NUSHARP™

A cutting edge supplier

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ABOUT

Nusharp is a cutting-edge supplier of shears, scissors, and knives. Its core competence is the cutting edges, from the most delicate to the toughest cutters for aramid (e.g. Kevlar), composite fabrics, and the component blades for plastic pipe cutters, etc.

Nusharp works to increase end users' value by advancing function and performance and then reducing the total cost of ownership. Its products serve not only professional users but all those who care about their performance with the tool they use, such as high end DIYers.

- If you would one day renovate yourself,
do so from day to day. -

Nusharp pursues close working relationships with business partners - importers, distributors, resellers, marketers, and suppliers. Business partners help to identify the unmet demand, and Nusharp then works to meet that demand by tailoring products specifically for that niche. Nusharp pursues a strategy with variety-based positioning, which focuses on subsets of products or services that various industries offer. It concentrates its resources on producing a focused range of products that are outstanding for particular users' requirements or preferences, for particular applications, for users with certain capabilities, or for specific usage situations, and aims to surpass the offerings of any competitor.

NUSHARP'S PHILOSOPHY

- Innovation and continuous improvement–By focusing on innovation and continuous improvement, the company will be well prepared to adopt any new capabilities and do even better what we have done best on the daily basis.
- Agility, Speed–Nusharp can establish the most effective core business process for production.
- Integrity, Integration–By pursuing integrity and integration, the company can establish mutual trust with customers and suppliers, creating a true synergy.
- Leanness–Minimize the use of resources, eliminate waste, and maximize efficiency and effectiveness.

NUSHARP'S MISSION

“Customers are the reason we exist!” In a nutshell, Nusharp's mission is to continually improve its products and services to speedily meet its customers' needs and improve the long-term economic well-being and quality of life for all stakeholders.
Customers rank the top of the stakeholders.

DESIGN AWARDS

In this turbulent economy, innovation is more important than ever, and participating in the world-famous design awards demonstrates a company's will to innovate. So by not only participating but winning the design awards, Nusharp has demonstrated the outstanding quality of its designs and provided buyers a useful guideline for finding the best products and creative services within the marketplace.

GOLDEN PIN

※ Golden Pin Design Award, Taiwan
The Industrial Development Bureau (IDB) of the Ministry of Economic Affairs announced the first Golden Pin Design Award (GPDA) in mid-2009, replacing the Taiwan Design Award (TDA) as the highest profile national design competition on the island.
Award Number :
99GP-01-018 / 99GP-01-019 / 99GP-01-165

iF DESIGN AWARD

※ iF Design Award, Hanover, Germany
Established in 1954, the iF design award label is globally regarded as the quality seal of design, indeed it has become an internationally recognized trademark, serving as a buyer guidance tool in global markets.

Award Number :
162-45367 / 162-45369 / 191-55415

TAIWAN EXCELLENCE AWARD

※ TAIWAN EXCELLENCE
Taiwan Excellence was set up in 1992 to encourage Taiwan industries to upgrade and incorporate innovation into their products. They epitomize Taiwan's unique genius in using innovation to create added value in the design and manufacturing of leading-edge products.
Award Number :
100376FC-N017

GOOD DESIGN
グッドデザイン賞

※ Good Design Award, JIDPO Japan
The Good Design Awards is a comprehensive program for the evaluation and encouragement of design organized by Japan Industrial Design Promotion Organization (JIDPO), commonly known as the G Mark system established in 1957.
Award Number :
10C01001 / 10C01002 / 17G080722

835
WIRE CUTTER
GOOD DESIGN
グッドデザイン賞

KING

991
SUBMARINE
GOOD DESIGN
グッドデザイン賞

993
CRUISER
GOOD DESIGN
グッドデザイン賞

THE RIGHT TOOL EASES THE MOST DIFFICULT TASK

All fulcrum type shearing tools use a shearing action that starts near the fulcrum and progresses toward the tips as the handles are squeezed. This action creates a force which often pushes harder and thicker materials toward the tips, requiring a sizable opposite force to accomplish cutting. Some have serrations on the outside of the edges to reduce slipping, which only works with softer material. The most important factor is that blade edges are held in close contact through their entire length of cut or else tearing may occur or thin material may slip between them rather than being cut.

Since most are basically levers with the fulcrum in the middle, the ratio of the relative distances of the squeezing point and the cutting point from the fulcrum determines both the force and movement ratio. When the squeezing point is at a greater distance from the fulcrum than the cutting point, the cutting force is greater and the movement is less than that applied to the handles. This has two effects in selection. Relatively long handles provide greater control through less cutting movement and greater cutting force. The latter is often referred to as the mechanical advantage. As the cutting point moves toward the tip, the movement increases and the force decreases. Due to leverage ratio changes, the squeezing force required increases as cutting point approaches tips.

As mentioned above, there is a force that pushes the work piece toward the tips, which is generated by the angle of attack at the cutting point. Close to the fulcrum the force is greater due to the wide angle. As the point moves toward the tips, both the angle and the force decrease.

Scissors may have very thin or thick blades with sharp pointed or blunt tips in any combination. Although most are designed for specific uses, preferences are determined by the end user. The only general guide lines are that thinner and narrower blades are less rigid than thicker and wider, plus they must fit between two or three dimensional obstacles without obscuring sight of cut. Excess length may limit maneuverability. Short lengths may produce jagged lines in long cuts, due to repositioning between each cut segment. Cutting to the tips will only aggravate the situation. Cutting out intricate decals requires fine, short blades with clear vision of cutting point. In most cases, it is better to roughly cut pieces apart and trim them after. But this is limited by the minimum size that can be held. Dull scissors tear rather than cut. Spring opening can be good or bad dependent on situation and preference. Variation in style and characteristics are common.

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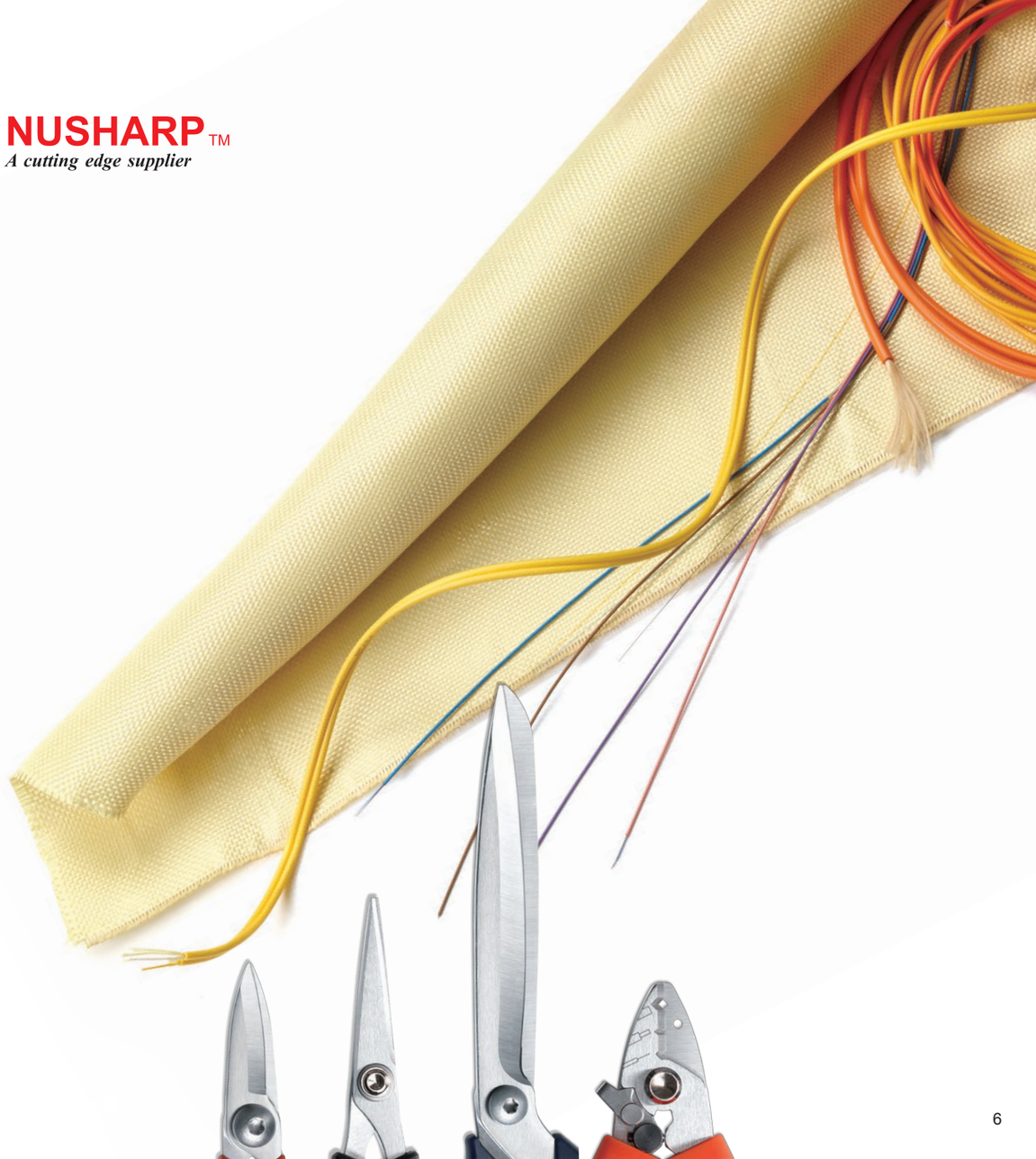


DESIGN / MATERIAL / PROCESS

Three most important components in manufacturing shears

HUMAN-CENTERED DESIGN

The objectives of design are that they should enhance human abilities, should overcome human limitations, should foster user acceptance. The design issues, the first issue is formulating the right problem, the second is designing an appropriate solution, the third is developing it to perform well, and the fourth is assuring user satisfaction. Here are some guidelines while Nusharp design their quality tools.

FUNCTIONALITY

Leverage, scissors is a fulcrum type shearing tool. Since most are basically levers with the fulcrum in the middle, the ratio of the relative distance of the squeezing point and cutting point form the fulcrum determines the force and movement ratio. Nusharp will most are basically levers with the fulcrum in the middle, the ratio of the relative distance of the squeezing point and cutting point form the fulcrum determines the force and movement ratio. Nusharp will select the optimal ratio for the purpose of tools, offering the most efficient and smooth run.

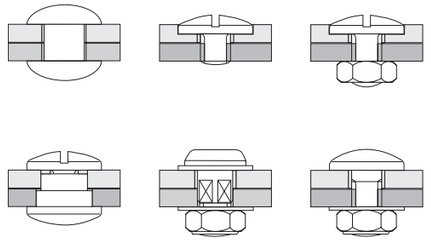
Sharpness is determined by the angle of the cutting edge. The sharper the cutting edge is, the faster the tool dulls. Nusharp select the best angle of the cutting edge to its application. Therefore the shape and type of cutting edge are paramount important in scissors design.

Reference cutting angle for various scissors and shears: 25°for home barber, embroidery, nail, cuticle shears; 35° for fabric, poultry shears; 35° to 45° for tailor, leather, professional barber shears; 50° for knife edge, one blade 50°, the other is 10° to 20°.

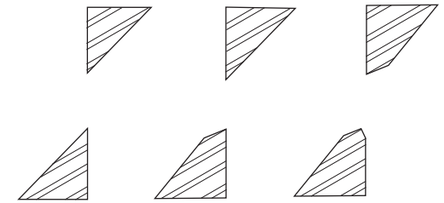
The edge of blade, besides cutting edge, is another factor that determines the maneuverability of shears. Nusharp always configures the best arrangement of bevel edge angle and its internal side to achieve the best cutting ability by flat grinding or hollow grinding. Serrations are fine lines or teeth ground into the edge of one blade. The serration holds the material, keeping it from being pushed forward.

More important than the serration is the actual cutting action. The ideal closing angle of the blades to one another is important.

FULCRUM STRUCTURE

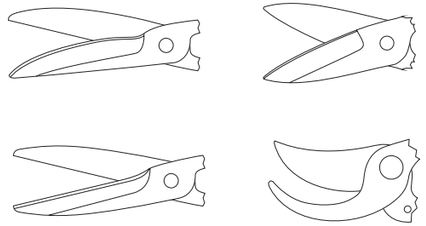


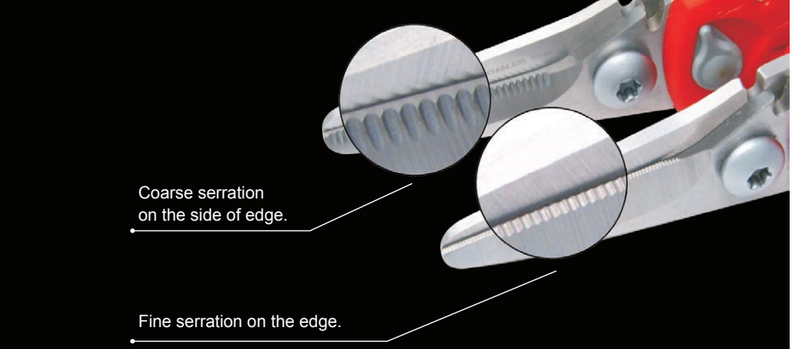
CUTTING ANGLE



General Cutting Edge | Knife Edge | With Inside Chamfer

BLADE SHAPE





SERRATIONS

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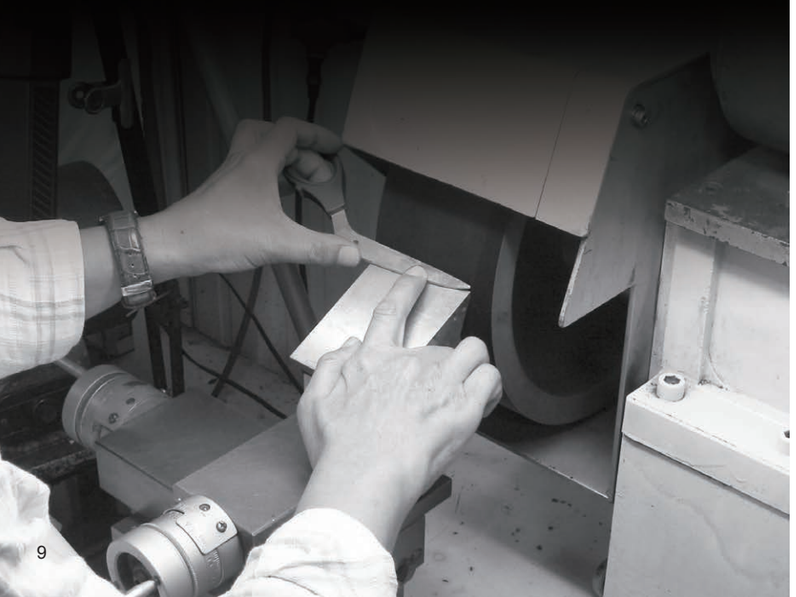
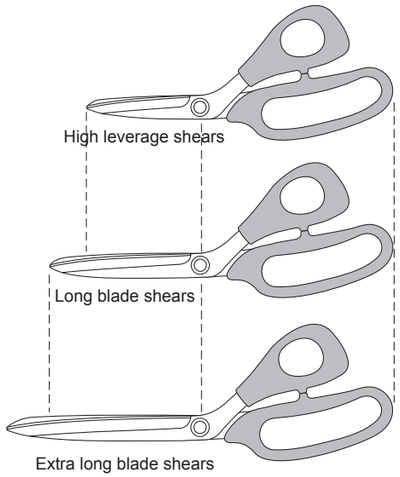
The serration holds the material, keeping it from being pushed forward.



ERGONOMICS

Modern dictionaries define Ergonomics as "The applied science of equipment design, as for the workplace, intended to maximize productivity by reducing operator fatigue and discomfort. Also called biotechnology, human engineering, human factors engineering."

There is no good design if ergonomics is ignored. Nusharp always keep ergonomic requirement in mind while in designing a shears, and would rather trade off the functionality to prevent operator from fatigue. This is one of the objectives of design, overcome human limitation.



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AESTHETICS

Aesthetic trends are also extending to the inside of the appliance.
The original Greek 'aisthetika' means that which is perceptible through the senses. The process of sensory perception in humans is complex and one which can provoke powerful responses in the enormous store of experiences, memories and behavioral patterns within people. People can respond at a purely personal level or from a consensus cultural viewpoint as to what is right, acceptable, beautiful, or to what is not. Aesthetics is not just concerned with the visual form, color, or texture of products, but with understanding and anticipating the effects of sensory stimulation on human perceptions and responses.

Aesthetic issues have traditionally been explored through the arts and have reflected human values and aspirations of quality, 'rightness', beauty, proportion, balance, rhythm and scale. The quality of the experience of beauty is descriptively elusive and designers must learn what constitutes beauty through qualitative means. Aesthetics is one of necessary features of any merchandise in today's commercial world. We regard it as one of the major factors of product marketability.

As a value-driven company, the customer define the value, and as consumers respond aesthetics from a consensus cultural viewpoint, Nusharp spend all their efforts on functionality of product, and request ideal aesthetic requirement from their customers for their own market. Materialize customers' concept is embedded in Nusharp's philosophy.

PRODUCT DESIGN AND DEVELOPMENT

Phase 0 idea validation

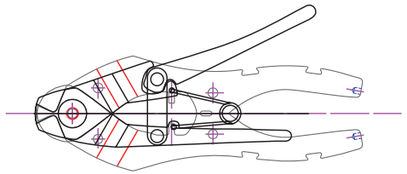
The ideas might be delivered by customers or from a thorough search. This is the planning stage of developing a new product, finding ways to improve on the existing products in the marketplace or in our current product range, if we can offer better value? could the market be satisfied better? If the answer is “yes”, move on to next.

Gate 0 launch the project

Phase 1 conceptual design

Once an idea has been selected and sufficiently developed. This is the phase to define the project goal, understand the needs and gain feedback from the market.

Develop the ideas through sketches that involve an understanding of users’ need, how to meet them with products, services, & processes.



Gate 1 approve project implementation

Phase 2 specification and design

Drawing up a specification may consider what sources we have, from the materials to production.

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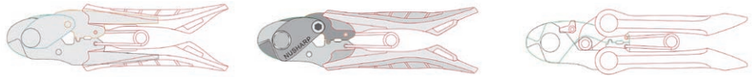

Gate 2 release the design

Phase 3 prototype production and testing

The prototyping phase holds significant importance. It is where we get the best answers quickly. By developing prototypes we can get more in-depth responses from our team as well user test responses. We take all the information and feedback gathered from prototyping. After evaluation, if the key requirements of the design are not successfully met, this phase involves returning to the beginning of the design process and returning through each step correcting the errors which led to the key requirements not been fulfilled.

Prototype 1 | Prototype 2 | Prototype 3 | Prototype 4 | Final Design

Gate 3 begin volume manufacturing

Phase 4 manufacturing ramp-up

The new product moves from pilot production to full-scale manufacturing. Whereby we can review the every step of the production and correct it if needed. Make preparation for the future full-scale manufacturing.

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MATERIAL STEEL

QUALITY BEGINS WITH QUALITY MATERIAL

Classic scissors are made of carbon steel. Modern manufacturing techniques include stainless steel. Some stainless steel alloys are good for cutlery. They can be hardened to acceptable levels and maintain toughness. Stainless Steel performs best when they are forged.

However, cold-forged scissors are of very poor quality and include the cheap scissors sold on the market in large quantities. They are made of steel wire which has been cut to length and placed under high pressure without heating, and are mostly only held together with a simple rivet.

We neither manufacture nor offer scissors of this type. More than 90% of our scissors are fabricated from sheets or strips of noncorrosive material cut out with a fine blanking technique and properly hardened. The some of our special scissors, such as those made for cutting Kevlar material are made from high carbon alloy steel. In some cases, special alloys with a higher proportion of molybdenum or vanadium used. Molybdenum adds toughness and increased corrosion resistance to withstand industrial chemicals and solvents and inhibits pitting caused by chlorides. Vanadium adds toughness and fatigue resistance.

The stainless material used is of SUS 420J2. This alloy is rustproof, nickel-free, and can be well hardened (hardness52-54 Rockwell). Nusharp is mainly offering these rustproof scissors with plastic handles that are ergonomically designed.

Nusharp uses only the finest material in our own scissors. We import material only from Japanese and German companies, e.g. Hitachi, Aichi, Nisshin, and Bohler.
To fulfill different application and market requirement, we also use DIN 1.4034, 440A, 440C, AUS8, DIN 1.4528.

STAINLESS STEEL

When you add a certain amount of Chromium to the steel, the steel becomes corrosion resistant. Steel alloys to which a minimum of 11.5% Chromium has been added do not usually form red rusts and so are called "stainless". The Chromium, when in contact with air, forms a non-reactive Chromium Oxide film. This passive film protects the surface iron from reacting with oxygen and forming rust. If the surface is scratched, the newly exposed chromium again reacts with the oxygen to form a new film barrier!

The passive chromium oxide film, which may be as thin as a molecule in thickness, can lose its protectiveness in reducing environments such as hydrochloric acids, etc. Increasing the Chromium content of the stainless steel increases its protective qualities. Adding Molybdenum also greatly expands the range of environments which are sufficiently oxidizing to maintain a passive film. This means that Molybdenum helps certain environments react easier with the Chromium to oxidize.

The only detriment of Chromium is that it does not harden the iron. Unfortunately, the Chromium must be added in great quantities, because the main hardening agent in steel, Carbon, can react with up to 17 times its own weight of Chromium to form Carbides. Carbides do not resist corrosion. So one needs at least an 18 to 1 ratio of Chromium to Carbon to have enough free Chromium left over after the reaction, to give the steel its stainless properties! Martensitic stainless steels are limited to 12-18% chromium. Only at this range can a fully Austenitic structure be obtained in the heat treating process. As with Carbon and alloy steels, 100% Austenite is required prior to quenching, if full-hardening response is to be obtained.

SUS 420J2 it's Carbon content is 0.26 ~ 0.40%. After hardening, its hardness is around 52 ~ 55 HRC. Because of its properties such as machinability or ease of forming and buffing, it is good for mass production of shearing and cutting tool. DIN 1.4034 is with 0.43 ~ 0.50% Carbon to increase hardness; DIN 1.4116 is with 0.42 ~ 0.48% Carbon, 13.8 ~ 15.0% Chrome, 0.45 ~0.60% Molybdenum, 0.10~0.15% Vanadium to add toughness, fatigue resistance and density. SUS 440 series with suffix A, B, C, F after hardening, the hardness of 440A is 54HRC, 440B is 56HRC, and 440C is 58HRC. 440C is, with 16 ~ 18% Chrome, first used on surgery tool and marine vessel. 440C, with its excellent properties of corrosion resistance, durability and toughness, is widely used on high quality knife.

AUS8 it's developed by Aichi, Japan. For its excellent properties such as corrosion resistance, durability, and toughness, AUS8 is widely used on high end cutting tool. AUS8 is 0.049%Ni, 13~14.5% Cr, 0.1~0.3%Mo,0.1~0.25%V, hardness HRC 60~61 after hardening.

ATS-34 it's developed by Hitachi, equivalent to 154CM, but less expensive than 154CM. HRC is 60~61 after hardening. Its toughness and sharpness is excellent.

Chromium
Molybdenum
Vanadium

ALLOYS ELEMENT

The chemical analysis of the steel must be known because small percentages of certain elements, notably carbon, greatly affect the physical properties during the heat-treating operation. Alloy steels owe their properties to the presence of one or more elements other than carbon, namely nickel, chromium, manganese, molybdenum, tungsten, silicon, vanadium, and colt. Because of alloy steels' improved physical properties, they are used commercially in many ways not possible with carbon steels.

Element / Steel	C	Si	Mn	P	S	Ni	Cr	Mo	V	Co
	%	≦ %	≦ %	≦ %	≦ %	≦ %	%	%	%	%
420J2	0.26~0.40	1	1	0.04	0.03		12~14			
DIN 1.4034	0.43~0.50	1	1	0.045	0.030		12.5~14.5			
DIN 1.4116	0.42~0.48	1	1	0.04	0.03		13.8~15.0	0.45~0.60	0.10~0.15	
DIN 1.4528	1.07	0.4	0.4				17	1.1	0.1	1.5
420MOD	0.4~0.5	1	0.8	0.05	0.02		12~14	0.60	0.18	
440A	0.6~0.75	1	1	0.04	0.03	0.06	16~18	0.75		
440B	0.75~0.95	1	1	0.04	0.03	0.06	16~18	0.75		
440C	0.9~1.2	1	1	0.04	0.03	0.06	16~18	0.75		
425MOD	0.45		0.35	0.35			13.5	1		
154CM	1.05	0.3	0.5				15	4		
ATS-34	1.05	0.35	0.4	0.03	0.02		14.5	4		
AUS-4	0.40~0.45	1	1	0.04	0.03	0.049	13~14.5			
AUS-6	0.55~0.65	1	1	0.04	0.03	0.049	13~14.5		0.1~0.25	
AUS-8	0.7~0.8	1	1	0.04	0.03	0.049	13~14.5	0.1 0.3	0.1~0.25	
AUS-10	0.95~1.1	1	0.5	0.04	0.03	0.049	13~14.5	0.1 0.3	0.1~0.25	

Influence of Alloying Elements on Steel Microstructure

C	• Carbon is the single most important alloying element in steel. • The hardenability of steel is increased by the addition of more carbon, up to about 0.6%. Wear resistance can be increased in amounts up to 1.5%. Beyond this amount, increases of carbon reduce toughness and increase brittleness.
Si	• Silicon is a principal deoxidizer used in steel making. It slightly increases strength of ferrite, and when used in conjunction with other alloys can help increase the toughness and hardness penetration of steel.
Mn	• Manganese is present in most commercially made steels. It contributes to strength and hardability. The amount of increase is dependent on the amount of carbon present. The more carbon in a steel, the higher the effect of manganese. Manganese is beneficial for the surface finish of a part, especially if the steel is high in sulfur. • It takes part in stabilizing the austenite. • Annealing embrittles the steel by the formation of carbides at the grain boundaries.
P	• Phosphorus increases strength and hardness, but at the sacrifice of ductility and impact toughness, if added in too great a quantity. • Improve machinability.
S	• Sulfur is detrimental to surface finish in high quantities, but improves machinability.
Ni	• Nickel increases the strength of ferrite, therefore increasing the strength of the steel. • It is used in low alloy steels to increase toughness and hardenability. • Nickel also tends to help reduce distortion and cracking during the quenching phase of heat treatment.
Cr	• As with Mn, chromium has a tendency to increase hardness penetration. • Chromium also increases the toughness of steel, as well as the wear resistance. • Probably one of the most well known effects of chromium on steel is the tendency to resist staining and corrosion. • Steel with 12% or more chromium are referred to as stainless steels.
Al	• It is one of the most important ferrite-forming and nitride-forming elements. • Having good conductive and thermal properties, it is used to form many hard, light, corrosion-resistant alloys.
Mo	• Molybdenum increases the hardness penetration of steel, slows the critical quenching speed, and increases high temperature tensile strength. • Since molybdenum tends to minimize temper brittleness and reduces mass effect, Ni-Cr-Mo steel are widely used for large articles. • It is also a constituent in some high-speed steels, magnet alloys, heat-resisting and corrosion-resisting steels.
V	• Vanadium acts as a scavenger for oxides, forms a carbide V, C, and has a beneficial effect on the mechanical properties of heat-treated steels, especially in the presence of other elements. • It slows up tempering in the range of 500-600 C and can induce secondary hardening. • It helps control grain growth during heat treatment. By inhibiting grain growth it helps increase the toughness and strength of the steel.
Co	• Cobalt strengthens martensite base, increase wear-resistance. But, if added in too great a quantity will embrittles alloys. • It helps pearlite heat resisting. • It decreases hardenability but sustains hardness during tempering. • Scissors made from the powder metal cobalt alloy demonstrate outstanding mechanical properties and cutting performance.
W	• Tungsten, with carbon it forms WC and W2C. A compound with iron-Fe3W2-provides an age-hardening system. • Tungsten raises the critical points in steel and the carbides dissolve slowly over a range of temperature. When completely dissolved, the tungsten renders transformation sluggish, especially to tempering, and the use is made of this in most hot-working tool ("high speed") and die steels. Tungsten refines the grain size and produces less tendency to decarburisation during working. • Tungsten is also used in magnet, corrosion- and heat-resisting steels.
Cu	• The addition of copper in amounts of 0.2-0.5% primarily improves steels resistance atmospheric corrosion. • It should be noted that with respect to knife steels, copper has a detrimental effect to surface quality and to hot-working behavior due to migration into the grain boundaries of the steel.

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MANUFACTURING PROCESS

A process is the sequence and organization of all activities it needs to convert material into products that was designed to meet customers' demand. Finally, some activities check or inspect work to make sure that it meets standards for quality, quantity, lead time, or timing.

1. BLADE SHAPING

The shears are blanked out. Strips of steel are cut out in the form of a shears. The cheaper version of the "Blanked" shears are then ground into shape so that it is difficult to sustain precision. Nusharp employ "Fine -Blanking" technique to shape the blade and punch screw hole at a time. The process is capable of producing sheet metal part with completely smooth edges. It needs no second machining and grinding. This means that not all blanked shears are cheap.

Blanking process

Single Part

• Single Part Transfer :

A single part transfer is a method in which single parts are

moved from station to station for blanking and metal forming. The relative dimension of shape and holes is in loose tolerance.

• Single Stroke :

Blanking and forming in one diestroke. The relative dimension of shape and holes is in tight tolerance.

• Progressive :

It is a forming process that utilizes a series of stamping stations to perform simultaneous operations on sheet metal. The final metal workpiece is developed as the strip of metal is processed through the stamping die.

It's low cost. However, the grain will be cross the blades. This will reduce shearing force of blades, and the blades may snap off.

• Fine- Blanking :

Compared with the Fine-Blanking, the Conventional Stamping are found to have about 1/3 shearing edge and their shape is bowed whilst those produced by the Fine-Blanking are found to have100% shearing edge, flat shape and accurate dimensions.

Furthermore, in applying the Fine-Blanking Technology, the clearance between the punch and the die is much smaller.

Advantages

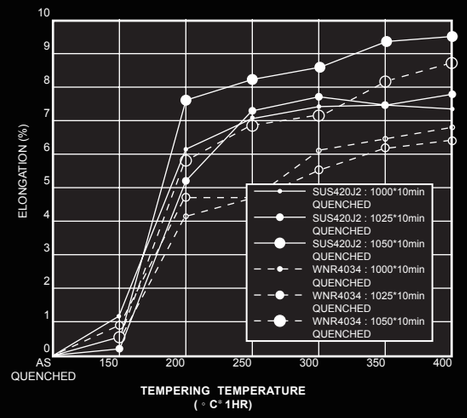
By applying the Fine-Blanking technology, the significant improvement of the component should be obvious. As the components are with good shape, smooth surface and precise size, they can be ready for assembly without any further secondary operations. The productivity is increased the production cycle time and the component cost are significantly reduced.

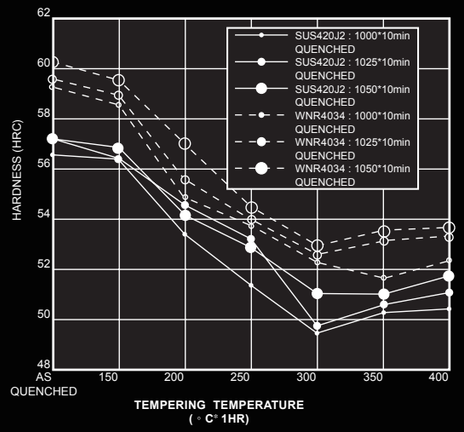
Surface produced by conventional method

Smooth surface produced by Fine-Blanking method

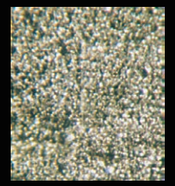
2. HEAT TREATMENT

Heat treating is the operation of heating and cooling a metal in its solid state to change its physical properties. For example, steel can be hardened to resist cutting action and abrasion, or it can be softened to permit machining. With heat treatment internal stresses may be removed, grain size reduced, toughness increased, or a hard surface produced on a ductile interior.





If heat treatment performed properly, it produces hard structures able to withstand high stresses or abrasion in service, and corrosion resistance. The structure is made up of fine grains.



If heat treatment performed improperly, it leaves the steel with a very coarse and erratic grain structure that cannot withstand high stresses or abrasion in service, and low corrosion resistance.

Continuous heat treatment

The shears are carried on a conveyor side by side into heating tunnel. Due to its productivity and cost efficiency, this is the most popular way to harden steel for general application. It minimizes oxygen contact with the parts with a fire curtain.

Induction heat treatment

For special application, some of our shears are double heat treated.
For a proper tension between blades, and because the metal behind the cutting edge has the job of transmitting the cutting forces and standing up to the stresses, the shears are first harden to the hardest point of material, which becomes hard and brittle, then subsequently tempered to relieve quenching stresses and to provide a limited but necessary degree of toughness and ductility to protect the part from cracking.

To make the shears sharper, more durable, and to perform under high load, Nusharp employ induction hardening to re-harden the cutting edge of shears. In induction heating treating, a high frequency current flowing through an inductor results in an alternating magnetic field which induces a current in a conductive metal part. This allows the heating of the parts to harden to proper hardness.

Vacuum heat treatment

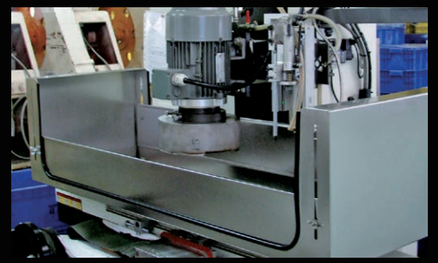
For a better quality, the scissors are placed in a vacuum chamber where the oxygen is extracted and heated up.
The key advantage of vacuum heating is making a small grain structure that is tougher than one with large grain structure, so that it makes the shears sharper, more durable and more corrosion resistance.
It is very important to minimize oxygen contact with the parts. If steel comes in contact with oxygen in heat treating, the carbon will dissipate into atmosphere, forming a decarburized layer of steel. This will result in the scissor, edges cutting into eath other and dulling very fast.

3. GRINDING & POLISH

Grinding means to abrade, to wear away by friction, or to sharpen. In manufacturing it refers to the removal of metal by a rotating abrasive wheel. Wheel action is vaguely similar to a milling cutter, which is considered a multiple cutting point tool. However, a grinding wheel is composed of many small grains bonded together, each one acting as a miniature cutting point. The grinding wheel is considered to have an infinite number of cutting points.

Grinding machines finish parts having cylindrical, flat, or internal surfaces. The surface of the part largely selects the grinding machine. Machines designed for special functions, such as tool grinding or cutting off, are designated according to their operation.

The harden blades then go through several grinding and polish processes.



Back blade grinding

For blanked parts, the blades are put on the rack in row. The operator feeds the rack to sand belt to sand and then polish. For fine blanked parts, it needs only polishing.

Straight grinding in inner blade

For economic reason, the general scissors and shears are straight ground. Comparing with hollow ground shears, it needs more squeezing force in shearing action.

Bevel grinding to the backside of blade

There are Flat-ground bevel and Hollow-ground bevel. In shearing action, the shears with hollow-ground bevel is with less force.
The bevel angle, small angle less force, larger angle more force is required in closing a shears. But, when determining the bevel angle, we have to consider the thickness of blade. The thinner blade with larger angle will scarify the clamping force of blades through the entire length of cut or else tearing may occur rather than being cut.

Cutting edge grinding

The cutting angle, shears may have very thin or thick blade with different cutting angle. Both blades can be cutting blades in the same or different angle, or one of them is anvil in any combination. Most are designed for specific uses; preferences are determined by the end user. Besides above mentioned that various cutting angles with different applications, the shears also distinguish between straight blade and curved blade. The curved blades offer consistent closing angel to reduce a force that pushes the work piece toward the tips. It can be one curve or a combination of different curves.

Inside chamfer, the shears designed for garden use or for any other rough cuts may cross cut its blades due to the cross force. To avoid a cross cut and chipping the blade, an inside chamfer is required at the tip of cutting edge.

Polish, to easy cut and to maximize the stainless feature, the surface should be highly buffed. After grinding, the grit leaves a rough surface which looks like a ragged groove under microscope. Moisture, or other foreign particle etc., can be trapped in the cracks and the steel could get rusty.

Notch, when cutting a tougher or round shape work piece, it is best to place the work piece closest possible to fulcrum. Tougher the work piece, harder the force will push it out of position. The notch can hold the work piece and reduce the closing angle of shears in turn with less squeezing force required.

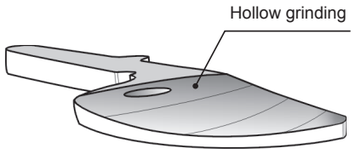
Serrations are fine lines or teeth ground into the edge of one blade. The serration holds the work piece, keeping it from being pushed forward.

Hollow grinding in inner blade

The high quality shears made by Nusharp are hollow ground. The advantage of hollow ground shear is to reduce the friction resistance and prevent the material jammed in shearing action. This is not only increasing the productivities, but also reducing shearing action. This is not only increasing the productivities, but also reducing operator fatigue.

Nusharp designed their own machine, which can be adjusted to a desired hollow depth, and process a consistent hollow side of blades, and offer a consistent quality.

Nusharp is also able to grind spiral hollow blades. This can vary the clearance angle on the cutting edge and compensate the squeezing force while the cutting point is moving forward to tips of shears.



4. SURFACE TREATMENT

The processes of surface treatments, more formally surface engineering, tailor the surfaces of engineering materials to :

- Control friction and wear
- Improve corrosion resistance
- Vary appearance, e.g., color and roughness
- Change physical property, e.g., conductivity, resistivity, and reflection

Ultimately, the functions and/or service lives of the materials can be improved.

Other surface finishing

Sandblasting is used to clean, deburr, or etch a surface; the effect is similar to that of using sandpaper, but provides a more even finish with no problems at corners or crannies.

Tumbling finishing is used to burnish, deburr, clean, radius, de-flash, descale, remove rust, polish, brighten, prepare parts for further finishing, and break off die cast runners.

Note : The salt spray test is a standardized test method used to check corrosion resistance of coated samples. Coatings provide corrosion resistance to metallic parts. The surface of cutting edge of shears are NOT coated or altered, it is not suitable for salt spray test.

• Surface treatment

◎ : best ○ : better △ : good × : poor N/A : Not Applicable

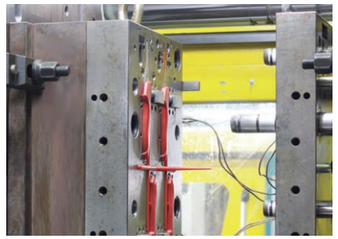
	Oxidizing	Nickel plating	Zinc plating	Chrome plating	Hard chrome plating	PTFE coating	phosphate coating	Aluminum anodizing	Electroless nickel	PVD* coating	Electrolyte Polishing
Wearing resistance	N/A	△	△	○	○	◎	N/A	N/A	◎	◎	N/A
Impact resistance	N/A	×	×	△	◎	N/A	N/A	N/A	◎	◎	N/A
Surface hardening	N/A	○	△	○	◎	N/A	N/A	N/A	◎	◎	N/A
Corrosion resistance	○	◎	◎	△	○	◎	◎	◎	◎	◎	◎
Heat resistance	N/A	△	△	◎	◎	○	△	△	◎	○	N/A
Friction factor	△	○	△	○	×	◎	△	△	○	◎	○
Non-stick	N/A	N/A	N/A	N/A	N/A	◎	N/A	N/A	N/A	N/A	N/A
Self-lub**	N/A	N/A	N/A	N/A	N/A	◎	○	N/A	N/A	N/A	N/A
Evenness	◎	△	○	△	△	△	○	◎	◎	◎	◎
Appearance	◎	○	△	◎	○	◎	×	◎	◎	◎	◎
Cost	Low	Med	Low	Med	Med-High	Med-High	Low	Low	High	High	Low
Peeling resistance	N/A	○	◎	○	○	○	N/A	N/A	◎	◎	N/A

*Physical vapor deposition (PVD)

5. HANDLE MOLDING

To provide a comfortable grip, Nusharp adopt human-centered design concept. On a traditional shears the handles are even, meaning that both handles look the same and are the same length. One of the first and most popular ergonomic shears developed was the offset shears, where the thumb ring has been brought forward. This allows thumb to have a more natural movement and not force it opposite the ring finger when closing. Anyway, it is best to cut with the wrist straight.

In addition to the shape of handle, the material is also very important. For different applications, there are some different concerns, such as skin acid, oil, electrostatic, toxic, and recyclable, etc. Its physical feature is unbreakable, non-slippery, and easy to grip.



• The application of frequently used plastics materials

Material	Full name	General application
ABS	Acrylonitrile Butadiene Styrene	Shell of appliance, houseware, stationery, container, safety helmet, high grade toys and sporting goods, etc.
PA	Polyamide (Nylon)	Appliance, electrical parts, industrial parts, electric tool, gear, bearing, houseware, sporting goods, medical instrument, etc.
PC	Polycarbonate	Electrical goods cover, electrical parts, industrial parts, safety helmet, dive glasses, safety lens, electrical tool shell, bullet proof glass, precision machinery parts, houseware, CD diskette, etc.
POM	Polyoxymethylene Resin	Industrial parts, washing machine, juicer parts, high grade insulation material, machinery parts, etc.
PP	Polypropylene	Electric insulation material, lining of electrical products, appliance, daily supplies, daily sundry, packing plastic bag, etc.
PVC	Polyvinly Chloride Straight Resin	Electric wire pipe insulation material, tape, electric wire, car parts, water pipe, flexible hose, window frame, board, floor, roof material, heat-insulating material, handbag, belt, plastic shoe, table cloth, transparent bottle, etc.
TPE (TPR)	Thermoplastic Elastomers (Thermoplastic Rubber)	Auto parts/ supply: oil seal, piping, electrical wire and cable lining, medical supply, soft grip of hand tools, etc.

• The characteristics of frequently used plastic materials

	ABS	PA	PC	POM	PP	PVC	TPE (TPR)
Hardness	◎	○	◎	◎	△	×	×
Gloss	◎	△	◎	○	△	○	×
Transparency	×	×	◎	×	△	△	○
Wearing resistance	○	◎	△	○	○	△	×
Elasticity	×	△	○	◎	○	◎	◎
Impact resistance	○	◎	◎	◎	○	N/A	N/A
Heat resistance	◎	◎	◎	◎	△	×	×
Cold resistance	◎	○	○	×	×	△	◎
Friction	△	○	△	◎	○	△	×
Self-lub*	×	◎	×	◎	×	×	×
Moisture absorption	○	◎	○	△	×	△	×
Molding	○	◎	△	○	◎	△	◎

6. ASSEMBLY AND INSPECTION

Tension system, screw and nut, or with washer, assembly is not only the pivot of blades, but also provides an important function clamping the blades together while in shearing action. Thus, the material of tension system has to endure tensile force, pulling force, and shearing force that reverses back to tension system. In addition, this mechanism is adjustable to stabilize the blades. SUS 302, SUS 303, SUS 304 and AISI 435 are good choice for these components.

Assembly Line

Packing Line

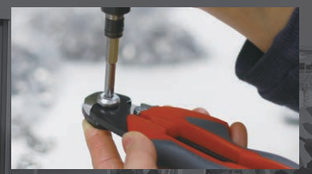
Logistics

Storage

Assembly

Assembly is not only the pivot of blades, but also provides an important function clamping the blades together while in shearing action.

1. Assembly



2. Tension Adjustment

3. Performance check

4. Cleanness

The scissors with screw mechanism provides good serviceability. It is the nature that the shears will wear off overtime. Some types of the shears need to be taken apart for regrinding and readjusting. The inexpensive scissors that are riveted can not be properly ground and readjusted. After assembly, to give the shears a smooth, efficient run with less force, adjusting and straightening the scissors is craftwork that only few people can master.

Surface, some shears are plated with chromium for specific application. To maximize the stainless feature, the surface is highly buffed. Scissors made of non-corrosive stainless steel are either burnished, sandblasted to give a fine matt effect, coated in Teflon (black or colored).

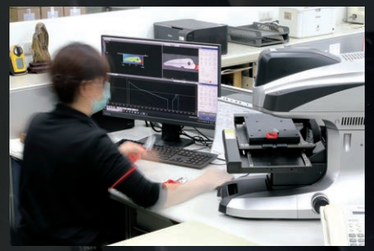
Quality, to assure a high level consistent quality, Nusharp execute a thorough, extensive control of the material, hardness, and grinding of the scissors and all craftwork in whole process.

8.Test and measurement equipment

Test and measurement equipment are used across the whole process from design to production. They are applied to measure the workpieces and components we are working with and analyzing. Equipment helps manufacturing improve efficiency, accuracy & precision.

3D Optical Profilometer Controller

It is used for grinding process control, such as the measurement of the cutting-edge angle, the curve of the hollow grinding, the flatness of grinding.



2.5D Image Dimension Measurement

It is used to measure the stripping notch of fiber optic stripper to make sure the notch sizes are precisely met. The result can be generated by a label printer and goes with measured product.

It is also used to measure the first article of workpiece to make sure the dimensions and hole sizes are fully met.

Fully Automatic Load Cell Vickers Hardness Test System

The equipment can auto-read, auto-fucus and auto-stage according to the testing scope, distance and loads specified in the system. The microhardness can be tested within the specified scope with high accuracy and time-saving. No mounted samples are needed.

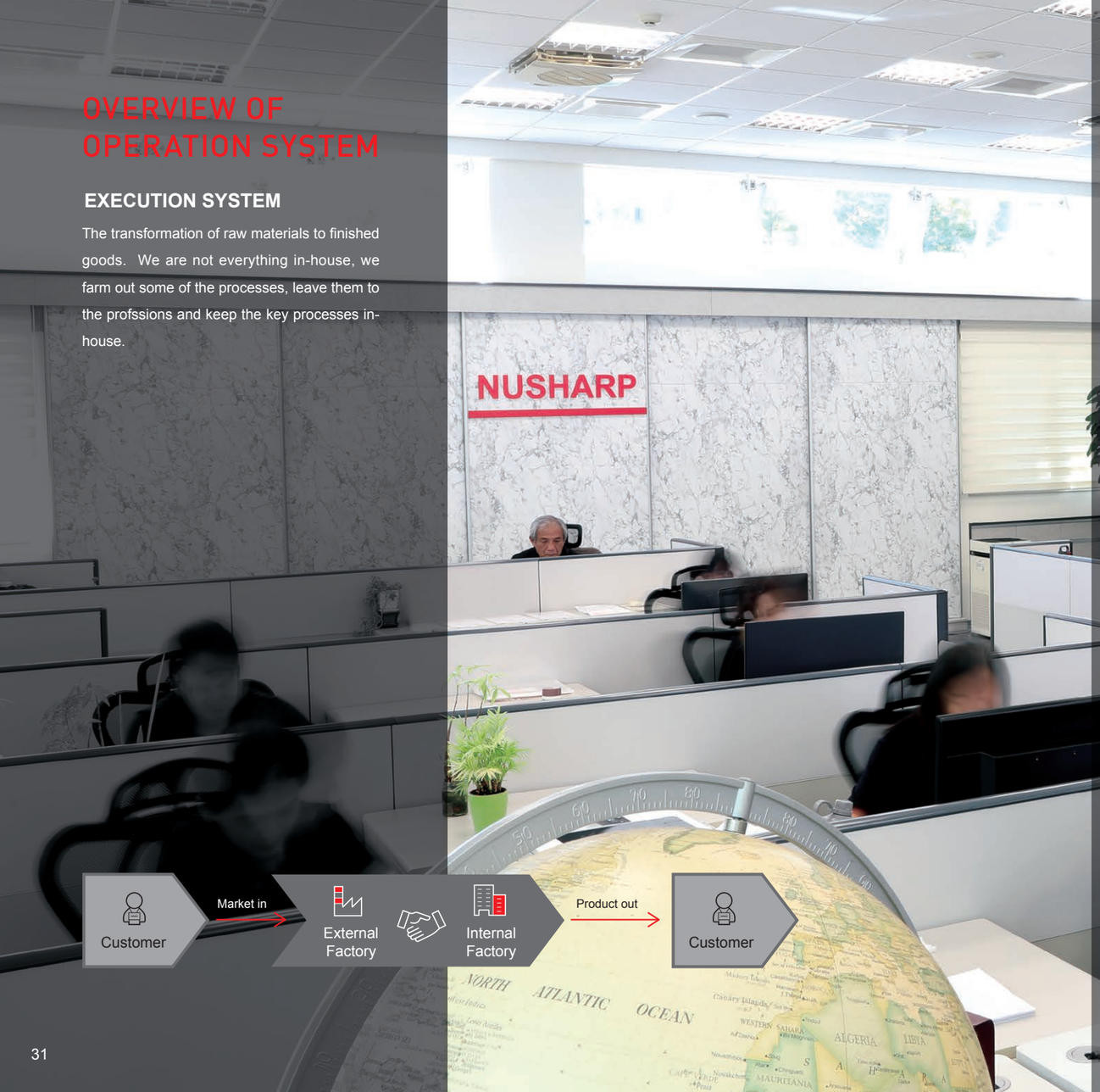
Rockwell Hardness Tester

It is used to measure whether metallic material meets the hardness as required.

OVERVIEW OF OPERATION SYSTEM

EXECUTION SYSTEM

The transformation of raw materials to finished goods. We are not everything in-house, we farm out some of the processes, leave them to the profssions and keep the key processes in-house.



Customer → Market in → External Factory → Internal Factory → Product out → Customer

EXTERNAL OPERATION

Material → Shaping → Drilling → Tapping → Hardening → Handle Molding → Polishing → Back Grinding

INTERNAL OPERATION

Internal Grinding → Bevel Grinding → Cutting Edge Grinding → Serration Grinding → Blade Bending → Rust Proof → Assembly → Tension Adjustment → Packing

PROCESS CONTROL

It involves a set of procedures designed to ensure that processes within the manufacturing plant are carried out correctly and that the desired output will be achieved.

1. Material

1.1 Verify material certificate and packing list
1.2 Inspect specification
1.3 Visual inspection

2. Shaping

2.1 Inspect measurement
2.2 Inspect cutting edge, flash and burrs
2.3 Visually inspect surface of scratch or damage
2.4 Inspect Flatness

3. Drilling

3.1 Verify verticality of hole, and
3.2 Dimension
3.3 Burrs

4. Tapping

4.1 Verify verticality of hole
4.2 Inspect dimension

5. Hardening

5.1 Hardness
5.2 Toughness
5.3 metallography
5.4 Oxidized

6. Edge Grinding

6.1 Dimension and position
6.2 Visual inspection:
6.2.1 Grinding pattern
6.2.2 Over burn

7. Polish : Polish Fineness

7.1 Polish fineness

8. Internal Grinding

8.1 Dimension :
position and thickness
8.2 Grinding fineness
8.3 Visual inspection:
8.3.1 Burrs
8.3.2 Over burn

9. Bevel Grinding

9.1 Dimension :
length, width, bevels
9.2 Fineness
9.3 Visual inspection:
9.3.1 Burrs
9.3.2 Over burn

10. Cutting Edge Grinding

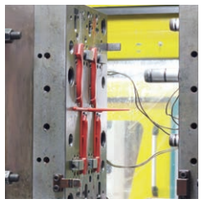
10.1 Dimension :
length, angle
10.2 Visual inspection:
10.2.1 Burrs
10.2.2 Over burn

11. Serration Grinding

11.1 Dimension :
pitch, length, angle
11.2 Visual inspection:
11.2.1 Burrs
11.2.2 Over burn

12. Handle Molding

12.1 Tips overlap
12.2 Visual inspection of
12.2.1 Color
12.2.2 Flash
12.2.3 Joining
12.2.4 Shrinkage



13. Blade Bending

13.1 Bending curve
13.2 Visual inspection of damage

14. Rust Proof

14.1 Corrosion resistance
14.2 Visual inspection of coasting completeness

Cutting Force & Wear Testing Instrument

15. Tension Adjustment And Assembly

15.1 Sharpness
15.2 Functionality
15.3 Visual inspection:
15.3.1 Level tips
15.3.2 Tips overlap
15.3.3 Burrs or sharp flash
15.3.4 Cleanness

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We build and sell trust!

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