HIMACS Tools and Accessories

HM2060

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Introduction

This section informs suitable necessary tools and accessories to fabricate and install HIMACS products.

Overview

LX Hausys strongly recommends to use the equipment and/or machinery and/or tools that have proper power and performance to fabricate solid surface products. Although, lots of general equipment, machinery and tools for woodworking can do fabricate HIMACS products, there are some optimized points for better work condition, high quality and longer tool life. Therefore, this section informs the list of those equipment, machinery, tools and minimum essential points of them.

Note !

1. *This guideline has been created to provide technical information for successful fabrication and installation of HIMACS, and it is intended to be used in a safe environment considering their own discretion and risk by who has technical skill for fabrication and installation of HIMACS.*
2. *This guideline is continually revised to provide reliable and up-to-date information, replacing all previous versions of the guideline and technical information, however the usage and conditions of use are beyond LX Hausys control, LX Hausys cannot guarantee the suitability of material, fabrication and installation for all usage and conditions of use. Users should not regard or rely on this guideline as a complete, sole, up-to-date or absolute information. HIMACS users, fabricator and installer should review whether the design for HIMACS, fabrication method, installation method and required performance are suitable for the intended use and conditions of use. LX Hausys shall not be liable for any direct or indirect, commercial damages or losses caused by the fabrication and installation results of HIMACS using any or all of these guideline. In addition, the results of joining with other materials, and the fabrication and installation guidelines for other materials shall not be covered by LX Hausys.*
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Contact LX Hausys HIMACS territory manager or distributor of your market for specific questions and information.

1. Equipment for Work Environment

1-1. Dust collection system

The dusts produced while fabrication HIMACS products should be extracted and collected from your work place for your health, tool life, better working condition and quality improvement. Therefore, follows are recommended for safe handling of dusts.

- Dust extraction/collection system for whole workshop
- Dust collecting parts for each equipment and tool
- Portable/movable dust collectors for all place

For more health safety information refer to 'HM1021 HIMACS Sheets MSDS', 'HM1022 HIMACS Adhesive MSDS'.

1-2. Pneumatic system with flexible hose and air blow gun

Air blow gun is a good way to remove dusts and residues from HIMACS products without scratches before, during and after fabrication and installation. In addition, tool life can be extended through cleaning using air blow gun. Easy and quick cleaning your work place and work clothes using air blow gun might be a small tip. Therefore, setting pneumatic system with flexible hose and air blow guns that can be reached at any place it needed in your workshop is recommended.

1-3. Worktable (workbench)

Good worktables are essential as well for your safe and efficient work as for quality of finished products. Proper size and quantity of worktable can be optimized and calculated from your business scale and main target applications. The other essential elements to make good worktables are below.

- Worktable should be strong enough against to the HIMACS products weight and/or finished products weight and work pressure.
- Strong wooden and steel frame are good material for stable worktable. However, to avoid scratches on HIMACS products, the surface of top part those are frequently contacted with HIMACS products should be covered by materials that have more soft surface hardness than HIMACS products. Wood are good material for the surface. And any sharp edges of worktable are not allowed.
- Design the worktable considering clamping works. There are lots of clamping works between worktable and HIMACS products or between HIMACS products. Therefore, worktable should adapt convenient and efficient clamping works, and should minimize interference by worktable frame.
- Worktable should be flat except intended case. No high quality without stable flatness of worktable.

2. Cutting

2-1. Saws

Cutting full size HIMACS sheets should initially be carried out using a panel saw, beam saw or table circular saw. The basic requirements for the respective saws are as follows.

- Table circular saws with adjustable, accurate rip fence and strong in-feed & out-feed tables
- Panel saws or beam saws always with dust collection system by machine or integrated shop system
- Minimum 5 HP (3.75 kW) motor
- 3,000 to 4,000 RPM
- Chop saws or miter saws that can equip saw blade with diameter of 254 mm (10") or 305 mm (12")
- Safe guards respecting local safety rules.

Don't use saws below

- Handheld rip saws
- Portable jig saws (saber saws)
- Chainsaws
- Hack saws
- Saws having big noise with vibration
- And, any kind of not sophisticated saws

Useful Tip !

During on-site fabrication portable circular power saws with guide rail can be used providing the edge is subsequently finished with a router. But the best and most efficient way for on-site fabrication is to use a router only with straight edge and/or template.

2-2. Saw blades

Circular saw blades with triple chip teeth of tungsten carbide will provide the best possible result. The ideal requirements for the respective blades are as follows.

- Saw blades with diameter of 254 mm (10") having 80 teeth or saw blades with diameter of 305 mm (12") having 96 teeth
- Saw blades with 1 tooth per 10mm circular arc
- Negative hook angle (-5 degree)

Fig. 2-1. Saw blade with positive angle

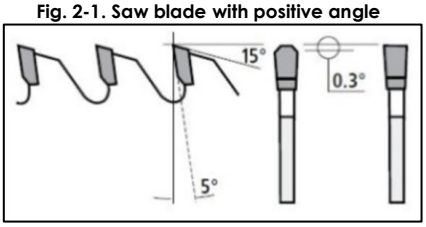
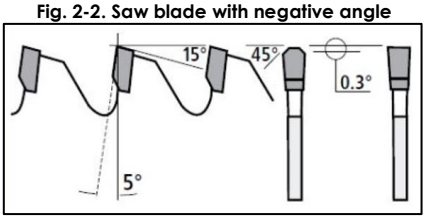


Fig. 2-2. Saw blade with negative angle



There are lots of optimized saw blades and brands for solid surface. Consult manufacturer of blades to choose more sufficient saw blades for your cutting equipment and tools.

Useful Tip !

- *It is important to avoid stress fractures when cutting HIMACS sheets, this can lead to crack formation later. In the event of small chips and cracks appearing when cutting, ensure the edges are always dressed using a router or spindle molder.*
- *Regularly sharpen blades for higher quality.*
- *Consider to use automatic equipment like CNC machines, V-Grooving machines and diamond blades for mass volume production and more accurate fabrication.*

Note !

When you cut HIMACS sheets never use the saw blade that has been used to cut other materials. The saw blade should cut HIMACS sheets only to get high quality cutting face stably.

3. Routing and Trimming

3-1. Router and trimmer

There are wide range of routing and trimming process due to various applications of HIMACS products, and the sufficient power of tools for each step are different. Therefore, refer to following tool information for each step of the process. Following information are based from tool manufacturer's specification for their tools. Consult manufacturer of tools to choose more exact tool for your task.

Table 3. Router and Trimmer

Router	Power	**1,400 ~ 1,900W (1.8 ~ 2.5 HP)**
	Main task	General routing for 12 mm HIMACS sheets
	Examples	Cutout, simple straight edge trimming, seaming preparing
Router	Power	**2,200 ~ 2,300W(3HP)**
	Main task	Heavy-duty routing and general routing for 12mm ~ 20mm HIMACS sheets
	Examples	Cutout, all kinds of trimming and profiling
Trimmer	Power	**700 ~ 950W (1 ~ 1.25 HP)**
	Main task	Minor trimming
	Examples	Simple edge treatment like chamfer trimming on edge

Router should able to mount minimum 12mm shank router bits. It means that router must have 12mm collet chuck (collet clamp).

Higher power rating of tools and machines will make result in more precise cuts and a higher quality fabrication. Therefore, consult tool manufacturer and choose possible higher power rating tools in a tool group. The power and RPM speed minimize chipping and provide precision high quality cuts.

Solid surfacing materials are very abrasive and the fine dust can quickly damage electronic control contacts and bearings. It is always best to invest in routers with dust extraction/collection devices, or provide good air flow and dust collection through other means. Also, it is important to have spare parts like bearings, templates, bushings.

Useful Tip !

- *There are various parts that can be attached on router or trimmer. Those parts are useful for multiple task.*
- *Lots of specialized equipment like CNC router, planner and spindle molder can be used for more efficient and high quality work.*

3-2. Bits for router and trimmer

Lots type of bit are in the market. And various shapes of bits are needed for the design with variety. When considering router bits or trimmer bits for your task, please remember bellow standards.

- Minimum 12mm shank for router
- Minimum 6mm shank for trimmer
- Wide selection of tungsten carbide tipped bits for straight cuts, profile finishing and bowl installation
- C-3 (minimum) or C-4 (recommended) grade of carbide
- Profiling bits with ball bearing guide (best is nylon bearing)

Useful Tip !

- *Regularly check and maintain the quality of the bits.*
- *Have a habit to check the bits before use it.*
- *Always prepare spare bits.*

3-3. Tamplates

Templates are necessary to make good cutouts having accurate size, correct shape and smooth/clean cut surface. Templates can be made from HIMACS sheets and wooden materials (MDF, plywood). Make various templates for sinks, lavatories, cooktops or other applications. And, store them in good condition, so that you can use them again without deformation.

4. Seaming (Clamping)

Several types clamp are needed to fix and join HIMACS products. For example, a "Basic" fabrication shop needs 500 to 1000 hand-spring clamps and other type clamps in order to work on multiple projects at one time. Suitable clamp type, size, quantity can be calculated from your business scale and main target applications. Generally, 50 mm spring clamps and various size of bar (F) clamps are main. Please refer to following clamps that are suitable for HIMACS products fabrication and installation.

Table 4. Clamp

Types	Task
Spring clamps	Build-up/profile edge
C (G) clamps	Narrow joint
Locking C clamps (Plier)	HIMACS sheet fixing, bowl fixing, template fixing
Bar (F) clamps	Wide range of usage from narrow joint to wide joint,
Vacuum clamping systems	Flat butt joint

The features of useful and efficient clamps are bellows.

- Steel body with plastic or wood jaws
- Steel body with steel jaws covered by protective surface cover
- Stable fixing and easy/quick release mechanisms

And, do not allow any factor that can occur damages on HIMACS products.

Useful Tip !

- *Especially, before you start routing and jointing, place clamps near your current work area.*
- *For your efficient work, prepare various type and size of clamps in your work shop.*

5. Finishing (Sanding, Polishing)

5-1. Tools and machines.

The quality of finished surface is one of most important factor that represents the overall quality of final products, because customers will find and notice the defects at the visible finished surface first. Detailed finishing process, well trained skill and optimized tools/machines are essential for stable finish with high quality. Refer to following tools and machines for finishing process.

- Hand grinder
- Orbital sander
- Random orbital sander
- Palm sander
- Hand belt sander
- Stationary belt sander (wide/long belt sander)
- Polisher

Good tools for finishing should have or should be:

- less sanding scratch marking
- easy and quick fixing system for sanding disk and pad
- equipped dust collector or dust extraction system

Consult manufacturer of tools to choose more exact and efficient tools for your task. Some optimized tools can provide more efficient work in a short time. In addition, your workshop condition, market characteristic and your skill should be considered when you choose finishing tools.

- Air sanders are efficient for mass volume workshops due to faster sanding and longer tool life, but it needs pneumatic system, so they have poor portability.
- Electric sanders are useful tools typically used at many places. However, they should be well maintained for longer tool life.
- Various type of tools are needed for the variety of finishing process.
- Stationary belt sanders (machines) may provide stable high quality on large area surface.

Useful Tip !

- *Always prepare spare tools and/or spare parts, because finishing tools are always exposed to tough work condition.*
- *Some tools should be handled by expertized people. Good tools do not make good finish quality every time without good handling.*

5-2. Sandpapers/discs/pads.

Generally, there are 3 types of finish like matte finish, semi-gloss finish and high-gloss finishes. However, the name and favorited texture of each finish type are slightly different at each market. The aesthetic and quality of finish are caused by combined several factors like finishing process, quality of tools/sandpapers and fabricator's skill. Therefore, it is not possible to define which sandpaper and the brand can make the correct target texture finish for clients at each market. There are too much options. However, there are a few features to consider when looking for sandpapers. Refer to following information.

- Aluminum oxide sandpaper is typical for HIMACS sheets finish.
- Silicon carbide sandpaper can be used for rough sanding.
- Sandpaper with holes for vacuum dust collection/extraction is required.
- 125mm (5") to 150mm (6") sanding discs are typical for hand tools.
- Strong or heavy backing paper is required.
- Wide range of sandpaper which have several grit grades or micron grades are required.

Table 5. Sandpapers required

Grit	Micron(μ)
60	
80	
120~150	100
180~240	60
320~400	30
600	15
1000~3000	9~5

Useful Tip !

- *Polishing pastes and waxes will improve the gloss level to a previously sanded element but are only recommended for art and special purpose.*
- *Optimized polishing pad can be used*

6. Thermoforming

6-1. Heating machine(Oven)

There are two types of typical heating machines. One is air heating circulating oven (convection oven) and another one is platen heating oven. Heating machine type is not critical, but the working bed size of heating machine should be considered by following information.

- HIMACS sheets standard dimension
- Working bed size of forming machines
- Size of main finished products for your business

And, refer to following essential consideration for heating machines.

- Heating temperature up to 190℃
- Uniform heating for the entire materials
- Stable heating and holding target temperature
- Quick heating with efficient power use
- Temperature control per 1 ℃

Useful Tip !

Generally, platen heating oven shows better performance for uniform speedy heating of entire sheets than air circulating heating oven (convection oven).

Note !

The heating methods through direct flame to HIMACS sheets are not allowed. These methods such as forge/torch burner heat partially and burn HIMACS sheets. As a result, it course thermoforming fail and durability down.

6-2. Forming machine(Press)

There are three typical methods for forming. One is manual method using male/female molds and other two method are using hydraulic press machine or vacuum press machine.

- Hydraulic press machine is useful for small products like washbasin.
- Vacuum press machine is useful for larger products like top covering or wall cladding.

Refer to following information for your consideration. And, consult manufacturer of the machines for more details.

- Proper press type and working bed size for your business
- Minimum 40tons of pressure power for hydraulic press machine
- Minimum 9tons/㎡ of pressure power for vacuum press machine
- Capable working height of silicon membrane for vacuum press machine
- Size of main finished products for your business

6-3. Others

- Protective gloves with insulation that protect hands from heat
- Temperature meter to calibrate oven
- Timer to check and alert the heating time
- Molds for forming to fit the shape

Useful Tip !

- *When you make big thermoforming products, the lower height of vacuum press table are more efficient and convenient for your work handling heated big HIMACS sheets.*
- *There are lots of brands of machines for heating and forming in the market, and there are no limit to choose the brands. However, the proper performance for your work should be considered.*
- *Please visit the website "https://globalvacuumpresses.com" for your consideration. "GLOBAL VACUUM PRESSES" is one of companies that serve reliable machines and standards in solid surface thermoforming machine market worldwide.*

Referenced documents

'HM1021 HIMACS Sheets MSDS'
'HM1022 HIMACS Adhesive MSDS'

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