

LABORATORY ERGONOMICS IN 2-102, 104, 106

Contacts:

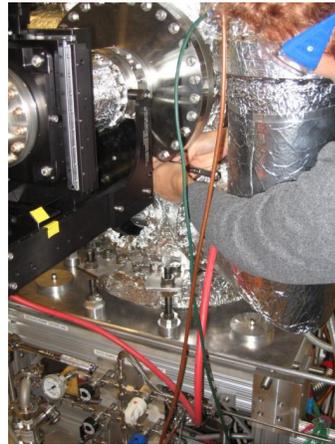
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Ergo Problems in the Lab:

Some Examples

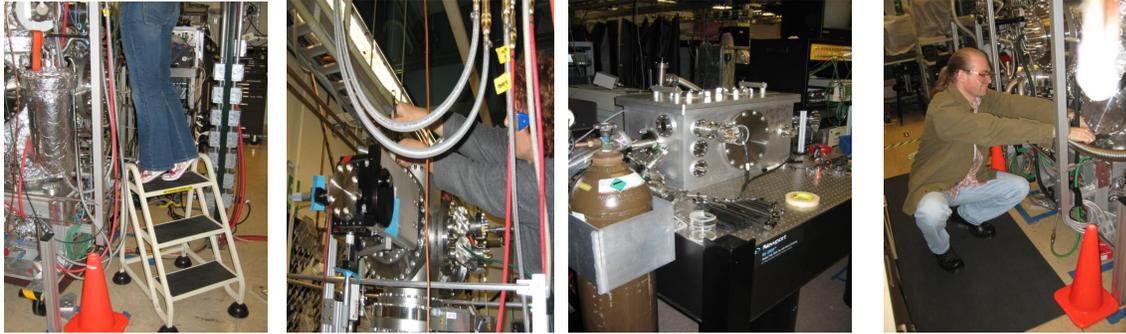
Working in tight spots/confined spaces:



Many nuts and bolts are hard to access on the vacuum chamber. Sometimes they have to be assembled almost blind and the employee is forced to work with a bad posture. Special, ergonomically shaped tools (wrenches, pliers etc.) of different lengths are needed to help tightening these flanges in an easier way.

Sometimes a load of torque needs to be applied to tighten these flanges. Slim power tools are highly desirable to help the worker.

Working with parts and objects that are hard to reach:



The flanges are hard to reach since the chamber is tall or located in the middle of a laser table. The employee has to tip-toe on the step stool, work with stretched out arms, or overhead. (Foldable) platforms and pedestals are needed to get the worker closer to the object. Longer tools (wrenches, pliers etc.) would help as well.

The scaffolds and platforms need to be removable fast and easy since the worker needs good access to the lower part of the setup too.

Working with heavy loads at hard to reach places:



Portable cranes or crane carts are of high interest as well to help with the load of the parts which need to be attached (the turbo pump weighs about 30lbs; with stretched out arms it can hurt your back quickly).

Trying to tackle these issues we ordered the following equipment

Special Tools:

Snap On:

Gary Kramer, PO Box 9004, 3011 E. Route 176, Crystal Lake, IL 60039, cell: 707 321 4044, Fax: 707 838 4601, email: gary.a.a.kramer@snapon.com

Part Number	Description	Quantity	Unit	Price (\$)
OEXLM10B	Long handle wrench	1	Each	18.59
OEXLM13B	Long handle wrench	1	Each	20.15
OEXLM17B	Long handle wrench	1	Each	28.73
OEXL16B	Long handle wrench	1	Each	18.85
OEXL18B	Long handle wrench	1	Each	20.93
CXM1012	Half moon wrench	1	Each	18.59
CXM1113	Half moon wrench	1	Each	19.63
CXM1417	Half moon wrench	1	Each	22.62
CX1416	Half moon wrench	1	Each	19.63
CX1820	Half moon wrench	1	Each	22.62
SBXM1012	S shaped wrench	1	Each	19.73
SBXM1113	S shaped wrench	1	Each	22.75
SBXM1719	S shaped wrench	1	Each	31.98
SBX1012	S shaped wrench	1	Each	19.73
SBX1416	S shaped wrench	1	Each	20.02
SBX1820	S shaped wrench	1	Each	23.14
FHOF80	Offset flex handle ratchet	1	Each	66.04
912AEP	Pliers Pistol Grip	1	Each	31.17
612AEP	Pliers Pistol Grip	1	Each	32.50
VSM5210B	Four Way Angle Head	1	Each	14.17
VSM5213B	Four Way Angle Head	1	Each	17.13
VSM5215B	Four Way Angle Head	1	Each	17.81
VS14B	Four Way Angle Head	1	Each	14.43
VS16B	Four Way Angle Head	1	Each	15.21
VS18B	Four Way Angle Head	1	Each	16.90

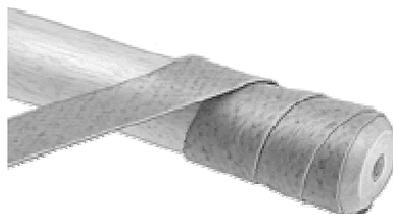
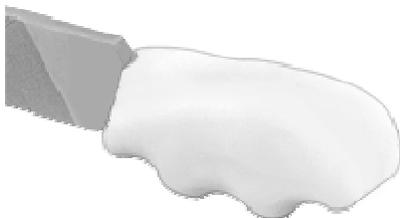
VS20B	Four Way Angle Head	1	Each	18.59
FHOM10B	Flex Combination	1	Each	24.83
FHOM13B	Flex Combination	1	Each	25.09
FHOM15B	Flex Combination	1	Each	31.85
FHO14B	Flex Combination	1	Each	23.40
FHO16B	Flex Combination	1	Each	23.66
FHO18B	Flex Combination	1	Each	28.08
FHO20B	Flex Combination	1	Each	33.54
SGDMRCE44	5 Position Screwdriver	3	Each	42.80
SDM213B	Flat Tip	3	Each	1.33
SDM222IRB	Phillips	3	Each	1.33
86EP	Pistol Grip Cutter	1	Each	25.09



* product(s) acquired

McMasters:

Tool grip: <http://www.mcmaster.com/#tool-grips/=exl00b>



* product(s) acquired

S & S:

Power tool:

Makita LCT300W

Compact Lithium Ion 3 Piece Kit Consisting of an Impact Tool, Drill, and four position Flashlight

Part# SS2605980

Price: \$ 348.72 ea



* product(s) acquired

Overhead Straps at the Laser table:

Pictures of ceiling in B2 Room 333

Goal: Explore feasibility of using a loop strap or handle (similar to something seen on a bus or train) on the overhead support beam to provide some support while scientists are leaning forward to work on laser table.

Example of bus strap:

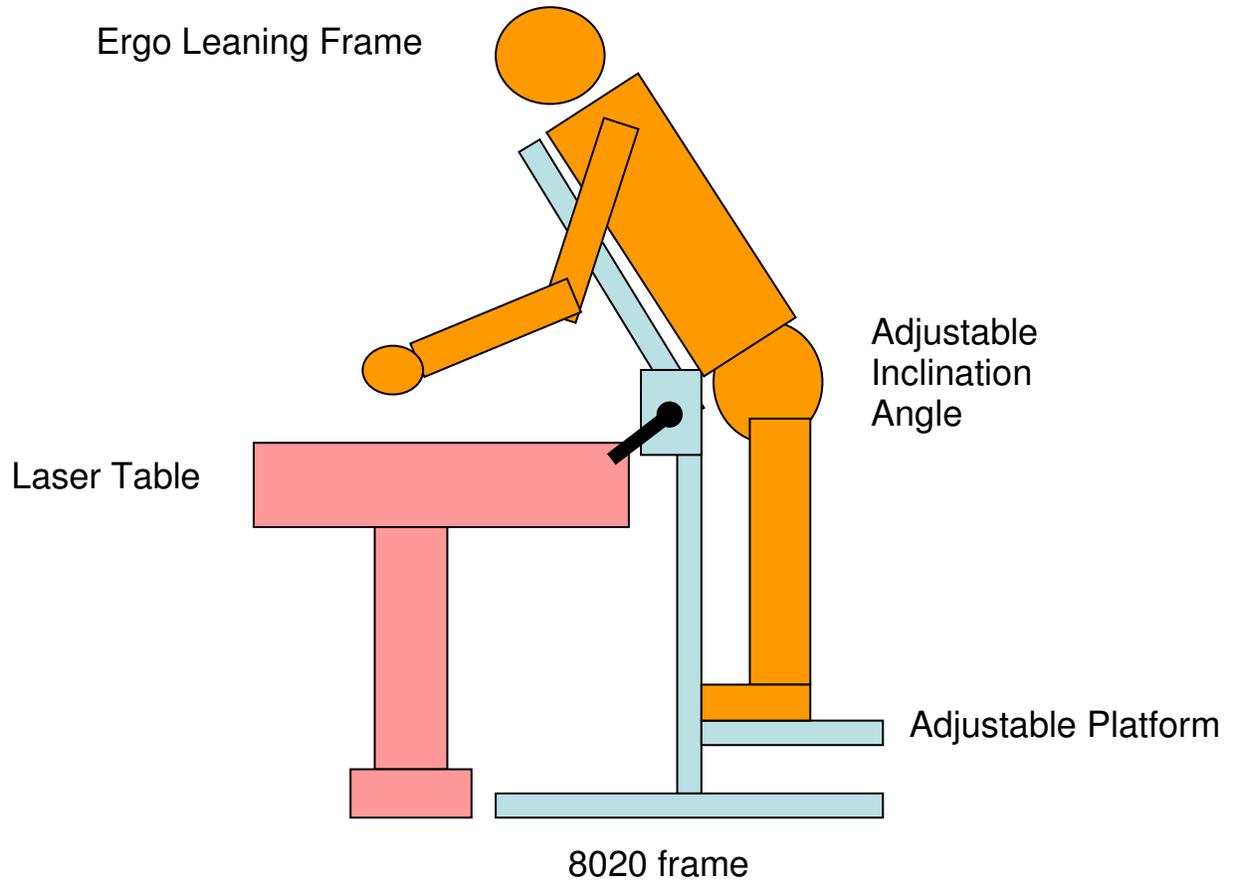


This would be possible locations where we would attach a strap

* idea not yet pursued

Leaning Frame at the Laser table:

Moveable 8020 leaning frame for one person with adjustable inclination angle.



* prototype realized



Platform is made out of 1in plywood from McMaster

Backrests are from two old chairs

8020 parts are from the following company:

Company: G.A. Wirth, P.O. Box 1169 Livermore, CA 94551, www.gawirth.com

Part Number	Description	Qty.:	Unit	US \$	Extended Price: US \$
2030-Plain	1515 End Caps	10	Each	1.395	13.95
2045-Plain	1530 End Caps	10	Each	1.53	15.30
2579	45deg support – 1530-Lite - 12”	1	Each	22.86	22.86
3678	5/16-18 ECON T-NUT - S/S	150	Each	0.567	85.05
4318	90deg pivot bracket assembly set	1	Each	37.80	37.80
4336	4 Hole I.G.C.B.	10	Each	5.625	56.25
4338	8 Hole I.G.C.B.	6	Each	8.055	48.33
6807	Linear Bearing Brake Kit L-Handle Yellow	2	Each	12.375	24.75
6860	Single UniBearing	2	Each	13.23	26.46
6892	Double Keyed UniBearing Pad	2	Each	3.15	6.30
1515-Lite	1.5"x1.5" Lite Extrusion 4@12.0"	48	inch	0.405	19.44
1530-Lite	1.5"x3.0" Lite Extrusion 2@3.0" w/7045 on both ends	6	inch	0.738	4.43
1530-Lite	1.5"x3.0" Lite Extrusion 1@11"	11	inch	0.738	8.12
1530-Lite	1.5"x3.0" Lite Extrusion 1@12"	12	inch	0.738	8.86
1530-Lite	1.5"x3.0" Lite Extrusion 1@25"	25	inch	0.738	18.45
1530-Lite	1.5"x3.0" Lite Extrusion 1@52"	52	inch	0.738	38.38
7010	Cut to length for 1515-Lite	4	Each	1.755	7.02
7020	Cut to length for 1530-Lite	6	Each	2.205	13.23
7045	5/16-18 tap charge 1530	8	Each	1.755	13.68

Leaning Forward in Kneeling Positions:

Harness to support the lower back.

Go to <http://www.springzback.com/>

Approx. costs are \$600.00 (no demos, no sales rep)



* for sure helps in kneeling positions. Not clear if it works while standing up. Considered for buying.

Professional Leaning Frame:

TraXion Foldable Topside Creeper



* Considered for buying.



The height of the Topside Creeper can be adjusted to allow usage on many different types of vehicles (adjust from 48" to 64" tall). It is constructed of heavy gauge steel and has a powder coat finish to protect from scratching and has a 400lb weight limit. The deck is padded and covered with a heavy vinyl for comfort and durability.

Sale: \$189.57; SKU: 3-100

Got to:

<http://ktperformance.net/i-6683206-traxion-foldable-topside-creeper.html?gclid=CIGttl6yrLACFQ5rhwodM0vrTw>

Light Weight Forward Leaning Support:

Topside Junior Support



* Considered for buying.

The height and angle of the chest pad adjust 35" up to 44" to fit the worker to the job

- Foldable and lightweight
- Adjustable chest pads
- Lean-in workstation
- Reduces back and leg strain

TopSide Junior

by [REL Stapleton](#) part # 3-120

Ships from & sold by [WESTOCKTOOLS](#).

Product Dimensions: 28" x 18" x 6"; 21 pounds

Price: \$91.60

Got to:

http://www.amazon.com/REL-Stapleton-TopSide-Junior/dp/B0043PZCW4/ref=pd_sim_sbs_auto_5

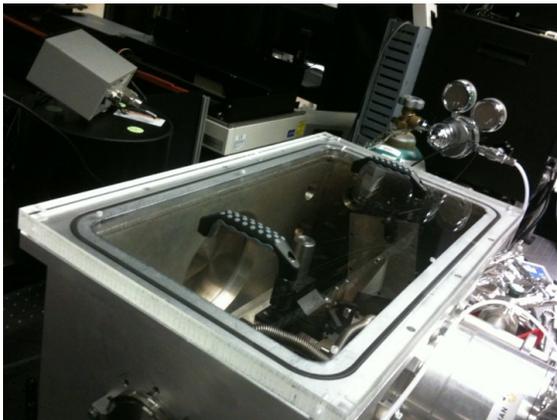
Light Vacuum Chamber Lids:

Goal: Reduce the weight of heavy metal lids by switching to acryl which should be good enough for vacua down to 1E-7mbar or better.

Old Aluminum lid:



New 1 in Acrylic lid (installed on the vacuum chamber):



Note: In terms of laser safety the lid is equipped with an additional thin metal plate (not shown here) to make sure now laser light is transmitted through the lid. Plastic tape is used where the handle bars are mounted.

Material is ordered from McMaster's.

* product(s) acquired

Replace Copper Gaskets:

Goal: Use rubber or viton o-rings where possible. These are good for vacuua down to 1E-8mbar and require 4 to 8 (rather loosely) tightened bolts only.

Find Viton O-rings at McMaster:

<http://www.mcmaster.com/#catalog/119/3477/=l8gc1o>

or go here:

Bay Seal Company
1550 West Winton Avenue
Hayward, CA 94545
510-732-7000 Phone
800-273-7325
510-782-2651 Fax

<http://bayseal.com/>

The challenge is to find Aluminum center rings. These are not that common in the US and only available to flange sizes of 12in. However, you can make you own by ordering Aluminum rods from McMaster and give them to the building 77 machine shop for bending (use the vacuum tube inner diameter as the outer diameter of this ring). Do not waterjet these rings but insist on the bending to get the spring effect.

You may want to go with:

Multipurpose Aluminum (Alloy 6061) 1/8" Thick X 1/2" Width X 6' Length for a 6in flange center ring for instance

Step Stools:

http://www.labsafety.com/dixie-step-stands_24550550/?searchterm=step%2bstools



* product(s) not yet acquired

<http://www.harborfreight.com/step-stool-working-platform-66911.html>



* product(s) not yet acquired

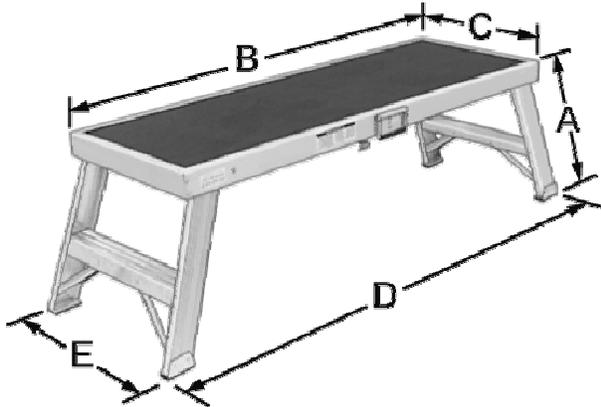
<http://www.stepstooluniverse.com/category-s/7070.htm>



* product(s) not yet acquired



<http://www.mcmaster.com/#step-stools/=f1dfbp>



* product(s) not yet acquired

http://www.productsforindustry.com/eCommerce/eComm?template=product&tran_id=19&ship_no=-1&prod_id=78355&search_criteria=7025501&parent_id=0



* idea not yet pursued

use standard stepstools:



* product(s) acquired

Platforms:

<http://www.strombergcarlson.com/store/products.php?categoryParentName=RV+Steps+%26+Step+Accessories&categoryName=Platform+Step>



* product(s) not yet acquired

http://www.productsforindustry.com/ecommerce/eComm?template=iCatalog/0513&user_id=&cust_no=&ship_no=-1



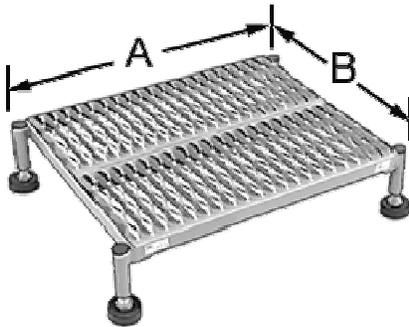
* idea not yet pursued

<http://www.pplmotorhomes.com/parts/rv-steps/rv-step-platform-acar.htm?source=google&gclid=Cl6px-KXyawCFSkZQgodAX4wqg>



* idea not yet pursued

<http://www.mcmaster.com/#work-platforms/=f1uytv> got to “adjustable height steel work platforms” and “fixed height fiberglass work platform”



* idea not yet pursued



8020 custom made Platforms:

2 platforms: 18Dx24Wx7.5in and 18Dx36Wx16Hin

Company: G.A. Wirth, P.O. Box 1169 Livermore, CA 94551, www.gawirth.com

Part Number	Description	Quantity	Unit	Price (\$)
4442	15S SQ Tricorner	8		17.955
3018	LHSCS 15S	24		0.567
4332	15S 2 Hole I.C.G.	20		3.87
3320	5/16-18 X 0.678" FBHSCS & Econ T-nut	40		0.54
1515-Lite	1.5"x1.5" Lite Extrusion 2@21"	42	inch	0.405
1515-Lite	1.5"x1.5" Lite Extrusion 2@33"	66	inch	0.405
1515-Lite	1.5"x1.5" Lite Extrusion 6@15"	90	inch	0.405
1515-Lite	1.5"x1.5" Lite Extrusion 4@5" w/7060 on both ends	20	inch	0.405
1515-Lite	1.5"x1.5" Lite Extrusion 4@13" w/7060 on both ends	52	inch	0.405
7010	Cut to length for 1515-Lite	18		1.755
7060	5/16-18 tap charge 1515	16		1.755

Plus 0.5in thick PVC boards (18x24in and 18x36in) from McMasters



* product(s) acquired

Alternative Platform option (diamond stainless steel plate): B77 at LBNL

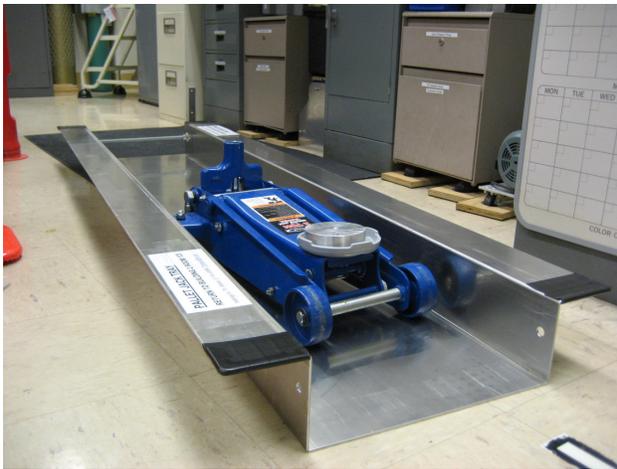


* idea not yet pursued

Pallet Jack Tray to transport mid-weight items:

Custom made at B77 of LBNL

Aluminum Pallet Jack Tray for transporting 3 heavy car jacks at once (72Lx25Wx4inH of 0.125in Aluminum)



* product(s) acquired

Car Jacks, Stands and Carts for lifting and positioning heavy Objects:

Snap On:

Gary Kramer, PO Box 9004, 3011 E. Route 176, Crystal Lake, IL 60039, cell: 707 321 4044, Fax: 707 838 4601, email: gary.a.a.kramer@snapon.com

Part Number	Description	Quantity	Unit	Price
YA1642A	Jack, Hydraulic Service 2-ton (20" max. lift)	3	ea	153.31
				459.93

McMasters:

<http://www.mcmaster.com/#scissor-jacks/=gfnfnt>

<http://www.mcmaster.com/#ball-transfer-plates/=gfng11>

<http://www.mcmaster.com/#equipment-movers/=gfngs9> the go to “steel dollies” and “multidirectional tripod dollies”



* product(s) acquired

Crane Cart to lift midsize Equipment:

SYCLONE ATTCO SERVICE, P.O. BOX 458, EMMETT, ID 83617
 CORPORATE: 8395 W. IDAHO BLVD, LETHA, ID 83636
 TEL (208) 365-5770, FAX (208) 365-5771
www.skyhookmfr.com

QTY	PART#	DESCRIPTION	UNIT PRICE (List price)
1	8570-C-21.3T-98-RSSSSSS-98M-130LB	'Custom' Model 8570 Sky Hook w/Mobile Base Modifications: (see approval drawing) - 98" overall height - 98" length of lift - Rotated hand wheel - 85.7" Hand wheel height - Load limit: 130 lbs - (4) Swivel Casters w/Brake ** Counterweight required; customer to provide or sold as a separate item. ** Counterweight must be at least 125% of load being lifted or 163 lbs for maximum load capacity (130 lb load limit)	\$2,017.44 ea
4	CW1-8570	Individual Cast Iron Counterweight for loads less than 500 lbs, each counterweight weighs 42 lbs (counterweights require mounting hardware for installation, sold separately)	\$100.00 ea
1	CW-HARDWARE-2	Mounting Hardware Kit for up to 7 Cast Iron Counterweights (use with CW1-8570 Individual Cast Iron Counterweights)	\$45.00 ea
1	CERTIFICATION	Certificate of Conformance	\$0.00 ea
1	HANDLING	Handling Charge (billed separately if customer bills freight charges to their UPS or other freight carrier's account#)	\$5.00



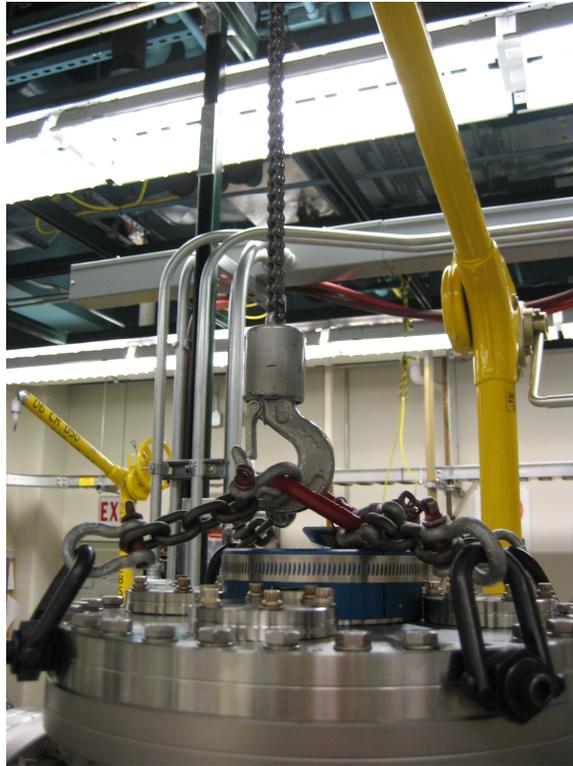
* product(s) acquired

Rigging Material:

Via Lou Pandolfo, contact person of CraneAmerica at LBNL
(building 76, room 123, x7667, LAPandolfo@lbl.gov)

Shackles and Slings:

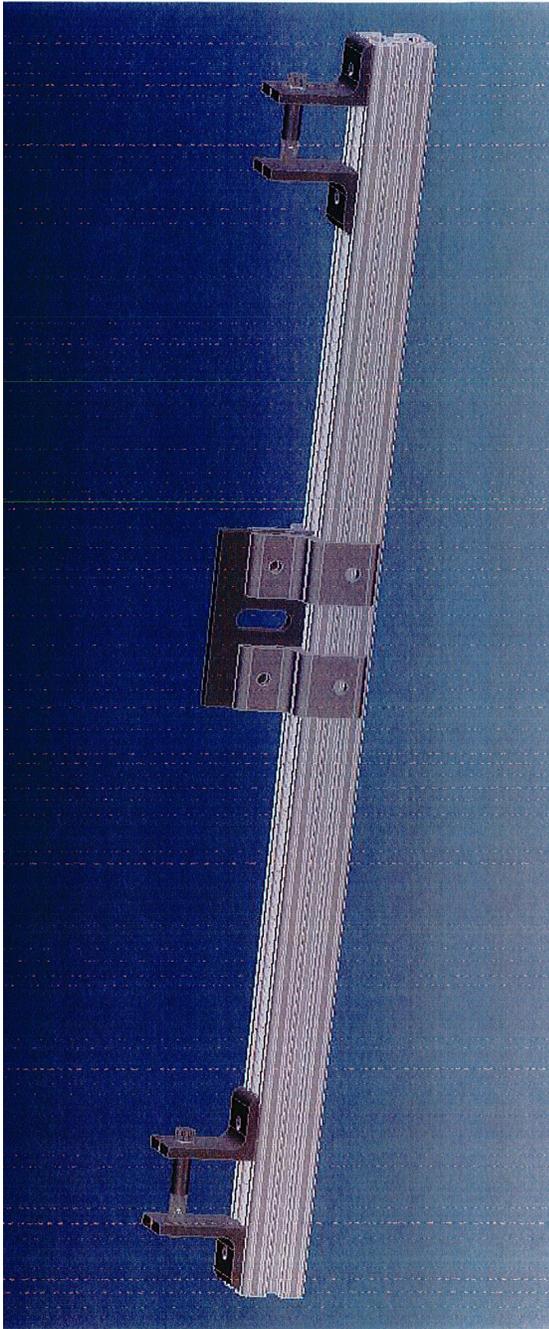
- 2x anchor shackles made of 316 steel rated for 1650kg 7/16 thickness of the material.
- 8x 1/4" anchor shackles
- 2x 12.0" lengths of chain or cable
- 2x 6.5" lengths of chain or cable
- 2x 2ft 1900lbs Nylon Choker from Lift-It
- 2x 6ft 2400lbs Nylon Choker from Lift-It
- 1x 7ft 2400lbs Nylon Choker from Lift-It
- 2x 8ft 1900lbs Nylon Choker from Lift-It



* product(s) acquired

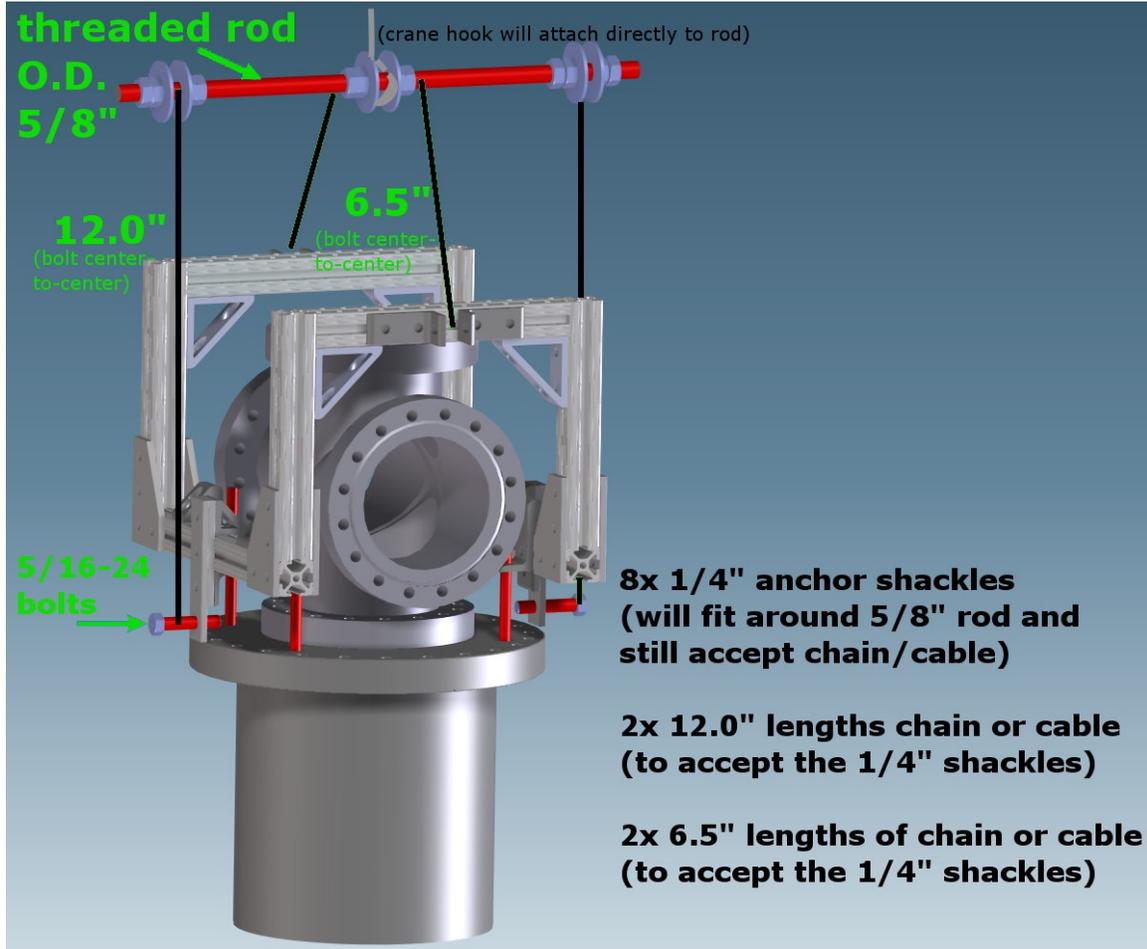
Custom Made Spreader bar:

LBNL approved custom made spreader bar for 250lbs made from 8020



* product(s) acquired

Custom made rigging frame:



* product(s) acquired

8020 parts:

Quantity	Part Number	Description	Price (\$)	Extended Price (\$)
4	4108	80/20 4108 10S 2 HOLE I.C.B. 1/8"	2.475	9.90
2	4509	80/20 4509 10S TO 15S 2 HOLE TRANS. I.C.B.	2.475	4.95
8	4176	80/20 4176 10S 3 HOLE I.C.B.	3.465	27.72
8	4250	80/20 4250 10S 3 HOLE SLOTTED I.C.B	4.05	32.40
8	4136	80/20 4136 10S 4 HOLE I. C. G. C. B.	5.085	40.68
10	4132	80/20 4132 10S 2 HOLES I.C.G	3.555	35.55
8	4150	80/20 4150 10S 4 HOLE PLATE	4.59	36.72
4	4118	80/20 4118 10S 3 HOLES JOINING PLATE	3.87	15.48
4	4117	80/20 4117 10S 4 HOLE STRIP	4.32	17.28
50	3675	80/20 3675 SS ECON TNUT 1/4-20	0.549	27.45
50	3280	80/20 3280 10S 1/4-20 DBL. ECON T NUT	0.621	31.05
20	2015	80/20 2015 1010 END CAP BLACK W/PUSH INS	0.945	18.90
				\$298.08

Crane Alternative:

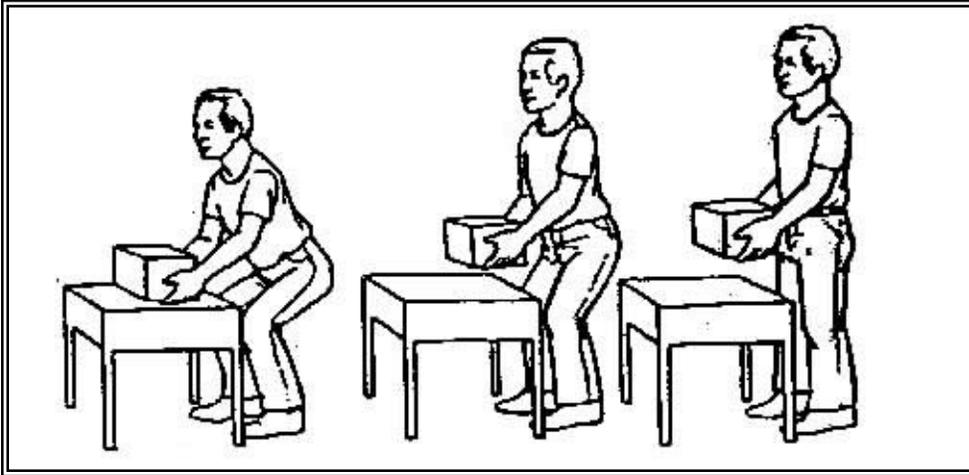
Custom made lifting arm with counterweight



* idea not yet pursued

Also: Put together new Online Course (EHS0056) about preventing lift injuries for short term guests

<http://www.lbl.gov/ehs/training/webcourses/EHS0056/>



*finished

Wireless Camera System to control Laser Performance:

Advantages:

- Laser Safety: no direct look on phosphor screens (avoid stray IR light)
- Ergonomics: no strange non-ergonomic postures (also avoid trip and fall)
- Science: remote performance control of multiple nodes from critical positions

Problems:

- no wireless network in laser lab
- installation of own wireless network is highly sensitive

Solution:

After contacting the LBNL network group we found out that they cannot install and maintain an official wireless router for us. Instead we are allowed to set up our own wireless network under certain constraints: The router cannot be connected to the internet. It is not allowed to broadcast the SSID and must use WPA2. Moreover, a certain frequency gets assigned in order to avoid interference with the LBL wireless.

Ordered Equipment:

Part	Model	Cost in \$
Camera	Thorlabs CD1545, Monochrome 0.5in chip, USB	345
Lens	For beam imaging in 20 cm distance: Thorlabs MVL25M23, 25 mm EFL lens	192
Clamps and posts	Thorlabs various	-
USB webcam	Logitech C615, HD, full rot. mount	60
Wireless router	Linksys EA3500 Dual-band, with USB port	133
USB ext. cables	Belkin 10 ft ext. 3	3
USB active ext.	Startech 16' active	16
USB hub	Belkin 4 port economy	15
USB flash drive	SanDisk cruzer 64	35
PC	Used (LBL repurpose program), 2 usb buses	150
Tablet	10' plus screen	400-500

* product(s) acquired