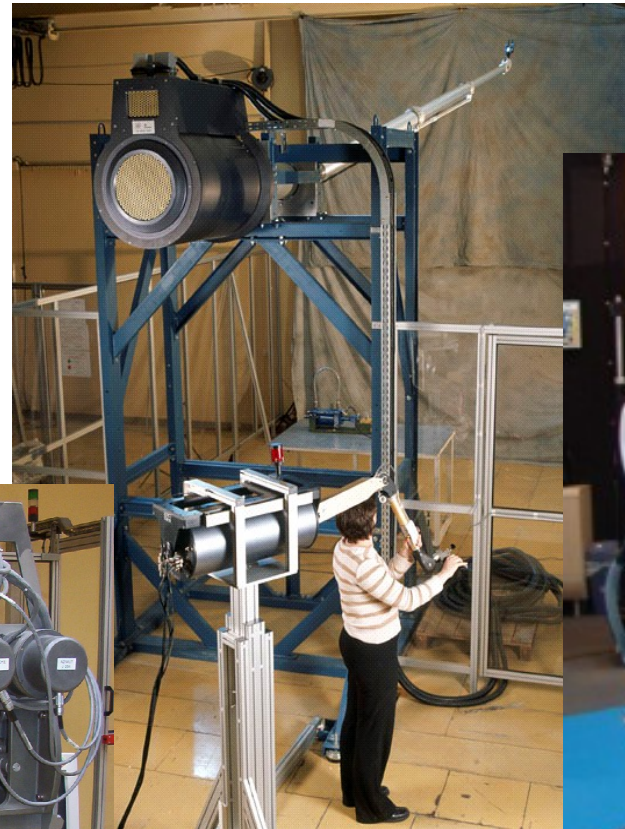
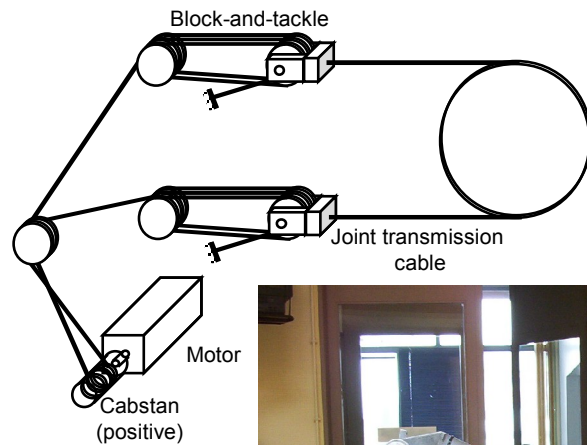


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CEA LIST: a long history of man – robot interaction

- Applied tele-manipulation

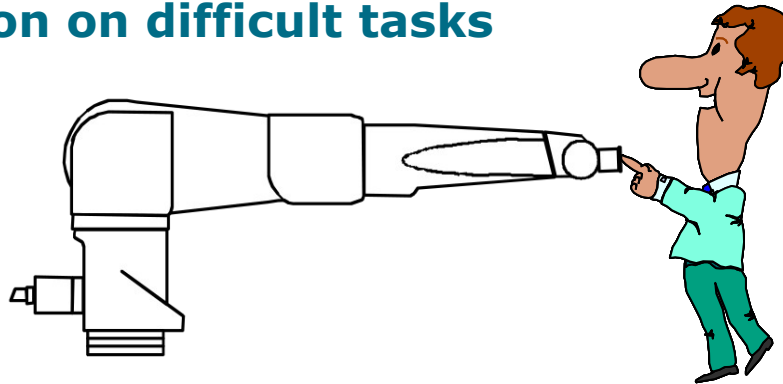
**BLOCK-AND-TACKLE/CABLE
MA 23
circa 1974 (CEA/La Calhène)**





ECHORD meeting / CEA LIST, September 4th, 2009

Cobotics applications

- **context: musculoskeletal disorders**
- **collaboration on difficult tasks**

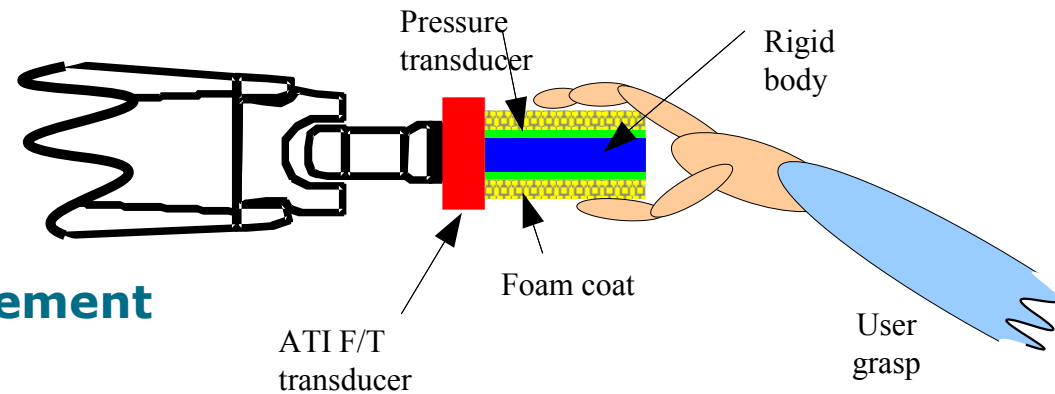


- **industrial robots complement well men**

	<ul style="list-style-type: none"> • Force • Speed • Precision • Stiffness 		<ul style="list-style-type: none"> • adaptation • easy to program • perception of complex tasks and environments
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- **+ other functions: weight compensation, supervision, force amplification**

Interfaces



- **Use of force / torque measurement**
- **Intelligent handle to allow high gain control**
 - enhances stability
 - toward much transparent behaviour (lower apparent inertia)
 - using mechanical filter and low cost pressure sensor
- **Protective active skin**
 - for safety reasons
 - fast response time (1 ms)
 - allow to modify robot control to avoid chocs
 - low cost