



Aalto University
Media Factory

Digital_Fabrication_Studio.07

Molding & Casting – materials, finishes, processes

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12.10.2012



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Today:

- * Mold
- * Designing a mold
- * Casting into a mold



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01. Mold: what can you get out of it?



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DIY Blow Molding Gun



Frustrated by the limited access to plastic blow-moulding equipment, George Fereday developed his own, outfitting a standard 'mastic gun'.

Source: <https://vimeo.com/12940879>

http://www.core77.com/blog/object_culture/george_feredays_personal_blow_molding_gun__16846.asp

Brickarms: hacking and casting LEGO toys



The screenshot shows the BrickArms website. At the top is the **BRICKARMS** logo with the tagline "Custom molded weapons and custom minifigures". To the right of the logo is a row of various custom minifigures. Below the logo is a navigation bar with links: Home, Products, Where to Buy, FAQs, Policies, Forums, and About.

On the left side, there are four categories with corresponding images and links: [Weapons](#) (showing various firearms), [Weapons Packs](#) (showing a collection of weapons), [Minifigures](#) (showing several custom minifigures), and [Headgear](#) (showing various headgear pieces).

The main content area features a paragraph about the products, followed by a date announcement and two product packs.

BrickArms offers building toy-compatible custom [weapons](#), [weapons packs](#), and custom [minifigs](#).

All BrickArms products are sized to perfectly fit your figs and designed and produced to meet the highest standards of quality. Each BrickArms toy will mesh seamlessly with your other building toys, and thousands of builders worldwide have used BrickArms to explore new ways of building and play.

Join other fans of BrickArms on the [BrickArms Forums](#) to see how others have used BrickArms in their building and even share some of your own BrickArms-equipped creations!

March 15, 2012 - MAAWS, Black Minigun w/Brass Ammo Chain, MCP v3, & WWII Pack w/Russian Protos!

Available at all resellers at 12AM March 16th, 2012!

BRICKARMS

Modern Combat Pack v3

©2012 BrickArms LLC

BRICKARMS
Limited Edition Weapons Pack

World War II

Contains 30 BrickArms

Each pack contains a special prototype WWII Russian Rifle!

Odds for each pack:

- SVT40 = 1 in 2
- DP28 = 1 in 10
- Mosin Nagant = 2 in 5

©2012 BrickArms LLC

BrickArms offers building toy-compatible custom weapons, weapons packs, and custom minifigs.

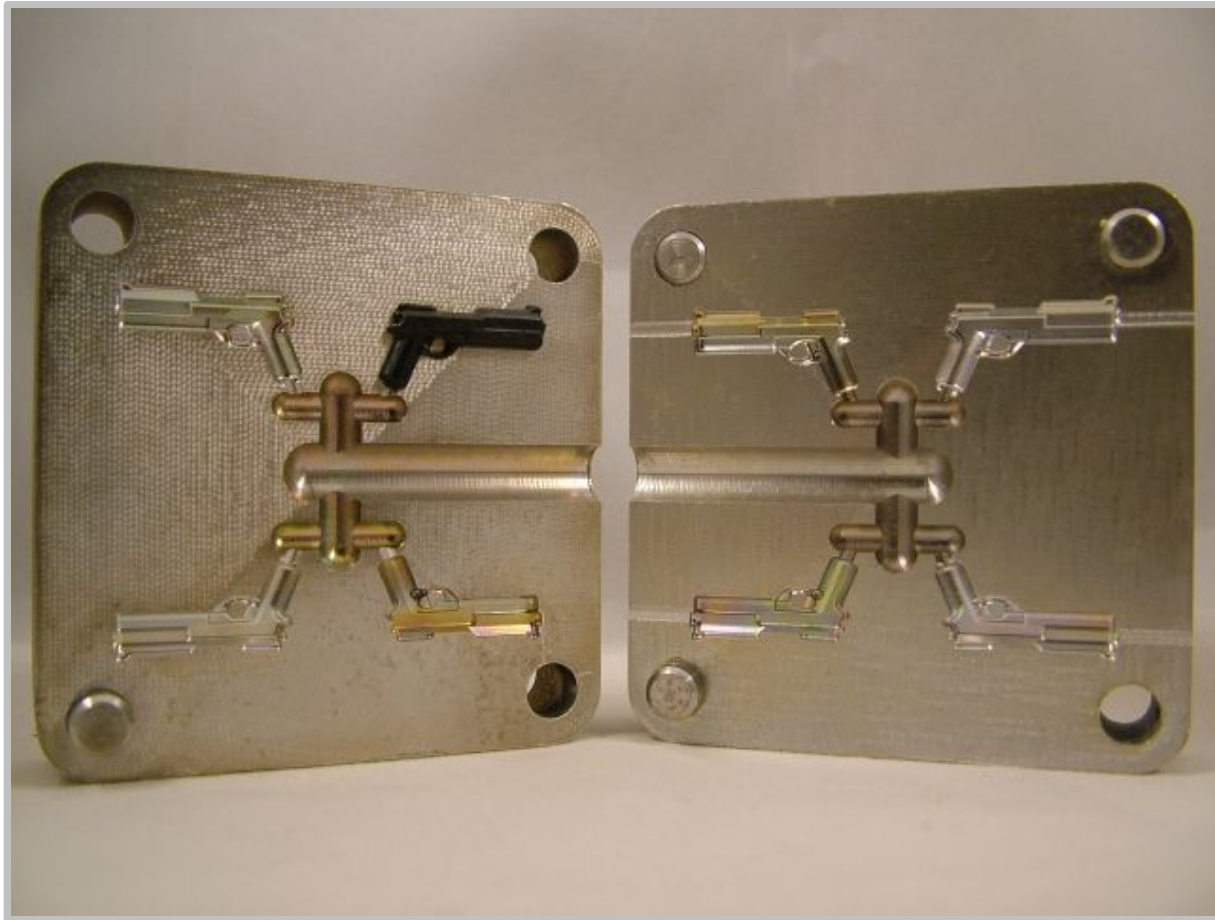
Source: <http://www.brickarms.com/>

Brickarms: hacking and casting LEGO toys



A set of pieces.

Brickarms: hacking and casting LEGO toys



The two-side mold (for injection moulding).

Brickarms: hacking and casting LEGO toys



The two-side mold (for injection moulding).

Brickarms: hacking and casting LEGO toys



Do you know this guy?
(Here's the answer)

Source: <http://www.flickr.com/photos/enigmabadger/3643236010/in/photostream>

Brickarms: hacking and casting LEGO toys



Do you know this guy?
(Here's the answer)

Source: <http://www.flickr.com/photos/enigmadadger/6010441876/in/photostream>

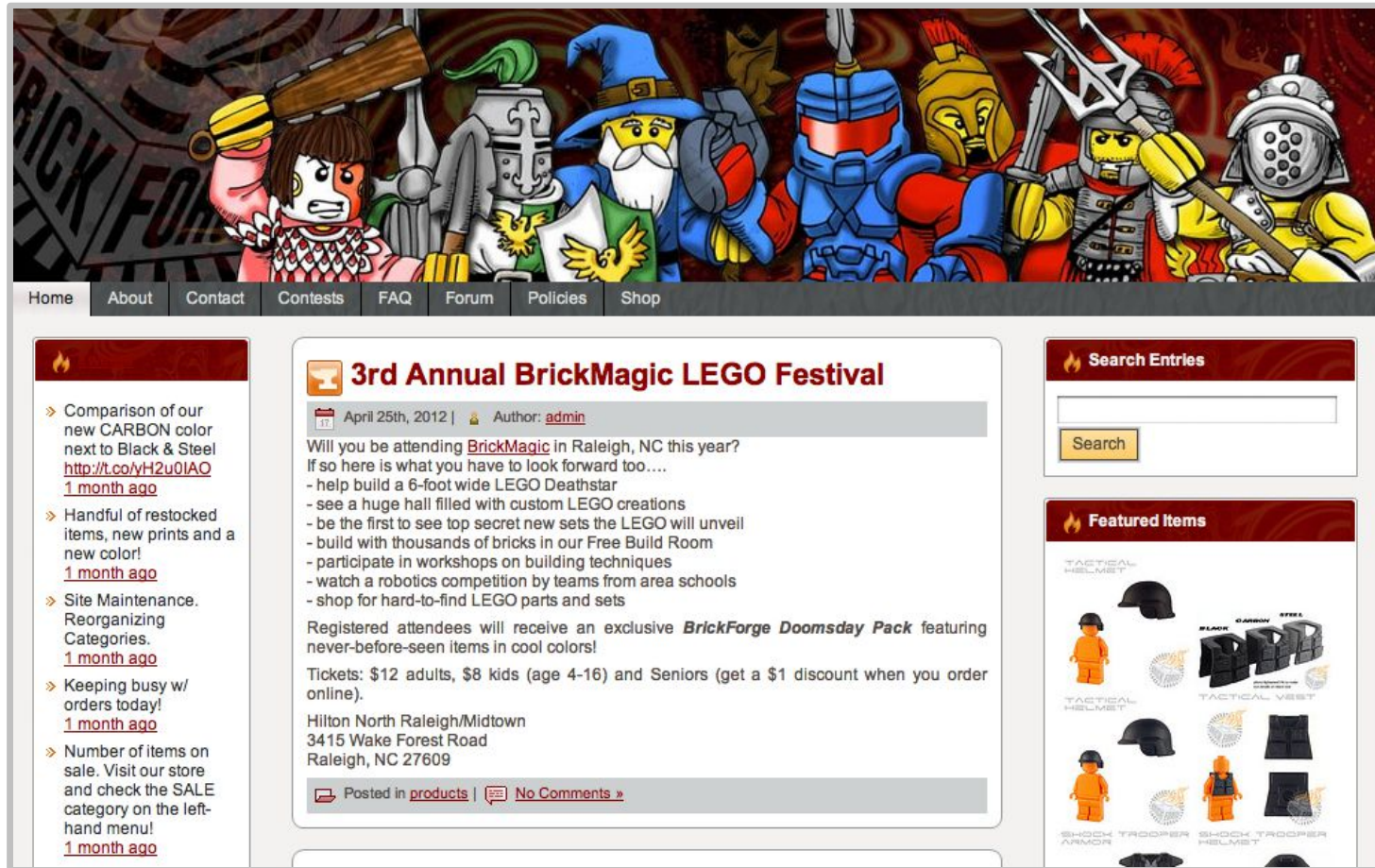
Brickarms: hacking and casting LEGO toys



Do you know this guy?
(Here's the answer)

Source: <http://www.flickr.com/photos/enigmabadger/6174048858/in/photostream>


BrickForge: hacking and casting LEGO toys

A screenshot of the BrickForge website. The header features a banner with various LEGO minifigures, including a wizard, a knight, and a trooper. Below the banner is a navigation menu with links: Home, About, Contact, Contests, FAQ, Forum, Policies, and Shop. The main content area is divided into three columns. The left column contains a list of links with a fire icon, including 'Comparison of our new CARBON color next to Black & Steel', 'Handful of restocked items, new prints and a new color!', 'Site Maintenance. Reorganizing Categories.', 'Keeping busy w/ orders today!', and 'Number of items on sale. Visit our store and check the SALE category on the left-hand menu!'. The middle column features a post titled '3rd Annual BrickMagic LEGO Festival' by 'admin' on April 25th, 2012. The post includes a list of activities for the festival, such as building a LEGO Deathstar, seeing custom LEGO creations, and participating in workshops. It also mentions an exclusive 'BrickForge Doomsday Pack' for registered attendees. The right column has a 'Search Entries' section with a search bar and a 'Featured Items' section displaying various LEGO minifigures and accessories, including 'Tactical Helmet', 'Shock Trooper', and 'Shock Trooper Helmet'.

“We consider ourselves intermediaries between the community and the lumbering Danish company.”

Source: <http://www.brickforge.com/>
<http://blog.makezine.com/2011/10/12/make-interviews-indie-lego-molder-brickforge/>

BrickForge: hacking and casting LEGO toys



Search: [Advanced search](#)

Categories




- Weapons
- Headgear
- Armor
- Equipment
- Instruments
- Accessories
- Hair/Beards
- Animals
- Decals
- Chrome
- Swag
- Colors
- SALE

Bestsellers

1. Beret - Medium Blue
2. Mushroom - Medium Blue
3. Powered Assault Helmet - Medium Blue
4. Knights Shield - Medium Blue
5. Military Helmet - Medium Blue

[BrickForge](#) :: [Colors](#) :: [Medium Blue](#) :: Scooter - Medium Blue (Rainbow print)

Scooter - Medium Blue (Rainbow print)



Miniquins, MOCs and Minifig parts not included with this item.

Considered a younger cousin of the motorcycle the vehicle featuring a more open step-through design for motorist's feet. In many parts of the world, such as popular form of urban transportation due to their low minifig up for a tour around Tuscany or help your day minutes or less. The **Scooter**, designed in conjunction with several standard 1x1 connection points to attach all accessories accommodates most standard minifigs.

Scooter is sold unassembled with the following parts:

- Scooter (body) x1
- Scooter (handlebars) x1
- Scooter (wheels) x2
- Front Tire (narrow) x1
- Rear Tire (broad) x1

Body, Handlebars & Wheels are same color. Black Tires

Details	
SKU	PL-VEHI-SCOO-MBR
Quantity in stock	775 item(s) available
Weight	0.40 oz
Our price:	\$6.25

(Almost) anything that you cannot find in a
LEGO store...

Source: <http://www.brickforge.com/store/product.php?productid=17777&cat=0&page=>

BrickForge: hacking and casting LEGO toys



(Almost) anything that you cannot find in a
LEGO store...

Source: <http://www.flickr.com/photos/42832748@N05/5680269752/in/photostream>

Few insights about their process

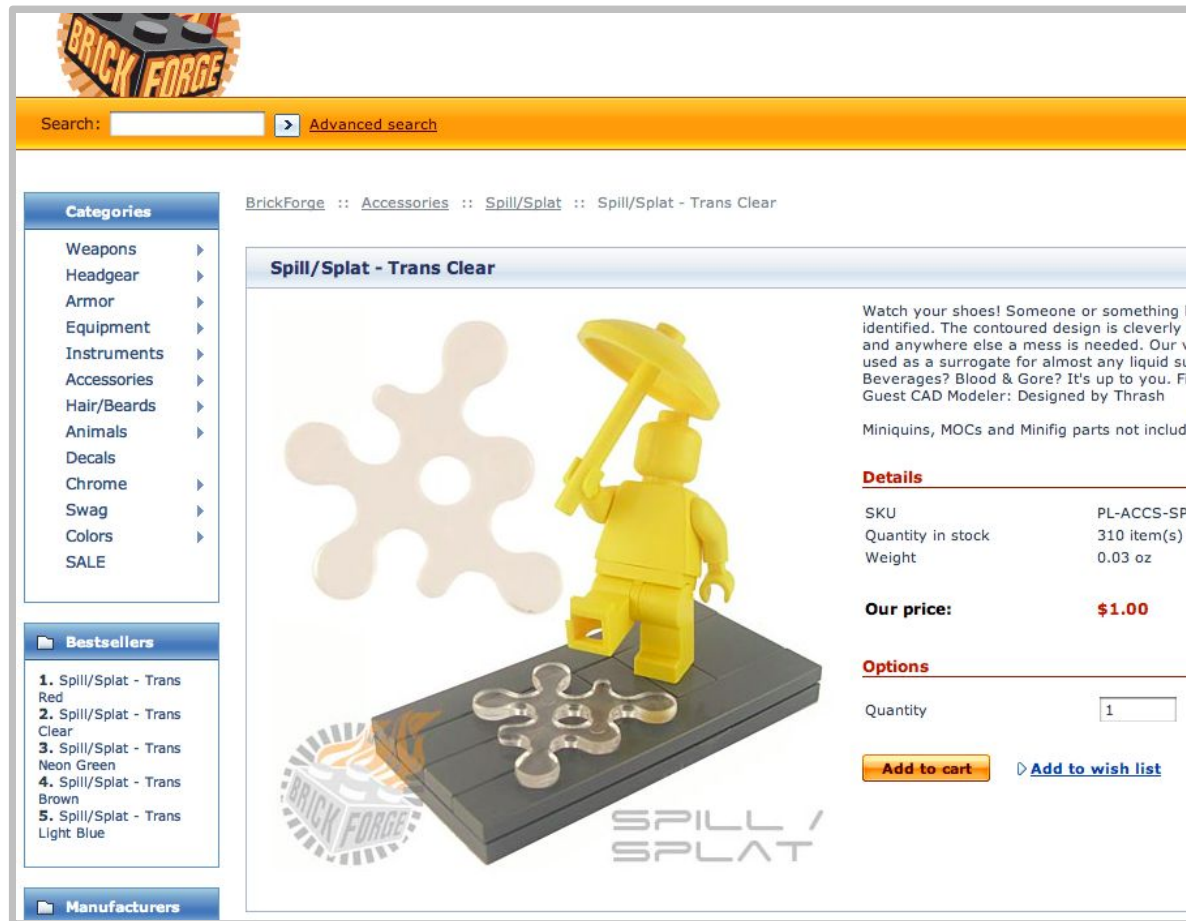
Having designed the element how do you create the mold?

Once the element is designed a mold is created out of aluminum stock using a CNC milling machine. Most of the time we bundle several accessories together on the same aluminum block. In dealing with such small scale elements we need to insure that every detail is accurate up to 1/10 of a millimeter!

I assume you use ABS. When you get it, in what sort of form does it arrive?

Once the aluminum mold is created it is slotted inside an injection machine and the magic begins. ABS pellets are mixed with a dye and then poured into a hopper. A heating cylinder and reciprocating screw located inside the injection machine feeds the molten ABS into the mold via gates and channels, that then defines the final shape of the object.

BrickForge: hacking and casting LEGO toys



You can be even creative and play with the materials and their attached meanings...

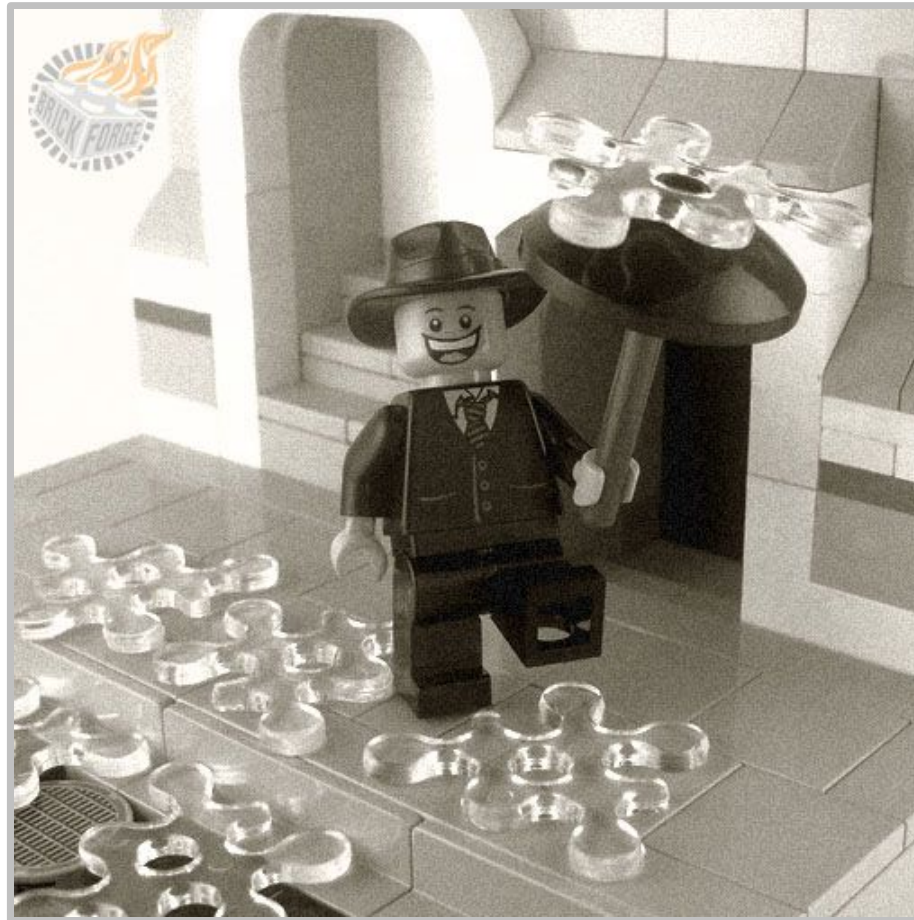
Source: <http://www.brickforge.com/store/product.php?productid=17563&cat=462&page=1>

BrickForge: hacking and casting LEGO toys



I mean, really creative....

BrickForge: hacking and casting LEGO toys



I mean, really creative....

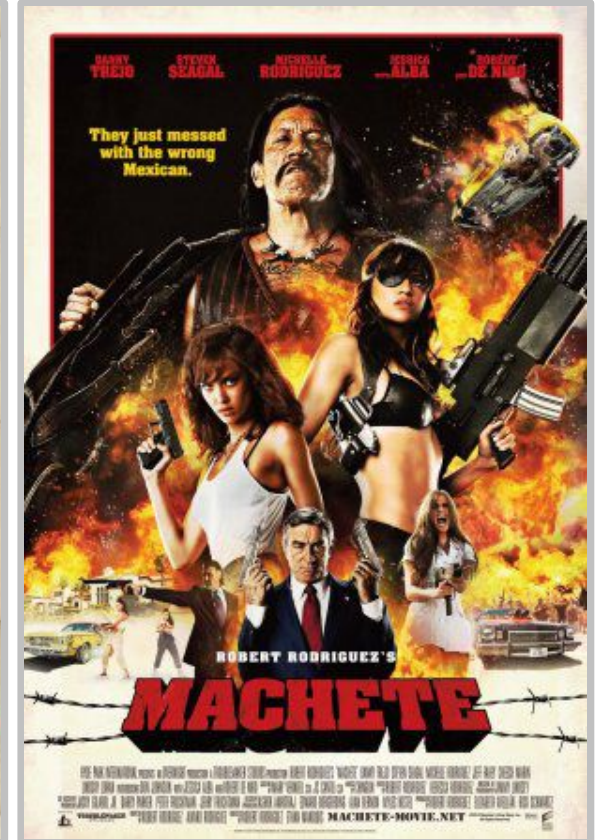
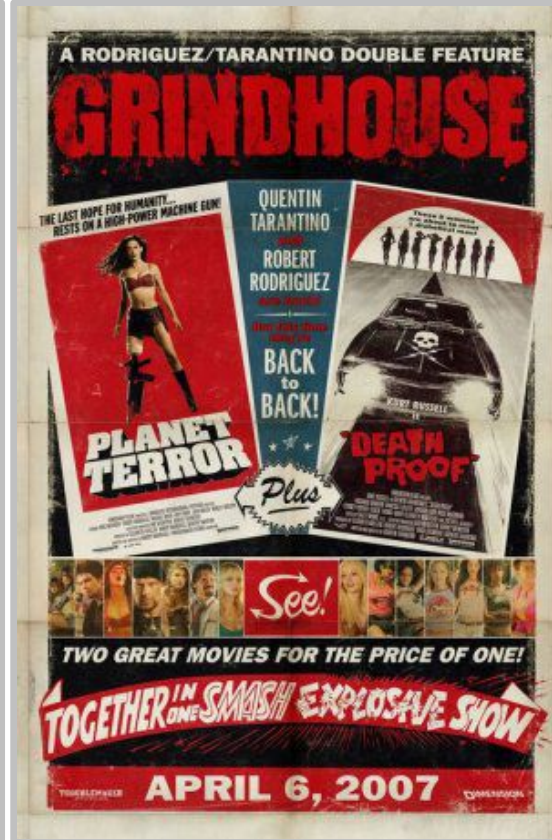
... and what can I do with these toys?



And then the fake trailer is so popular, that fans make even a Lego version..

Source: <http://youtu.be/XtkHygcTC8A>

With more than one possible media strategy



A side character from a movie, then a trailer of a fake movie inside another movie, the the trailer becomes popular and becomes a real movie.

Source: http://en.wikipedia.org/wiki/Spy_Kids [http://en.wikipedia.org/wiki/Grindhouse_\(film\)](http://en.wikipedia.org/wiki/Grindhouse_(film))
[http://en.wikipedia.org/wiki/Machete_\(film\)](http://en.wikipedia.org/wiki/Machete_(film))


... and that's not the only case!



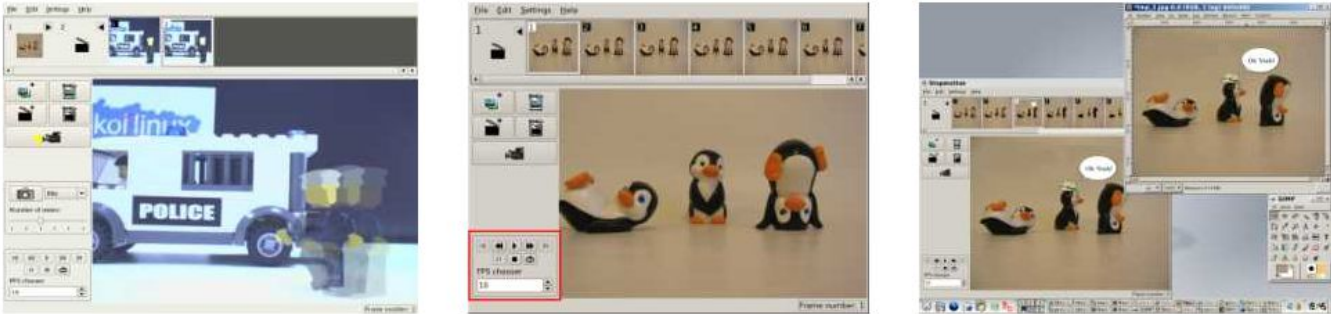
Many different adaptations, photos and videos can be found online.
(Solution for the above picture [here](#))

Source: <http://www.flickr.com/photos/catsy/5948099285/in/pool-1206921@N23>
<http://www.flickr.com/groups/1206921@N23/> <http://speckyboy.com/2009/06/12/24-lego-stop-motion-films-mimicking-cool-movies-scenes/>

... and there's an open software for this!



Home Download Support Development About



Linux Stopmotion

Linux Stopmotion is a Free Open Source application to create stop-motion animations. It helps you capture and edit the frames of your animation and export them as a single file.

Linux Stopmotion is a Free Open Source application to create stop-motion animations. It helps you capture and edit the frames of your animation.

Source: <http://linuxstopmotion.org/>



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02.

Molding: how to design and mill a mold



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Mold: choose your type

A mold can be 1-side or 2-side (or you may not need a mold). So start from these questions:

- * **positive or negative** shape? A mold or an object?
 - * **which material?** Silicon (soft object) or another plastic (hard)?
 - * so.. if you want **a soft silicon object: no mold**
 - * is your object **flat on one side or 360***?
-

Mold: choose your material

The screenshot shows the Smooth-On website with a banner at the top that reads "Materials to SCARE the LIFE out of you™" with a scary face image. The navigation bar includes links like Home, Technical Info, How-To, FAQ's, Videos & More, New Products, Distributors, and Mold Makers Exchange. A search bar and a language selector are also present. On the left, there is a vertical menu of applications including Architectural Restoration, Aquarium Decoration, Candlemaking, Concrete Casting, Encapsulation & Display, Food Related Applications, Home Projects & Hobbies, Industrial, Lifecasting, Model Making, Orthotics & Prosthetics, Prototyping & Inventing, Sculpture & Art Casting, Special Effects & Props, Sprayable Materials, Vacuum Bagging, and Taxidermy. The main content area is titled "SORTA-Clear® Translucent Silicone Rubber" and describes the material as a premium water white translucent silicone rubber. It mentions that it cures at room temperature with no shrinkage and has exceptional tear and tensile strength. It is ideal for making prototype, jewelry or other molds of any configuration where model visibility is important. It also states that materials such as urethane, epoxy or polyester resins can then be cast into SORTA-Clear® silicone without application of a release agent. Other materials such as wax and low melt metal alloys can also be cast into SORTA-Clear®. SORTA-Clear® can be pigmented with SILC Pig® silicone pigments. A yellow box highlights that SORTA Clear® 40 and SORTA® Clear 18 are both suitable for making molds for baking, casting ice, butter or chocolate and other applications used to produce food. A "CLICK HERE" link is provided. On the right, there is a small image of hands using the material, a "Click To Enlarge Image" link, and buttons for "Technical Bulletin", "MSDS", and "Videos And Photos". A list of hardnesses is provided: SORTA-Clear® 18 - Shore 18A hardness and SORTA-Clear® 40 - Shore 40A hardness.

Applications

- Architectural Restoration
- Aquarium Decoration
- Candlemaking
- Concrete Casting
- Encapsulation & Display
- Food Related Applications
- Home Projects & Hobbies
- Industrial
- Lifecasting
- Model Making
- Orthotics & Prosthetics
- Prototyping & Inventing
- Sculpture & Art Casting
- Special Effects & Props
- Sprayable Materials
- Vacuum Bagging
- Taxidermy

Home >> SORTA-Clear® Translucent Silicone Rubber

SORTA-Clear® Translucent Silicone Rubber

SORTA-Clear® rubbers are premium water white translucent silicone rubber (platinum catalyst) that cures at room temperature with no shrinkage. SORTA-Clear® features exceptional tear and tensile strength. Rubber clarity is especially useful when extracting models via cutting. SORTA-Clear® rubber is ideal for making prototype, jewelry or other molds of any configuration where model visibility is important.

Materials such as urethane, epoxy or polyester resins can then be cast into SORTA-Clear® silicone without application of a release agent. Other materials such as wax and low melt metal alloys can also be cast into SORTA-Clear®. SORTA-Clear® can be pigmented with **SILC Pig®** silicone pigments.

SORTA Clear® 40 and SORTA® Clear 18 are both suitable for making molds for baking, casting ice, butter or chocolate and other applications used to produce food.

[CLICK HERE](#)

- SORTA-Clear® 18 - Shore 18A hardness
- SORTA-Clear® 40 - Shore 40A hardness

Click To Enlarge Image

Technical Bulletin

MSDS

Videos And Photos

Smooth-On is one of the best manufacturers,
but it's not the only one...

Source: <http://www.smooth-on.com/>

Mold: **always read** the instructions!



SMOOTH-ON
SINCE 1965
MAKE IT NOW!

Materials to **SCARE** the **LIFE** out of you™

About Us Seminars Tech Support Contact Us My Account **BUY NOW**

Home Technical Info How-To FAQ's Videos & More New Products Distributors Mold Makers Exchange

Search Search  Select Language Powered by Google™ Translate

Home >> SORTA-Clear® Translucent Silicone Rubber

SORTA-Clear® Translucent Silicone Rubber

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Applications

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- Taxidermy

Click To Enlarge Image

TB Technical Bulletin

MSDS

Videos & Photos

It is very important that you always read the technical bulletin, it will tell you how to work the material, its features and safety information.

Mold: **always read** the instructions!

The screenshot shows the Smooth-On website with a banner for "Materials to SCARE the LIFE out of you™". The navigation bar includes links like Home, Technical Info, How-To, and a "BUY NOW" button. A search bar and a "Select Language" dropdown are present. On the left, a sidebar lists various applications such as Architectural Restoration, Aquarium Decoration, and Model Making. The main content area is titled "SORTA-Clear® Translucent Silicone Rubber" and describes its properties as a premium water white translucent silicone rubber. A red rectangular box highlights a yellow callout that states: "SORTA Clear® 40 and SORTA® Clear 18 are both suitable for making molds for baking, casting ice, butter or chocolate and other applications used to produce food. CLICK HERE". Below this, a list specifies the hardness for SORTA-Clear® 18 (Shore 18A) and SORTA-Clear® 40 (Shore 40A). On the right, there is a "Click To Enlarge Image" link, a "Technical Bulletin" button, an "MSDS" button, and a "Videos And Photos" button.

Applications

- Architectural Restoration
- Aquarium Decoration
- Candlemaking
- Concrete Casting
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Home >> SORTA-Clear® Translucent Silicone Rubber

SORTA-Clear® Translucent Silicone Rubber

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SORTA Clear® 40 and SORTA® Clear 18 are both suitable for making molds for baking, casting ice, butter or chocolate and other applications used to produce food.
CLICK HERE

- SORTA-Clear® 18 - Shore 18A hardness
- SORTA-Clear® 40 - Shore 40A hardness

Click To Enlarge Image

TB Technical Bulletin

MSDS

Videos And Photos

Also check if your material is food safe!

Mold: choose your material

Silcom
Muotista se kaikki alkoi

Restaurointi • kynttilät • betonityöt • koristeet • harrasteet • prototyytit • kuvanveisto • taide • erikoiseffektit • sekä lukuisia sovelluksia yrityskäyttöön

Tarjoustuotteet
Uudet tuotteet
Silikonikumit
Lifecasting
Polyuretaanihartsit
Vaahtomuovit
Polyuretaanikumit
Oheistuotteet
Muotoilusavat
Kynttilä- ja saippuamateriaalit
Valmispakit
Epoksit

Ostoskori | **Info** | **Materiaalilaskuri** | **Mediagalleria** | **Toimitusehdot** | **Palaute** | **Uutiset** | **Blogi**

Haku: Kaikki tuoterihmät

facebook
Osallistu ideakilpailuun Facebookissa. Palkintona yht. 600 euron edestä lahjakortteja!

Explore
Our Greatest Catalog Ever!
Tutustu uuteen upeaan Smooth-On katalogiin klikkaamalla kuvaketta

Tutustu oppaaseen ja tulosta itsellesi oma kappale. Siitä löydät yleistä tietoa muottikumeista ja niiden käyttämisestä, sekä tietoa yleisimmistä muottitekniikoista

Betonista on moneksi!
- Smooth-Onin muottikumeja käytetään maailmanlaajuisesti erilaisissa betoniprojekteissa. Tutustu millaisissa sovelluksissa tuotteita on käytetty.

Kaikkea mitä tarvitset muotin valmistukseen ja valutöihin

Asiakaspalvelu
0400 416 371
info@silcom.fi

Muottitietoa
Lue mihin kaikkeen muottitekniikka soveltuu

Materiaalilaskuri
Osta oikea määrä. Laske täällä.

Tutustu valmispaketteihimme

Media-galleria

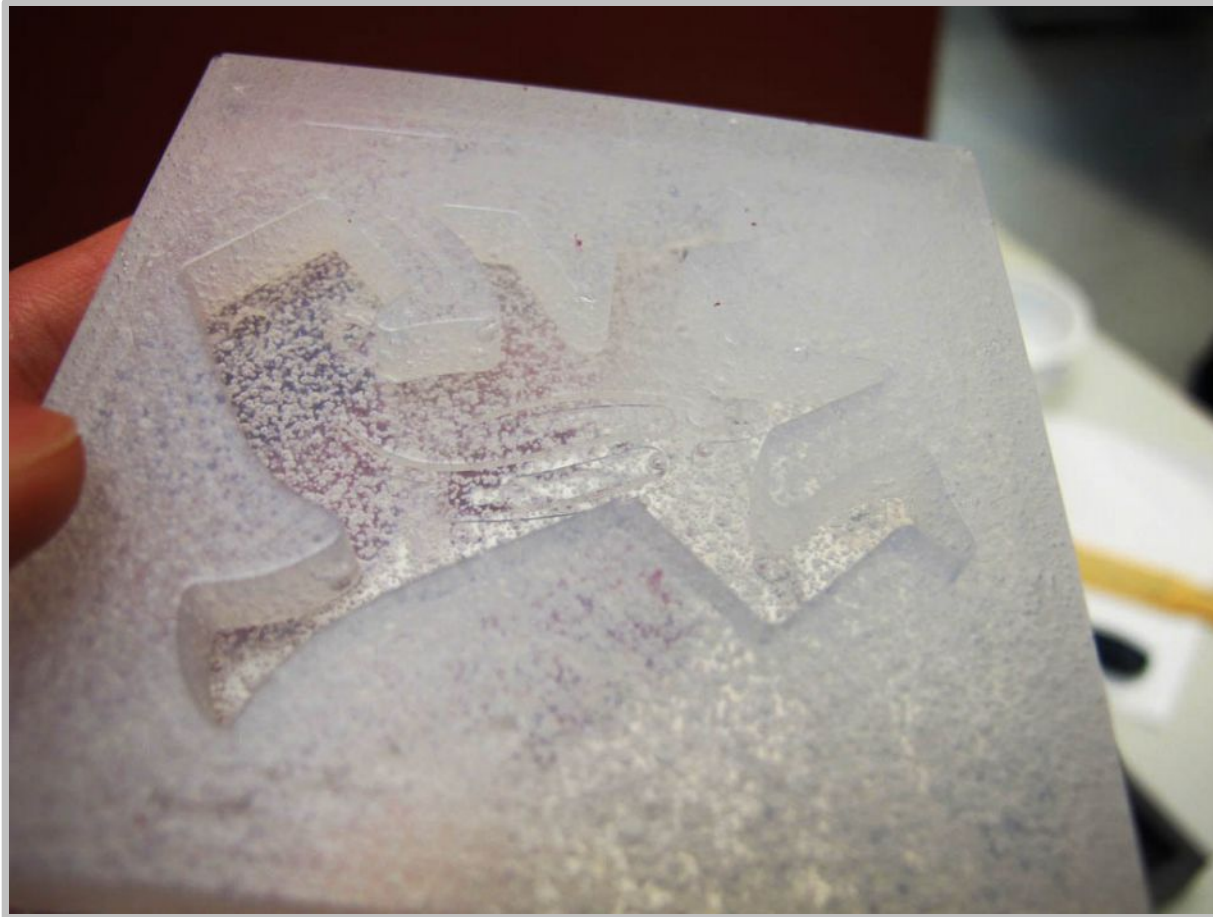
Oletko vasta aloittelemassa?
Täältä löydät helpot

Etusivu

Silcom is the Finnish distributor of Smooth-On and other brands...

Source: <http://silcom.fi/>

1-side mold: relief objects (one flat side)



A 1-side mold for an object with one flat side
(and a food safe silicon).

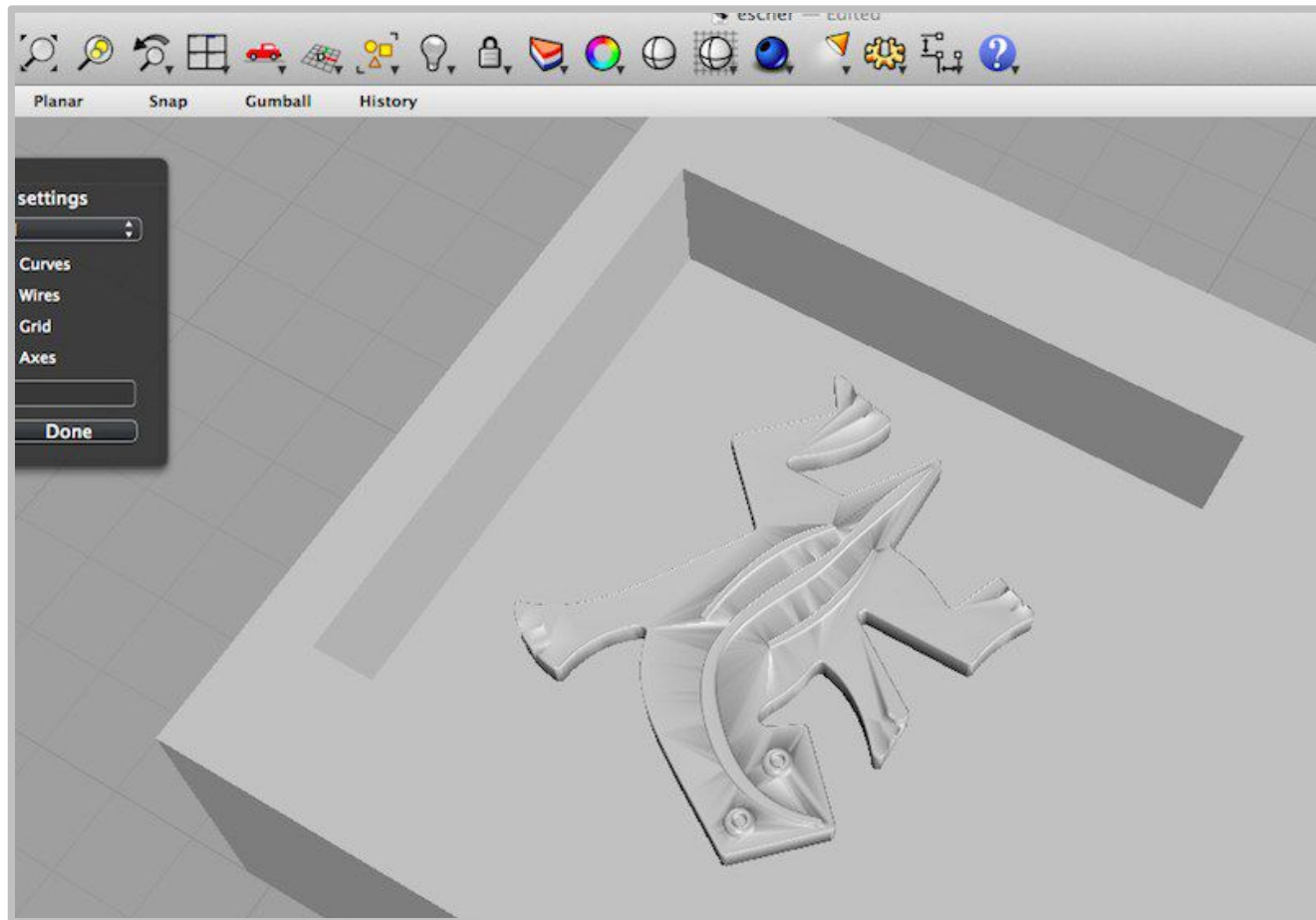
Source: <http://www.flickr.com/photos/aaltofablab/7073792943/in/photostream>

1-side mold: relief objects (one flat side)



The final flat object (chocolate).

1-side mold: relief objects (one flat side)



The mold designed for milling: it is the negative of what you want to get as a real object!

Source: <http://academy.cba.mit.edu/2012/students/menichinelli.massimo/index.html>

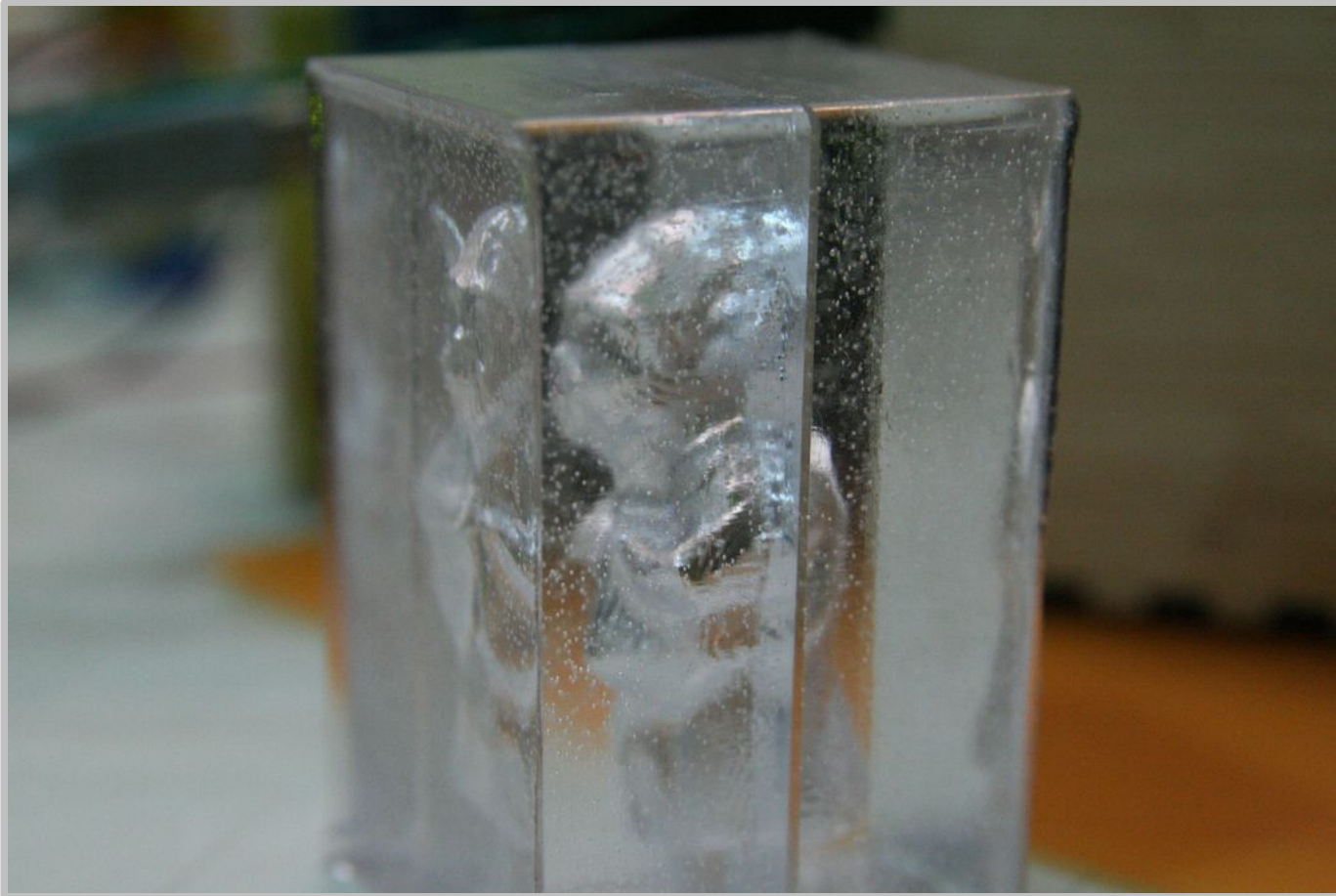
2-sides mold: full 360° objects



For objects that are 360° (not just a relief) you will need a two-sides mold, so think about how to split the model in two.

Source: http://www.flickr.com/photos/massimo_menichinelli/6766269767/in/photostream

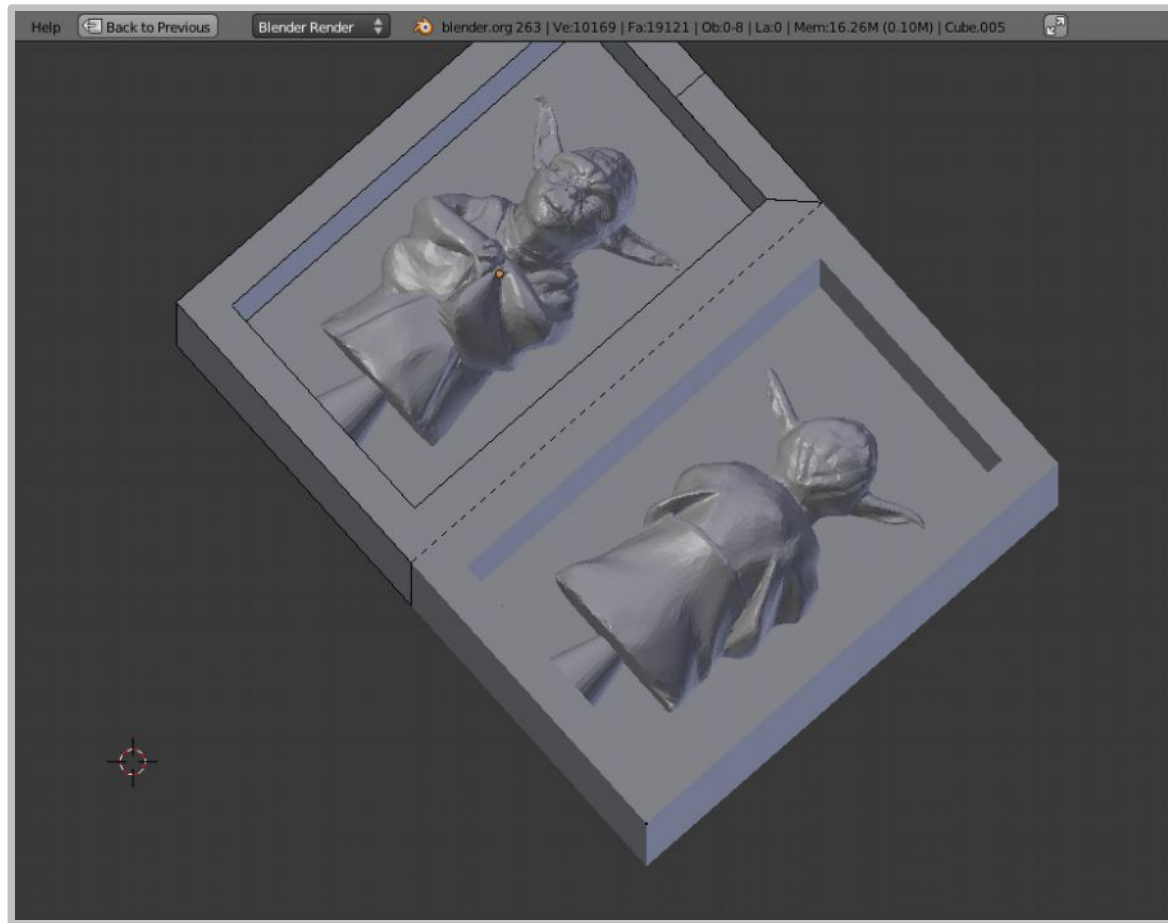
2-sides mold: full 360° objects



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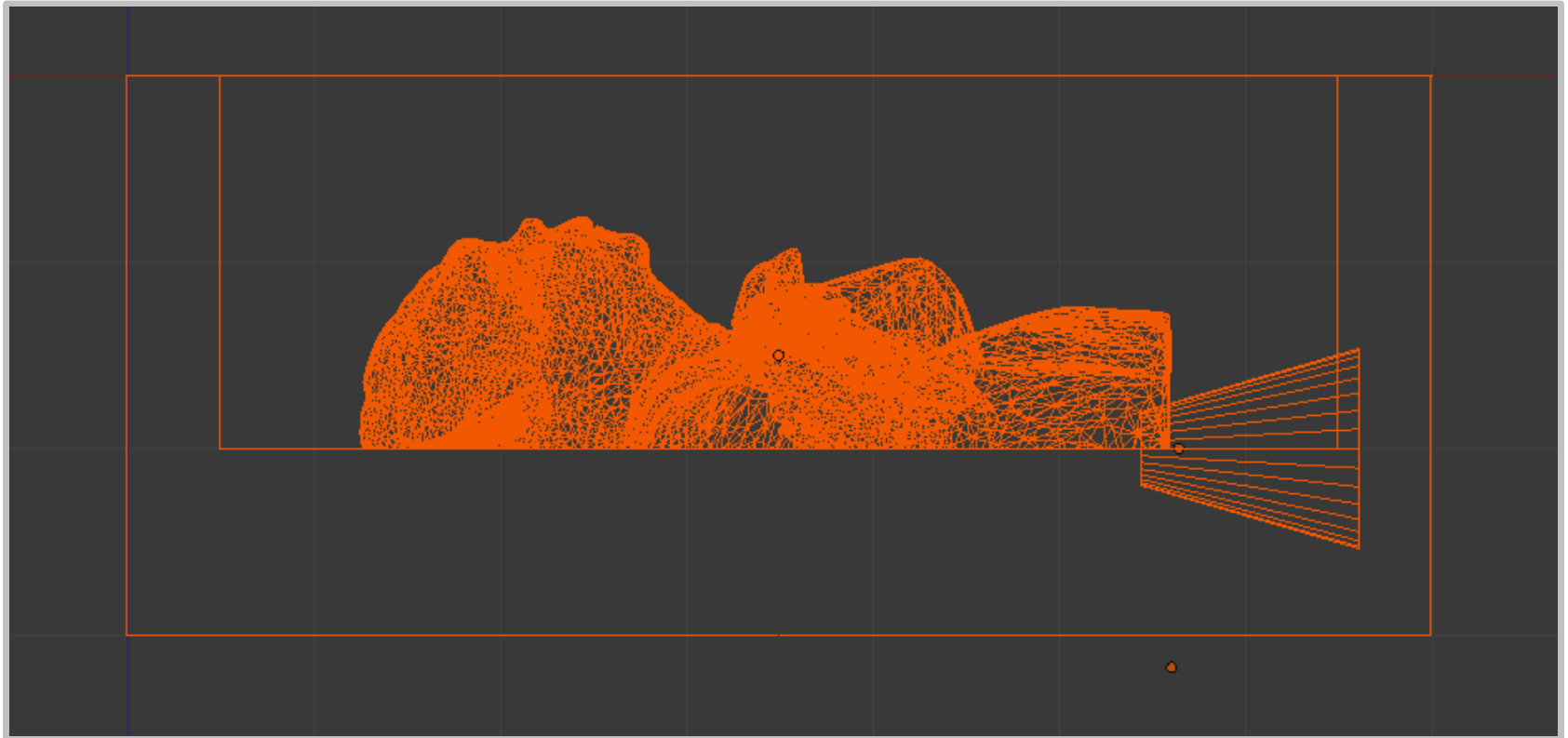
Source: http://www.flickr.com/photos/massimo_menichinelli/6766270509/in/photostream

2-sides mold: full 360* objects



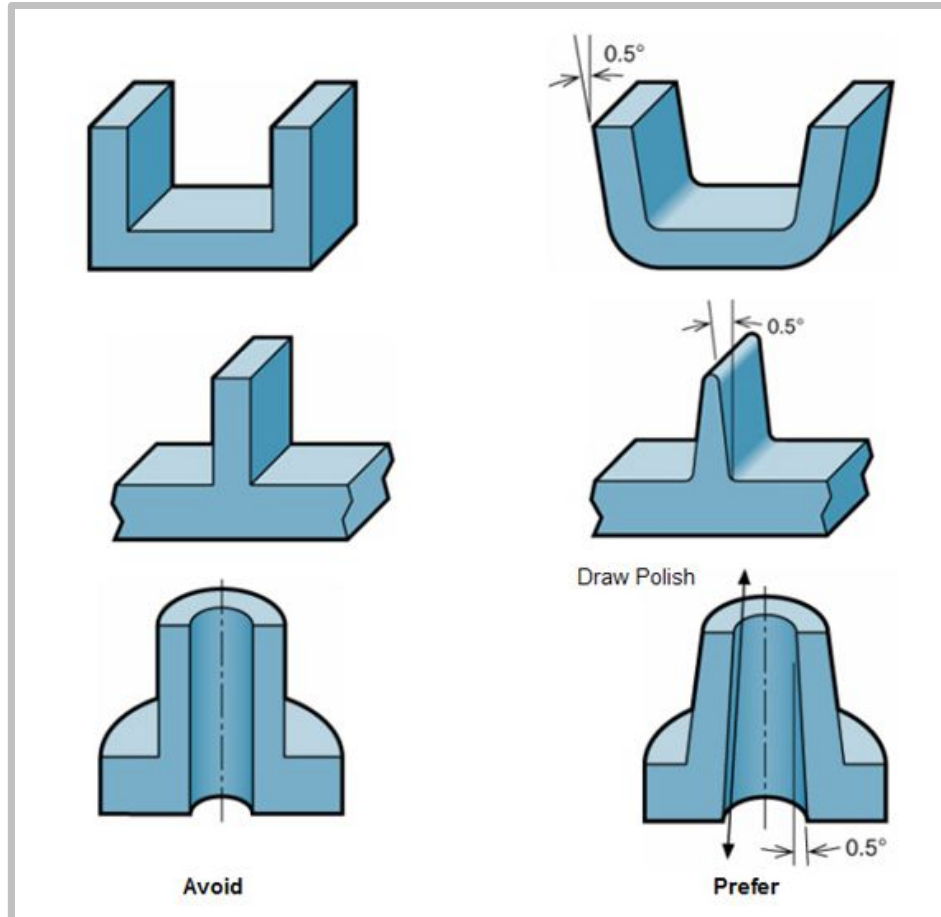
For objects that are 360* (not just a relief) you will need a two-sides mold, so think about how to split the model in two.

2-sides mold: full 360° objects



Add a cone for pouring the final plastic into the mold (the mold will be vertical!).

Draft angles: it may be hard to remove the part



In engineering, draft is the amount of taper for molded or cast parts perpendicular to the parting line. It can be measured in degrees or mm/mm (in/in).

Source: http://www.bayermaterialsciencenafta.com/checklist/draft_angle.html
[http://en.wikipedia.org/wiki/Draft_\(engineering\)](http://en.wikipedia.org/wiki/Draft_(engineering))



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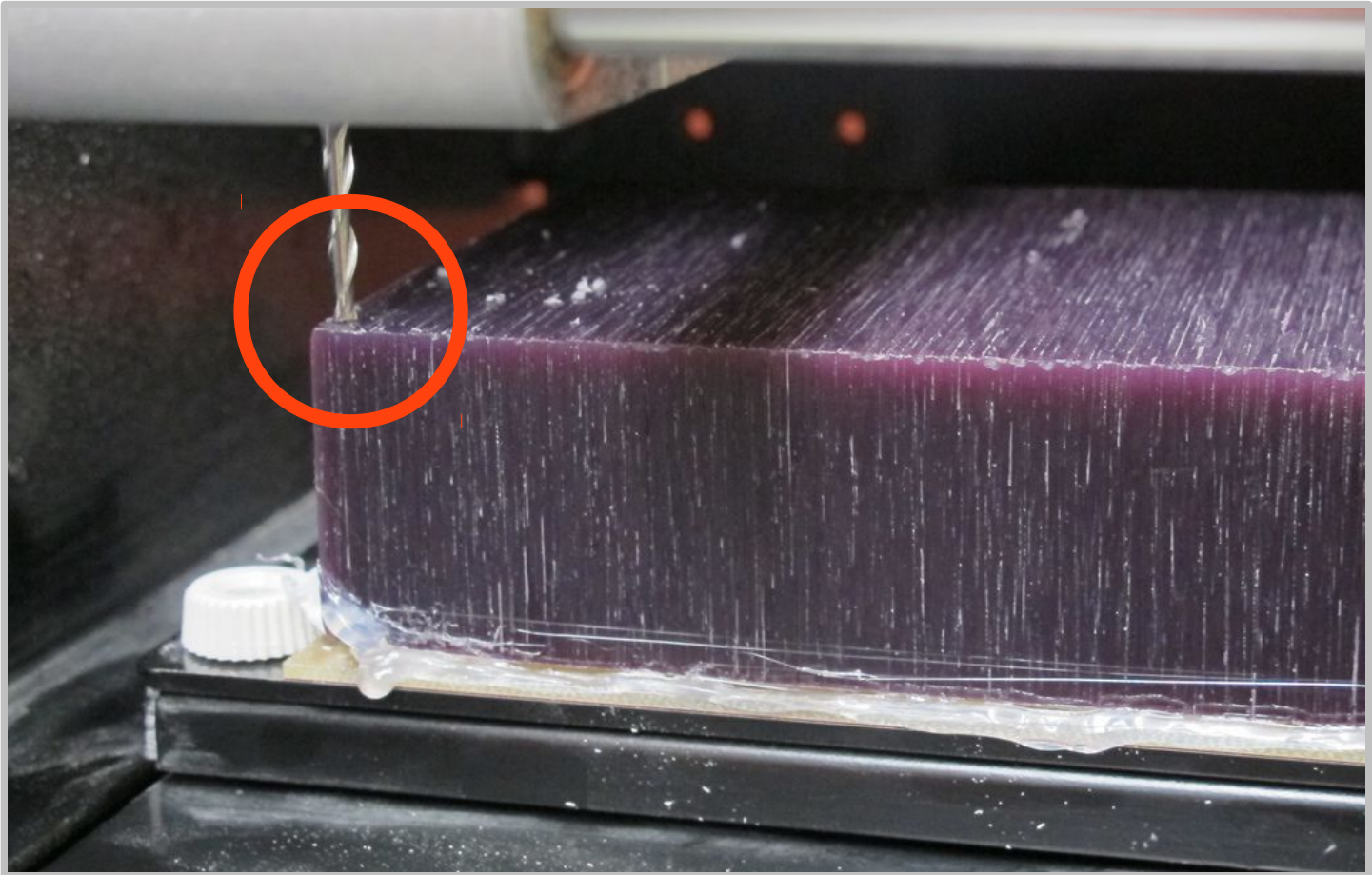
03.

Milling and Casting: How to create a mold and use it



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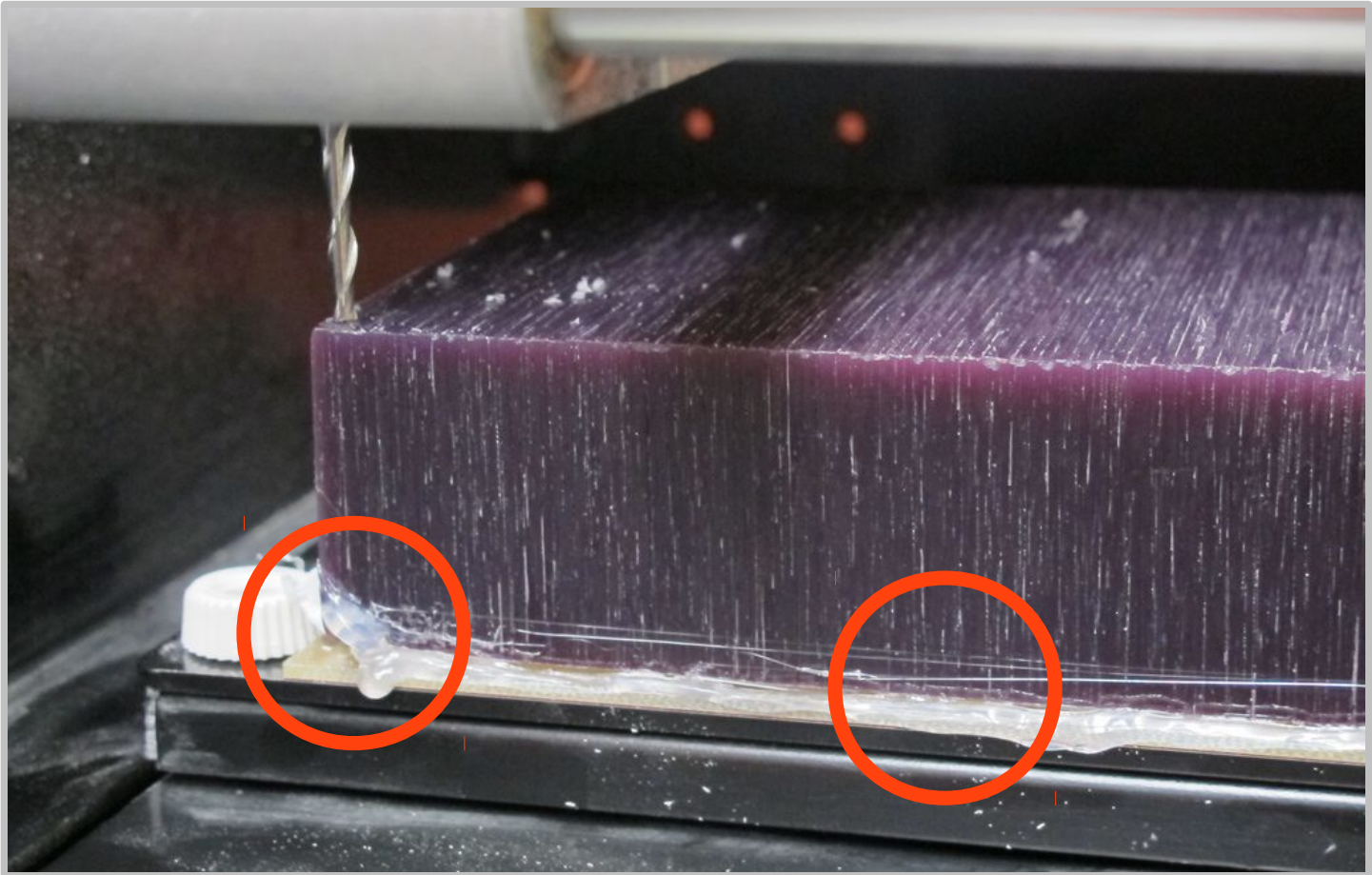
Always, set the Zero: X, Y, Z



And write down the X and Y coordinates! Furthermore, don't mill around it, so you can preserve it for future passes.

Source: <http://www.flickr.com/photos/aaltofablab/6924563776/in/photostream>

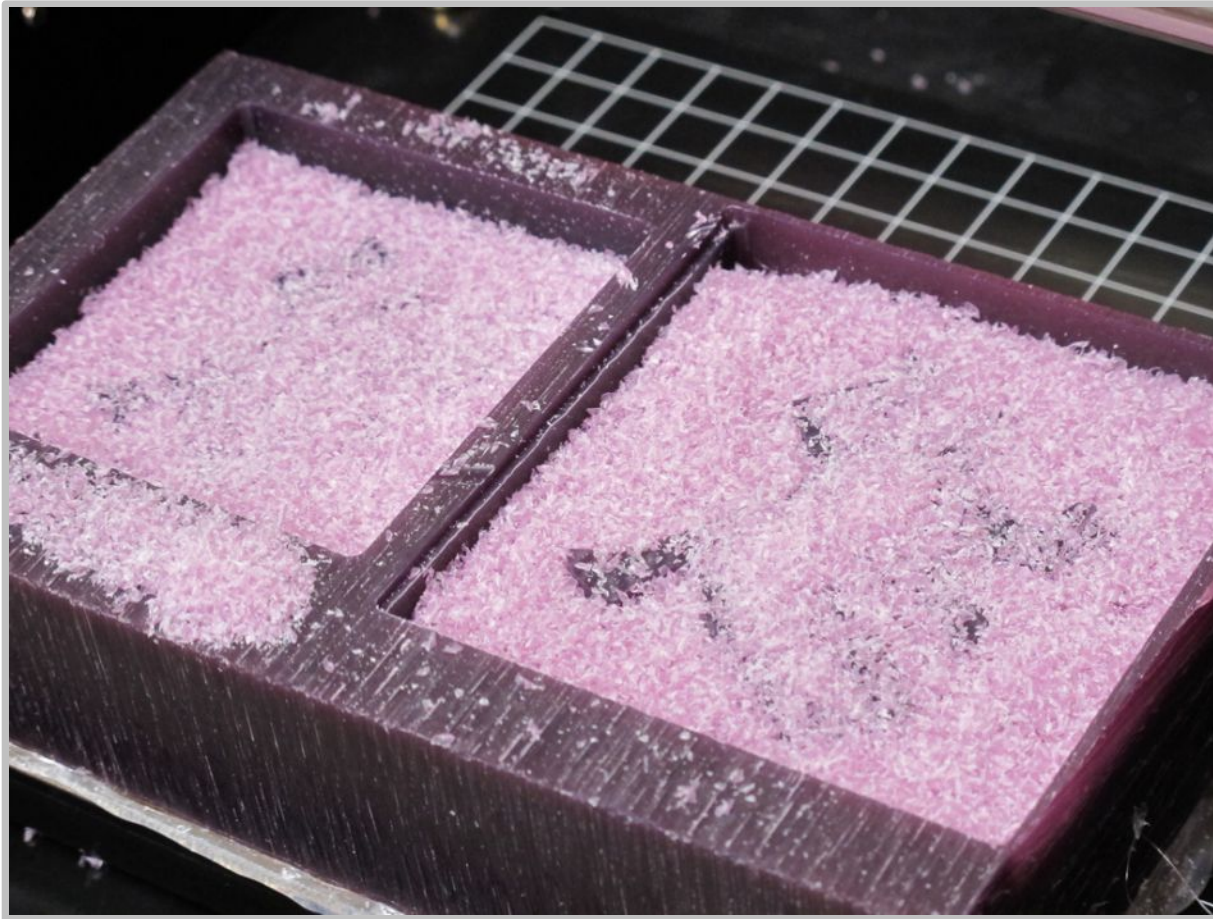
Always, use double side tape



Use double side tape to stick the modeling wax block to the milling machine, and hot glue if the tape is not strong enough.

Source: <http://www.flickr.com/photos/aaltofablab/6924563776/in/photostream>

Mill it :)



You may need to clean the machine to check the progress, but **always press the View button** before doing it!!!

Source: <http://www.flickr.com/photos/aaltofablab/6924566732/in/photostream/>

Mix and stir the components



Most of the time you will have to mix two separate components, **always check the instructions**, you may need to balance by volume or by weight.

Source: <http://www.flickr.com/photos/aaltofablab/7070850521/in/photostream>

Use the demoulding spray



It will help you when taking the mold away from the wax block.

Pour the silicon with a steady flow



You want to avoid the formation of bubbles inside the mold (or you will have to cast it again), so be careful when pouring the silicon.

Source: <http://www.flickr.com/photos/aaltofablab/6924789764/in/photostream>

Wait ... and repeat!



Check the instructions! Sometimes it help for demoulding to leave the stick on the mold ... sometimes not!

Source: <http://www.flickr.com/photos/aaltofablab/7073738569/in/photostream>



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Thank you!!

Massimo Menichinelli
Aalto Media Factory
massimo.menichinelli@aalto.fi
@openp2pdesign
<http://www.slideshare.net/openp2pdesign>



12.10.2012