Telerobotics at Harwell

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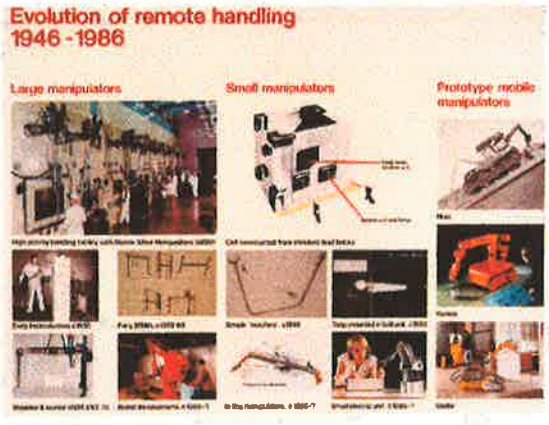
Engineering Manager, Harwell

Presentation to RHWG, 21 May 2001

Telerobotics at Harwell

- Background - Harwell's Remote Handling Group



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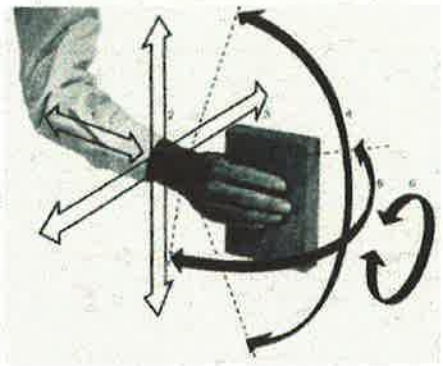
- Remote Handling (& Telerobotics) is all about controlling manipulation safely, at a distance



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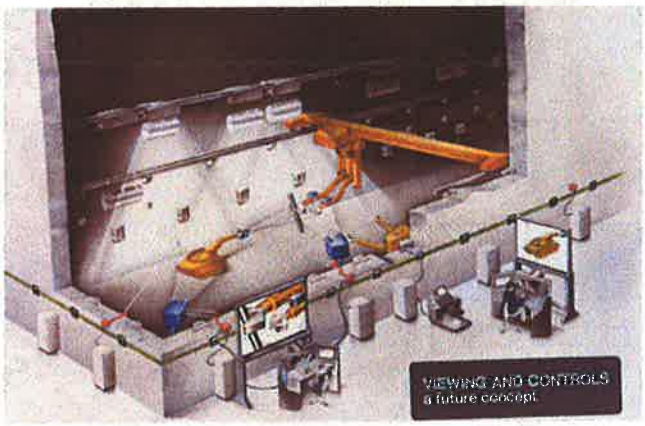
- The Open Cell Concept - c.1979



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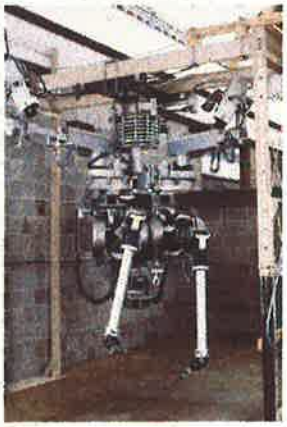
Telerobotics at Harwell

- The basic bilateral, force-reflecting servomanipulator



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CRL

Telerobotics at Harwell

- The basic bilateral, force-reflecting servomanipulator

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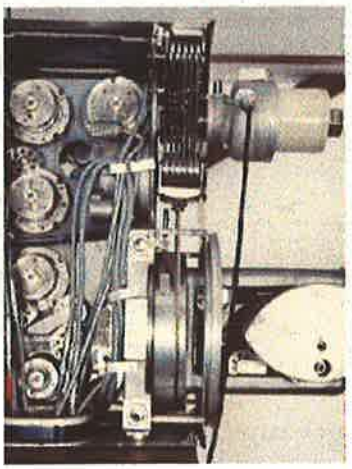
CEA MA23M

Telerobotics at Harwell

- With the cover off.....



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CEA MA23M

Telerobotics at Harwell

- With the cover off.....

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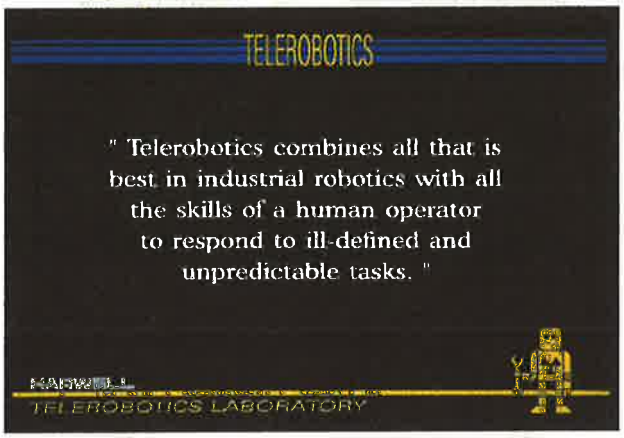
Unimation Puma 760

Telerobotics at Harwell

- The Definition:



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Telerobotics at Harwell

- **Robotics & Teleoperation Study Project**
  - joint funded with BNFL (1984-5)
- **Development of Rad-tol Telerobot (NEATER)**
  - and systems infrastructure (HTC/CARMA/BSP)
- **Development of Advanced Viewing (TV^3)**
  - joint funded with CEGB/NE
- **CEC Projects**
  - Decommissioning, TELEMAN I & II
- **Commercial Sales to Nuclear Organisations**
  - BNFL, NE, Germany, Belgium, Canada, USA, Spain, Japan

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- NEATER - Nuclear-Engineered Advanced TEleRobot

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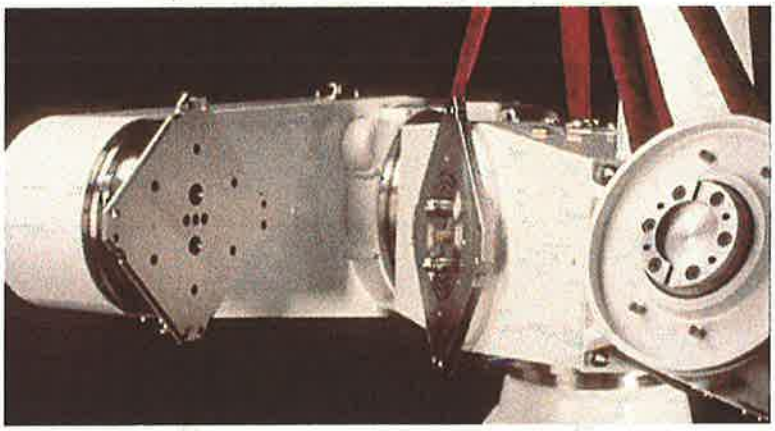
- NEATER - modularity - forearm removal



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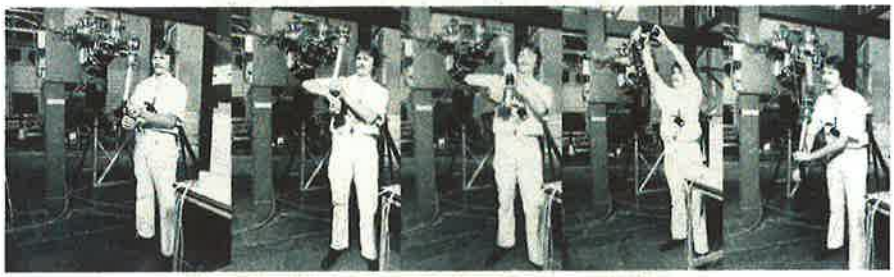
- Human Factors Evaluations



Use of High Resolution TV vs Stereoscopic TV with a force-reflecting servomanipulator

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- Stereo TV Application Trial

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- Applications of Telerobotics (i)

NEATER - Flask swabbing at Windscale Vitrification Plant

NEATER - Decommissioning ~130 Pu & U gloveboxes

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- Applications of Telerobotics (ii)

NEATER - Clearance & Decontamination of DIDO High Activity Handling Bay

ARTISAN - Clearance of VEC Hot Cells

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- Applications of Telerobotics (iii)

TV³ - Demonstration of
Reactor Inspection at OO7

TV³ - LLNL/IBM
New Pu Glovebox

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- AEAT's Products

Bilateral Stewart Platform (BSP)
- a force-reflecting master
input device

NEATER 660
- slim-line rad-tol force-reflecting
telerobot

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- Recent, Current & Future RH Projects
  - Reactors
    - GLEEP Fuel Unload, GLEEP Dismantling
    - BEPO Dismantling, MTRs Dismantling
  - ILW
    - ILW Retrieval
    - ILW Cementation; Sludge & Liquor Immobilisation
  - Tenants
    - B220.29 Box Handling
  - JET Decommissioning & Waste Management…

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- BEPO and GLEEP

		BEPO		GLEEP	
Shut down date		December 1968		September 1990	
Core size (cube side, feet)		26		23	
Graphite brick size (L" x W" x H")		27x7¼ x7¼		27x7¼ x7¼	
No of fuel channels		888		676	
Core shape (diam' x length')		20x20		$17^{2}/_{3}$x17	
Possible remnant Wigner energy (J)		$1.6\ 10^{10}$ in ~1000m^3		-	
Hulk material	main activity	t	GBq	t	GBq
Graphite	^{14}C, (B)/^{3}H(G)	863	40,000	523	30
Steel	^{60}Co	609	2	?	25
Concrete	^{133}Ba	3080	60 (inner m)	?	18 (lower BS)
Cast iron	^{60}Co	388	4,000	-	-

NB Caution - these figures are unchecked

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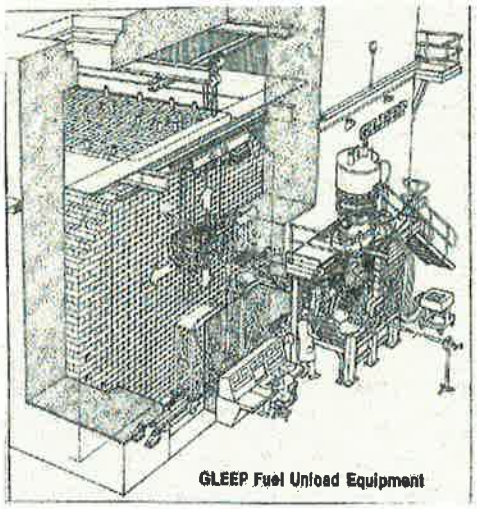
- GLEEP



GLEEP Fuel Unload Equipment

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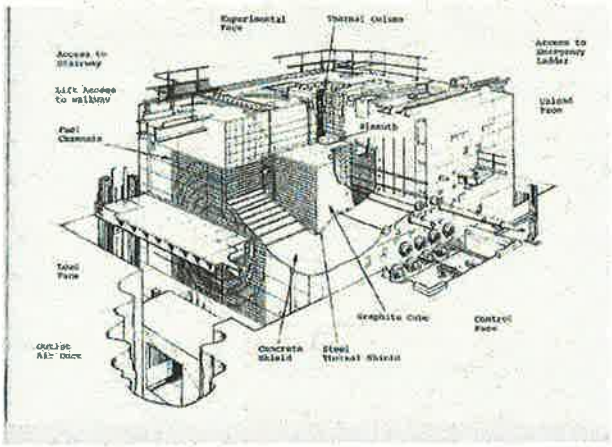
- BEPO



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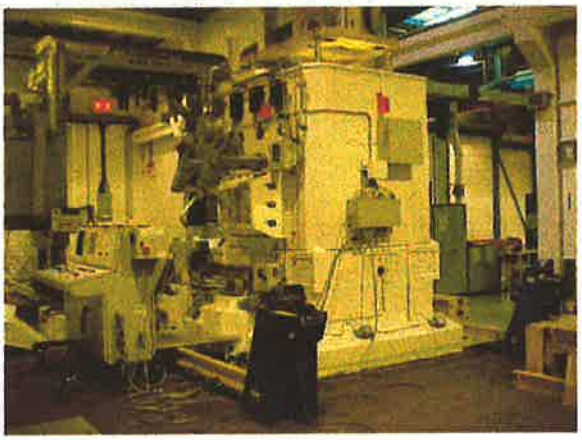
- ILW Retrieval Machine



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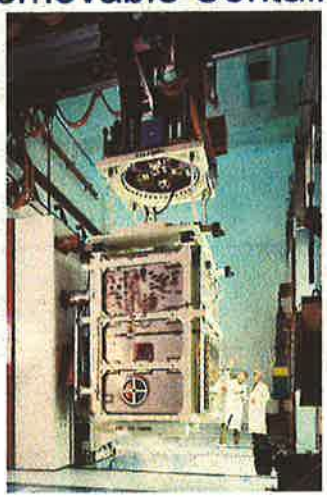
- B220.29 - Removable Containment Box



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