Textiles & Movement

Class Logistics

Sample Book & Final Project due 03/09

Final Project Options:

Proposal Option: You will create a proposal for a project that utilizes techniques or concepts covered in the class. Should include: sketches, write up of materials, techniques and concepts used.

Skill Investigation Option: You will learn a new textile skill and create a sample to show what you have learned. Should include: photos of your sample, what resources and guides were used, and possible applications.

Chromat Adrenaline Dress

Chalayan SS' 2007 (2:30 in)

Scorpions

by Di Mainstone & Joanna Berzowska

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Scorpions

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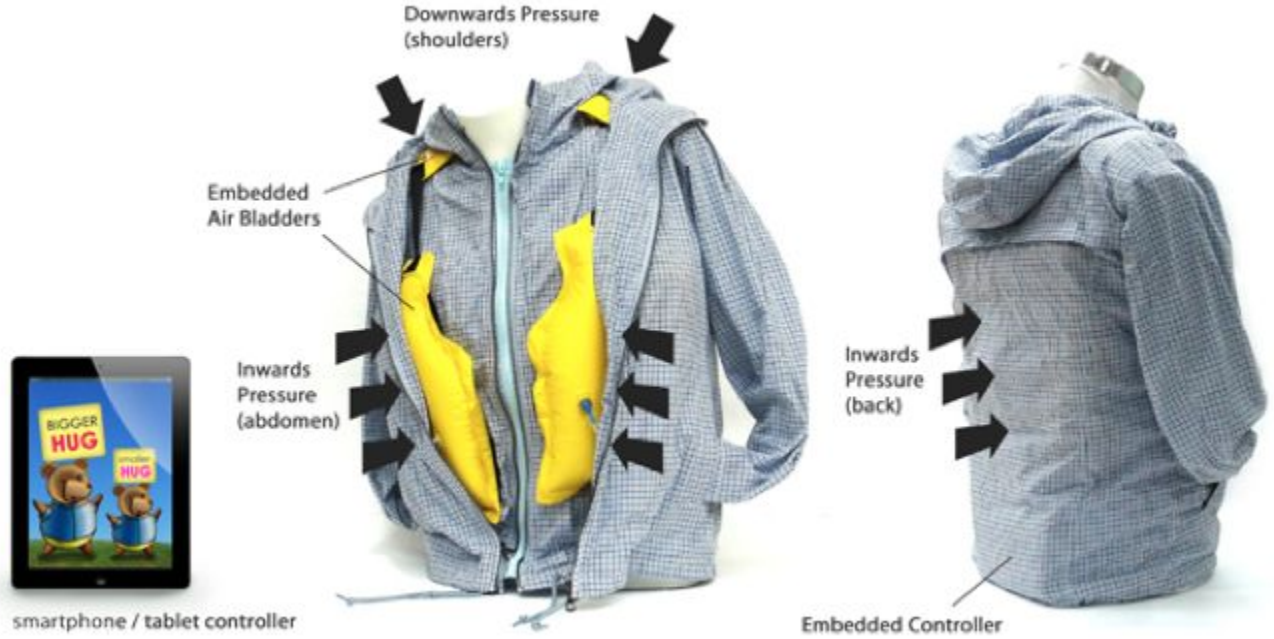
https://vimeo.com/142208383

Biologic - Lining Yao

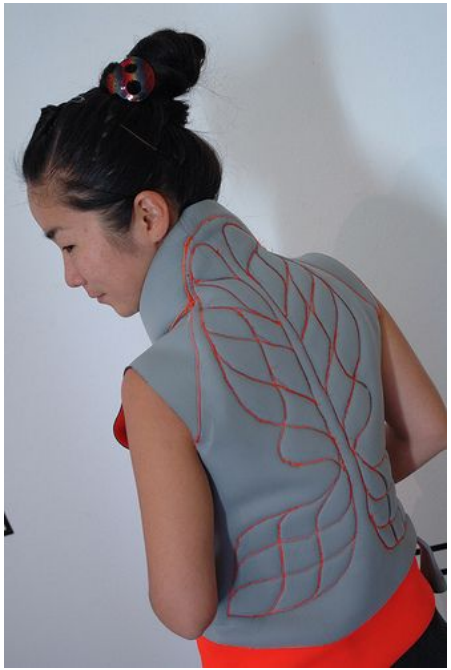
T. Jacket by T. Ware

T.Ware's T. Jacket



Social Body Lab: *Prosthetic Technologies of Being (Nautilus)*

Kobakant: *Massage Me*



Adi Marom

Clothing for Moderns http://lea.zone/portfolio/clothing-for-moderns.html

Ayah Bdeir

Ayah Bdeir Teta Haniyas Secrets

http://ayahbdeir.com/work/teta-haniyas-secrets/

Hussein Chalayan

Yael Mer & Shay Alkalay – Evacuation Skirt

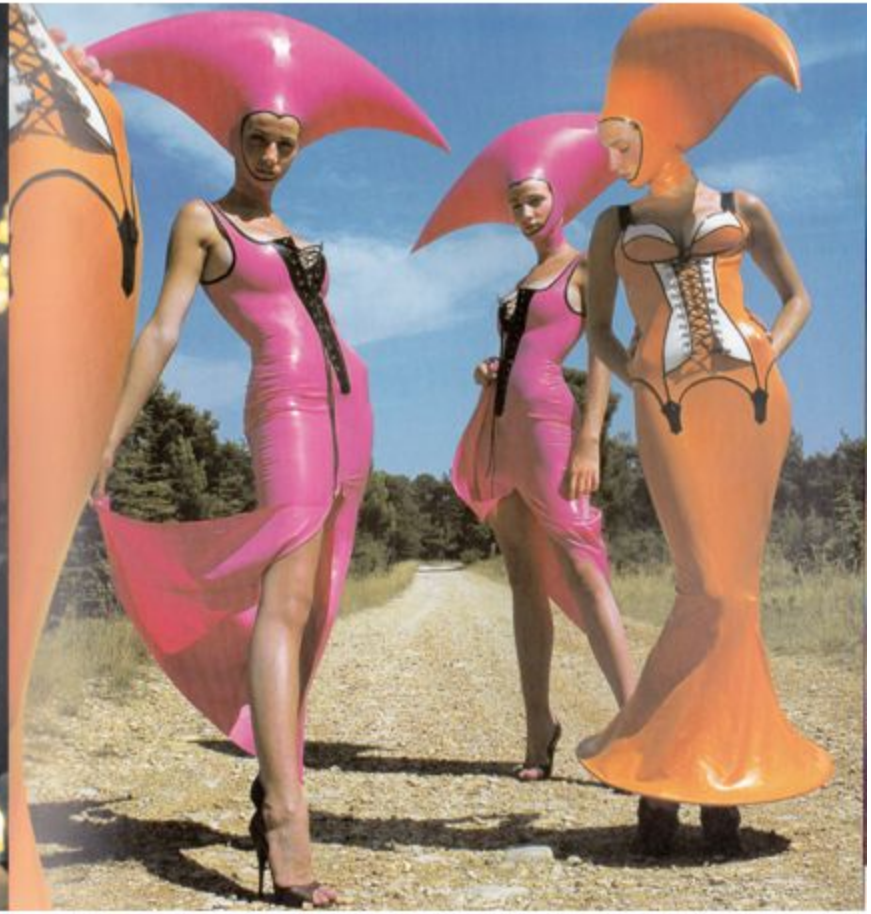
The Bee, Sex Clown Collection
By Walter Van Beirendonck

Untitled
By Gareth Pugh

Wedding Dress from *Skin & Bones*

Yes Men - Surviva Balls

Jean Paul Gaultier



Robin Archer

Kelly Dobson
Scream Body

An Introduction to Muscle Wire

Muscle Wire *is the perfect name … because it can be described exactly as it sounds: it is a unique type of wire that acts like the muscles in our bodies. Muscle Wire is an extremely thin wire made from Nitinol (a nickel-titanium alloy) that … contract[s] when an electric current is applied.*

Jameco

Muscle Wire Demo

Muscle Wire in Wearables

Muscle wire is often a good choice to use for wearables, because it is a form of creating motorless mechanical motion; instead of having a large and loud motor in your movement projects, all of you need is a thin wire and your electronics boards/batteries.

Ohm's Law

When figuring out the circuitry for muscle wire, this formula becomes crucial:

$$V = ((L \times R1) + R2) \times I$$

where V = Input Voltage of the Circuit

L = Length of the Muscle Wire

R1 = The Specified Resistance of the Muscle Wire

R2 = Any other resistance/resistors in the circuit

I = The Current the Muscle Wire Needs to Contract

Suppose you have a **5 V** power source and are using muscle wire with a diameter of **0.004 inches**. What is the length of the muscle wire and the size of additional resistor you would choose?

Diameter Size inches (mm)	Resistance ohms/inch (ohms/meter)	Pull Force* pounds (grams)	Approximate** Current for 1 Second Contraction (mA)	Cooling Time 158°F, 70°C "LT" Wire *** (seconds)	Cooling Time 194°F, 90°C "HT" Wire *** (seconds)
0.001 (0.25)	36.2 (1425)	0.02 (8.9)	45	0.18	0.15
0.0015 (0.38)	22.6 (890)	0.04 (20)	55	0.24	0.20
0.002 (0.050)	12.7 (500)	0.08 (36)	85	0.4	0.3
0.003 (0.076)	5.9 (232)	0.18 (80)	150	0.8	0.7
0.004 (0.10)	3.2 (126)	0.31 (143)	200	1.1	0.9
0.005, (0.13)	1.9 (75)	0.49 (223)	320	1.6	1.4
0.006 (0.15)	1.4 (55)	0.71 (321)	410	2.0	1.7
0.008 (0.20)	0.74 (29)	1.26 (570)	660	3.2	2.7
0.010 (0.25)	0.47 (18.5)	1.96 (891)	1050	5.4	4.5
0.012 (0.31)	0.31 (12.2)	2.83 (1280)	1500	8.1	6.8
0.015 (0.38)	0.21 (8.3)	4.42 (2250)	2250	10.5	8.8
0.020 (0.51)	0.11 (4.3)	7.85 (3560)	4000	16.8	14.0

Timing is Crucial

Even with the right circuit calculations, muscle wire can only be heated for a short period of time. When having muscle wire controlled with a circuit board, you must be sure to have the current tied to a clock (should loop between HIGH and LOW values to give enough time for heating and cooling), usually for a time period of ~1 second (check with your datasheet).

Process for Setting Muscle Wire

1) Mold the muscle wire in the way you want it to contract (e.g. around a screw to create a coil) - extreme shapes are usually better.
2) “Set” the muscle wire by heating it up for 10 minutes at 300 degrees Celsius. Afterwards, immediately dunk the muscle wire into a cold water bath (should hear a hissing sound).
3) After the muscle wire is cool, you need to wrap the muscle wire in the silicone tubing (electrically and thermally isolates it).
4) You should be able to test the muscle wire now with your circuit!
5) Using the crimping tools to crimp any connectors onto the end of the muscle wire.

Inflatables Demo

Hands-On Muscle Wire Time