DANCUT
DANIELI KNIVES FOR HIGH-QUALITY CUTTING IN FLAT AND LONG MILLS

Added-value original spares
for flat and long products

DANIELI SERVICE

INTEGRACTION
SMART SERVICES
FOR INTEGRATED
SUPPORT

DANCUT
MANUFACTURING PROCESS CARRIED OUT ACCORDING TO DANIELI QUALITY CONTROL PLAN AND ISO 9001

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DANCUT

DANIELI SERVICE
SINCE 1962

DANCUT

DanCut know-how in hot, cold and extreme-conditions steel processing matches shear knife manufacturing

Thanks to years of experience in engineering and manufacturing, Danieli has developed its own line of knives for flat and long products. These knives contain all the Danieli design and process know-how and are manufactured with the latest technological solutions. Customized solutions are available according to product mix and the strictest customer requirements. Danieli knives exploit the best characteristics of hot and cold special tool steels, resulting in extended lifetime (fewer stops, less maintenance) as well as better cut quality in casting and rolling operations.
The shear blade is the only component that makes contact with the processed material. It must be tough enough and must have very good wear resistance in order to perform high-quality cutting and minimize production stops. Danieli's target is to supply the optimal technical and economical solution for the customer's specific shearing application. For this purpose, Danieli has developed three different series of materials. Each material in these categories will be specifically chosen by Danieli engineers according to the customer's product mix and shearing application.

All DanCut production cycles are carried out according to the Danieli Quality Control Plan QCP: from the engineering step - with the knives design and materials definition, as necessary for the customer's shear working conditions - up to the manufacturing step with the accurate programming and control of CNC machining cycles and heat treatments. Danieli Service provides its knives with complete information and assistance for proper setting up, grinding, and refurbishment services, to increase their lifetime.

DanCut knives are designed to allow as many multiple grinding operations as possible. Thanks to the refurbishing operations and the supply of customized shims, the customer will always have new knives with the same cutting quality and a longer total lifetime. The regrinding process is integrated with a feedback and monitoring system for complete traceability of each DanCut knife supplied. Choosing DanCut knives means getting an optimized shearing process in terms of QLC (cutting Quality, knife Lifetime to reduce operating Costs). Danieli provides the optimal solution for managing knives, spare parts rotation, and refurbishing operations, in order to achieve the best plant performance and to obtain operational cost savings. Danieli Service breathes new life into used knives.

The shear blade is not only represented by its ability to execute the cut, but also by its capacity for repeating this task over the longest time possible without significant decrease in cutting quality. Furthermore, the shear blade has to be able to withstand very high shearing loads represented in the form of compressive forces, such as in its impact with the rolled materials, and elevated thermal shocks, without suffering cutting edge deformations, cracking or chip-off phenomena.
The final performances of a shearing blade depend on the correct steel grade definition, its manufacturing process and the final heat treatment, and represent an important factor for the final productivity of the rolling mill, in terms of forced production breaks for changing shear blades and of quality of the cut surfaces.
One of those productivity problems has been solved thanks to the introduction of DanCut 550 steel grade on t he flying shears after the bar quenching and tempering box, in which customers were forced to change the blades on average every 6 to 8 hours, while now are able to reach 24 hours of uninterrupted rolling. Other achievements in this field improved the frequency of blade changing from a daily basis to a weekly basis, and thanks to a better cutting-edge shape holding they also improved the quality of the bar sheared surface, reducing the amount of bad shape ends.

FLAT FOR HOT & COLD PROCESSING

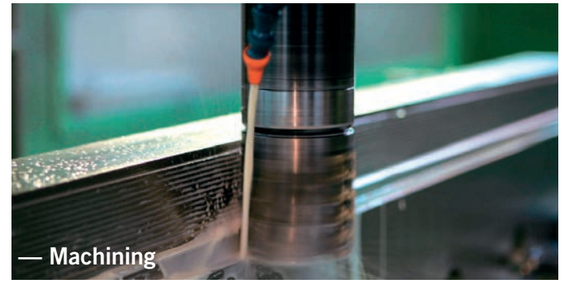
— **DanCut 100 Series** for non ferrodus material.
— **DanCut 300 Series** for cold cutting.
— **DanCut 500 Series** for hot cutting.
— **DanCut 700 Series** for extreme hot conditions.

LONG FOR HOT & COLD PROCESSING

— **DanCut 300 Series** for cold cutting.
— **DanCut 500 Series** for hot cutting.
— **DanCut 800 Series** for intermediate hot conditions.

— Steel grades

Steel grades of knives and all heat treatments are tested and certified according to the ISO 9001:2000 standard, in order to supply top-performance products. Steel grades are obtained through European steel producers according to standard and patented chemical compositions. DanCut materials are obtained from different types of steel qualities that go from standard or remelted quality up to powder metallurgy grades.

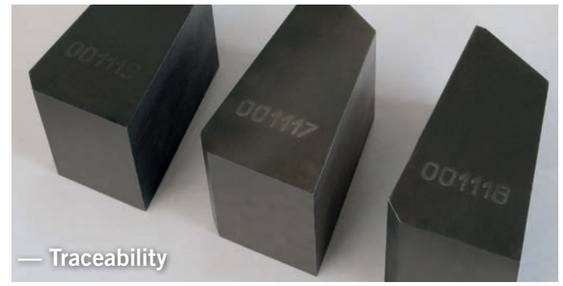


— Machining

Danieli knives are produced with the most modern and high-performance equipment, such as CNC milling machines with automatic, indexable high-speed milling heads; horizontal CNC grinding/ profiling machines with automatic grinding cycles for flat and profiled surfaces; and surface grinding machines for segment and peripheral grinding with 11-axes CNC control. This machinery makes it possible to obtain high-precision dimensional and surface finishing.

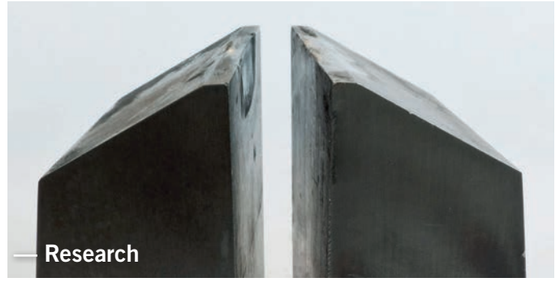
— Heat treatments

Heat treatments are performed in new-generation vacuum furnaces that guarantee the structural stability without decarburization phenomena and limit the stresses induced by the heat treatment that might limit the application range of the blades material.



— Traceability

All DanCut blades are marked with a specific progressive serial number in order to have complete traceability from the rough material to the final on-site performances.
This procedure is a clear example of the importance given to quality of DanCut products.



— Research

Danieli is continuously investing in research and development in order to find better solutions and improve customers' performances and quality of sheared products. Many projects carried out together with steel manufacturers, universities and end-users leads Danieli to provide innovative products like the recent DanCut 550, patented knife material with increased lifetime performances on quenched and tempered rebar cutting before the cooling bed.

DANCUT CUSTOMER SERVICE

DanCut product line not only includes blade engineering and manufacturing but also supports and assists all customers during the after-sale phase with the following added-value services:

— **Blade resharpening/repairs**
— **Shear blade design improvement**
— **Shear upgrade and blade shape modification**
— **Shear refurbishment**

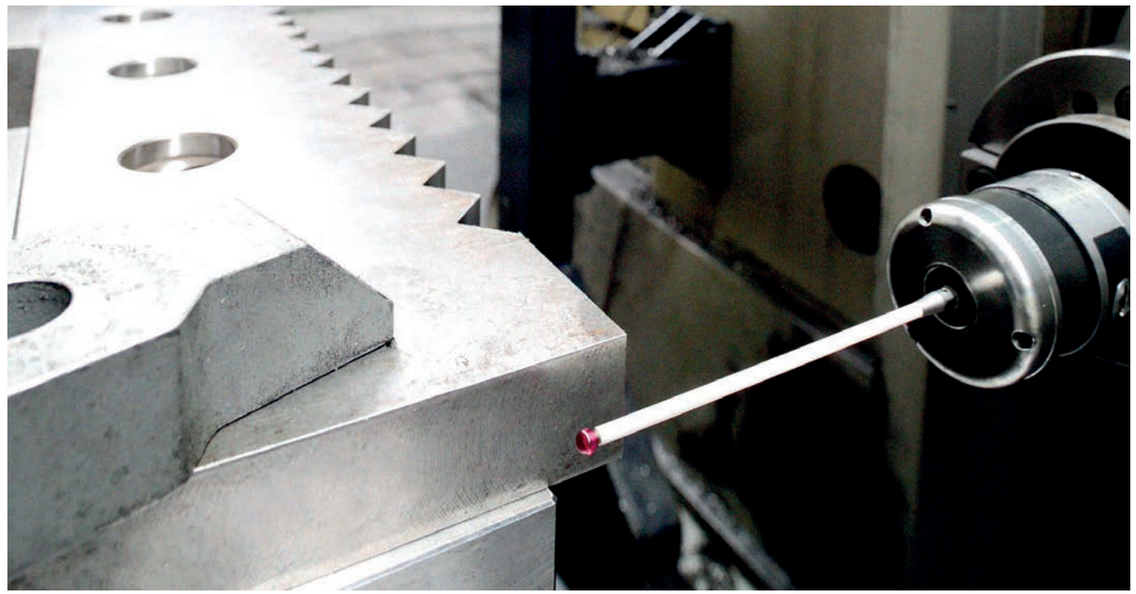
On this basis, Danieli Service offers many different advanced solutions with the aim of improving shearing performance and solving different problems directly related to shearing process.

Product line departments
Danieli Service is comprised of different Technical Departments that follow specific shear machines and work together with DanCut engineers to improve blade designs and cutting parameters like gap and overlap, with the aim of improving lifetime performances and also the quality of sheared material.
This cooperation, together with the departments that follow technical assistance on operating machines, makes it possible to improve the product and match customer needs.

Cost-saving service solutions
In the management of consumables, it has now become financially important to minimize the number of pieces stocked in the warehouse. Blades require careful stock management, enough to guarantee steel plant operations but also not too many to remain unused.
Danieli studied several logistic support programs to help customers:
— Keep a safety stock in reserve at one of our service centers, located around the world, the closest to the end user.
— Possibility to keep semi-finished products available in our workshop, ready to be completed on short notice, reducing lead-times.
— Establish full-service contracts that will include supply, and regrinding service.
All solutions must be evaluated with our engineers with the target to reduce the influence of blade cost on the final product.

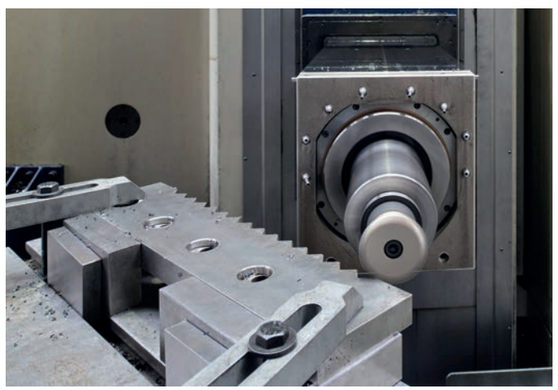
— **Blade resharpening/ repairs**
This activity generally consists of performing grinding and resharpening on used blades. Thanks to Danieli Service's knowledge and experience, we can repair any kind of blade as well as supply compensation shims. With Danieli Service grinding machines, using special grinding stones and appropriate speed parameters, we can bring used knives to a new life.
We support customers worldwide thanks to the Danieli Service network of workshops, and where this is not possible, we help customers by providing procedure and advise on how to perform blade repair. We provide this kind of service also on a Long-Term Agreement basis in which customers periodically ship a certain number of blades to Danieli Service workshops, and in a short time the repaired pieces are returned. With this philosophy, the customer can control and reduce the cost of knife management.
All DanCut shear blades are made in tough, hardened tool steel and allow multiple resharpenings up to the minimum resisting section of the blade. This kind of activity, when correctly performed, will restore the cutting edge of the blade without any variation in its microstructure or mechanical properties, which translates into the possibility of achieving the same lifetime performance as a brand-new blade will deliver.
Danieli Service performs resharpening activities for long product mills with CNC milling machines equipped with high-tech tools and capable of hardened steel milling up to 62 HRC, with outstanding surface finishing, comparable with those achieved wby grinding. For longer shear blades typical of flat product rolling mills and processing lines, Danieli Service uses CNC grinding machines with specific grinding wheels for proper material removal without shear blade surface overheating. Shear blade re-sharpening will maximize the cost-efficiency of each shear blade and reduce lead times compared to a new purchase.

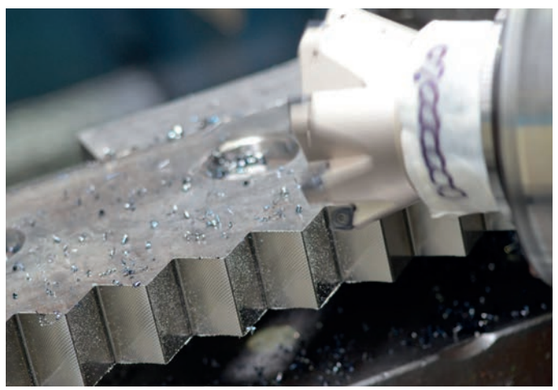
— **Shear blade design improvement**
In long-product cutting practice, such as for bars, channels, angles, beams, etc., blade design modification is very common: shear blades must be tailor-made to function for the profile that's being cut and the mechanics of the machine. Danieli's activity consists of verifying the shearing technological parameters by analyzing the roll-pass design, shear cinematic and dynamics, and re-engineering the blades with the latest philosophy applied to the newest plants.
The same activity may be carried out for an expanded product mix if the blade must cut new product not foreseen in the original plant design.



— **Shear upgrade and blade shape modification**
Many shears are supplied with a standard design concept for the blade but in some cases, it may not satisfy the customer, in terms of the function that they must accomplish or obtain the performance of the blades for a specific shape to be cut.
Generally, this service consists of re-engineering the blade and some components of the machine in order to change their concept, as for example:
— change a guillotine type shear into V-shape type;
— introduce the front radius on hot-cutting drum shears for head cut improvement;
— improve the design of blade and holder in order to establish a supplementary cutting edge, and gain on performances obtainable from it;
— modify the blade concept in order to foresee special material inserts;
— increase shear capacity (mainly on long product rolling mills).
All these activities are carried out by a specialized engineering team capable of structural calculations of shears' cutting parameters and technological verifications.

— **Shear refurbishment**
The shear blade condition investigation, the study of blades and its holder design improvement, are commonly accomplished thanks to an on-site shear inspection. From its base of collected information concerning shear internal part conditions, mechanical clearances, cutting cycles, speeds/current recoding, etc., Danieli Service provides technical assistance as well as complete shear overhauling.
Along with ordinary overhauling activities related to hot and cold cut shears, Danieli Service analyzes, studies, and offers the newest and most innovative solutions in order to take care of customers' equipment from different points of view:
— reliability and efficiency improvements, and
— solving maintenance issues implementing the latest technical solutions.





PREMIUM DANCUT MATERIALS

All materials used for Danieli Service DanCut product line are tool steel grades or special alloys and are obtained from three different manufacturing processes, each one characterized by different grades of microstructure dimension that increase the toughness of the material and consequently make it possible to increase the carbide forming elements in the alloy, which are responsible of the wear resistance. The three melting processes used for DanCut raw material ingot casting are:

— **Standard melting**
— **Multiple Electro-Slag Re-melting**
— **Powder metallurgy**

The multiple ESR process provides DanCut blades with a finer microstructure with smaller carbides and a much more regular distribution respect to the standard melting and casting, while powder metallurgy achieves many more of those characteristics giving an extremely high performing final product.
On the other hand, wear-resisting properties are provided by strong carbide-forming elements present in DanCut toll steel alloys, like vanadium, tungsten, chromium, molybdenum and cobalt.
The combination of these alloys in the correct quantities, together with other alloying elements present in the steel grades, provide the shear blades with other important characteristics, like thermal shock-resistance, edge holding properties and impact strength. Concerning the heat treatments performed on DanCut shear blades, they are responsible for the final properties of the blade and provide the material with the correct operating hardness and relative microstructure in order to withstand all working stresses and maximize the wear resistance.
Heat treatments are characterized by a complete austenitization of the rough material at specifically defined temperatures in order to avoid unwanted effects, like grain growth, and then cooled down to ambient temperature in controlled atmosphere in order to have better control over the cooling rate and to prevent surface decarburization. Once quenching is complete, DanCut steel grades are subjected to multiple tempering in order to achieve correct mechanical properties, remove internal stresses from the material, and obtain an elevated homogeneity of the microstructure. This homogeneity allows the end user to perform multiple regrindings on the shear blade, without concern for loss of performance after each layer of material is removed.

DanCut 550 knives for bars perform up to seven times fewer blade changes quenched.

DanCut 710 for hot-slab cutting in continuous casting and hot-rolling lines. It is the only one that allows the customer to exploit its shear blades without major problems, like excessive cracks that might lead to shear blade breakdown, and makes it possible to perform multiple regrindings in order to maximize the blades' lifetime performances.

Main view of Danieli heat treatment department.

Dimensional check of DanCut 710 blades after precipitation hardening treatment.

FLAT
DANIELI **DANCUT** BLADES FOR FLAT PRODUCTS

— Hot strip mill shear blades
Series of hot-cutting blades for standard and high-speed drum shears in the process section, and for pendulum shears after the slab caster.
Blades are especially designed to improve cutting quality and are made of special alloy steel grades to withstand heavy cutting conditions (up to 1150 °C).

— Plate mill shear blades
Group of blades used for cold cutting of material up to 50 mm thick, for dividing shears, side trimmers, scrap choppers and slitting shears.
Made of high-alloy steel grades in lengths up to 6000 mm.
Special alloy steel grade blades are also applied for hot cutting before the cooling beds on drum and guillotine type shears.

— Cold rolling and processing shear blades
Family of cold-cutting blades for thin material, usually installed on single cut or drum shears, used in cold-reversing mills, temper mills, skin-pass mills, pickling lines, galvanizing lines, annealing lines, etc.
Blades are made of high-alloy steel grades customized for each application in order to perform high-precision cuts.

— Rotary side trimming shear blades
Group of cold-cutting disc blades used for strip and plate (up to 30 mm) side trimming with high cut-edge quality.
These knives are made of high-alloy steel grades in diameters up to 1600 mm.


Pendulum shear knives


Rotary side-trimmer shear knives


Rocking-type side-trimmer knife


Drum shear knife


Single-cut guillotine shear knife


Rocking-type dividing shear knife

HOT-STRIP MILLS AND CONTINUOUS CASTING

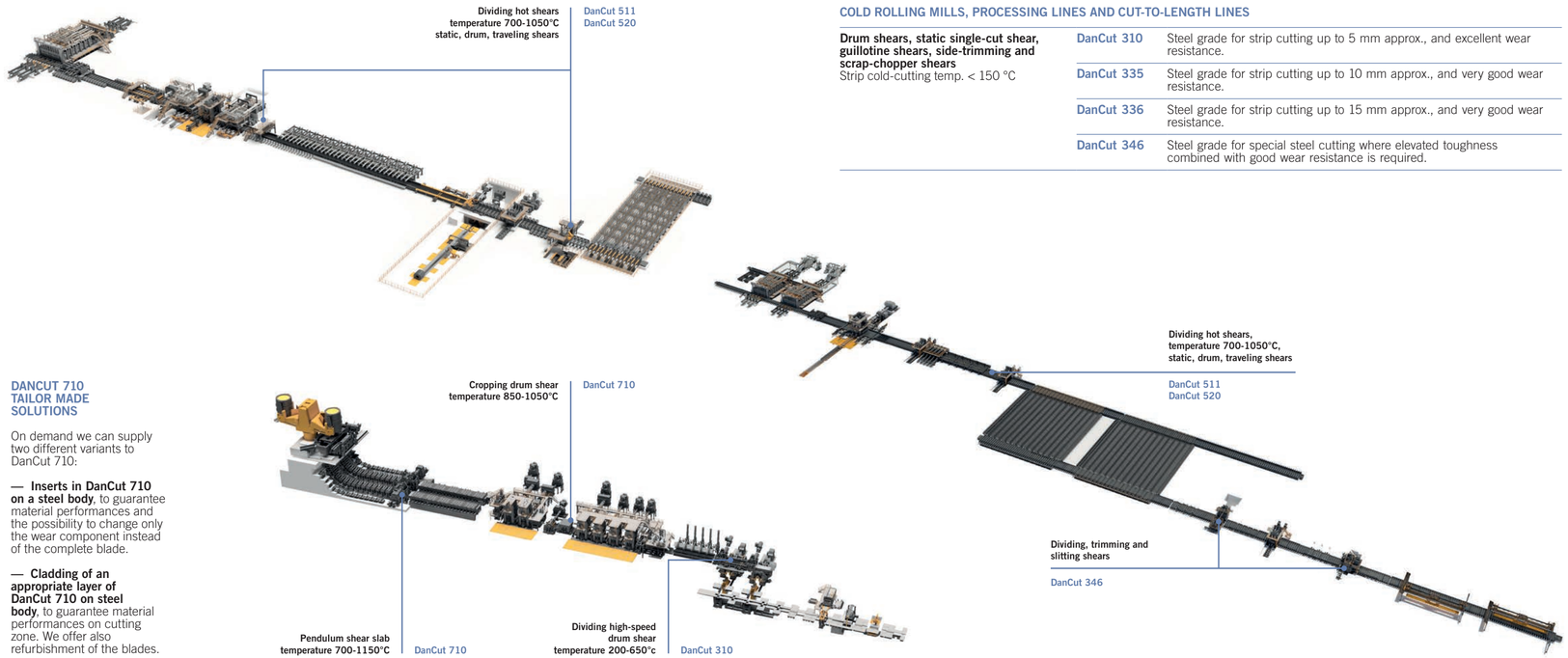
Pendulum shears (after continuous casting machine) Slab hot-cutting temp. from 700 to 1,100 °C	**DanCut 710**	Special Nickelnickel-Chrome chrome alloy with outstanding resistance to hot hot-work environments, able to cut up to 110 mm of slab thickness.
	DanCut 511	Standard steel grade for hot cutting suggested only for plant start-up and set-up purposes.
Drum and crank shears Transfer bar hot-cutting temp. from 900 to 1,100°C	**DanCut 511**	Standard steel grade for high-temp. applications and transfer bar thicknesses up to 60 mm.
	DanCut 520	Improved steel grade for high-temp. applications with better thermal shock resistance and wear resistance.
High-speed drum shears Strip cutting before downcoilers, temp. from 200 to 650°C	**DanCut 310**	Standard steel grade with specific heat treatment suitable for intermediate-temp. cutting of thicknesses up to 10 mm.

PLATE MILLS AND STECKEL PLATE MILLS

Drum shears Plate hot cutting, temp. from 700 to 1,100 °C	**DanCut 511**	Standard steel grade for high-temp. applications and plate thicknesses up to 60 mm.
	DanCut 520	Improved steel grade for high-temp. applications with better thermal -shock resistance and wear resistance.
Static shears Plate cutting before cooling bed, temp. from 400 to 900 °C	**DanCut 511**	Standard steel grade for high-temp. applications, suitable for intermediate-temp. cutting of thicknesses up to 50 mm.
	DanCut 336	Standard steel grade with good toughness and improved wear resistance, especially for side trimming of small thicknesses.
Dividing, slitting, side trimming and scrap chopping shears. Plate cold cutting, slitting and trimming (rocking type), temp. up to 150 °C	**DanCut 346**	Improved wear resistance steel grade for heavy shearing applications, with very high toughness for cold cutting up 50 mm plate thickness.

COLD ROLLING MILLS, PROCESSING LINES AND CUT-TO-LENGTH LINES

Drum shears, static single-cut shear, guillotine shears, side-trimming and scrap-chopper shears Strip cold-cutting temp. < 150 °C	**DanCut 310**	Steel grade for strip cutting up to 5 mm approx., and excellent wear resistance.
	DanCut 335	Steel grade for strip cutting up to 10 mm approx., and very good wear resistance.
	DanCut 336	Steel grade for strip cutting up to 15 mm approx., and very good wear resistance.
	DanCut 346	Steel grade for special steel cutting where elevated toughness combined with good wear resistance is required.



DANCUT 710 TAILOR MADE SOLUTIONS

On demand we can supply two different variants to DanCut 710:

— Inserts in DanCut 710 on a steel body, to guarantee material performances and the possibility to change only the wear component instead of the complete blade.

— Cladding of an appropriate layer of DanCut 710 on steel body, to guarantee material performances on cutting zone. We offer also refurbishment of the blades.

LONG
DANIELI **DANCUT** BLADES FOR LONG PRODUCTS

— Cut-to-length shear blades
Family of cold-cutting blades with straight or specially shaped cutting edges, able to simultaneously cut-to-length multiple profiles.
Those blades are made in high-alloy steel grades characterized by a high toughness, necessary for this kind of application.

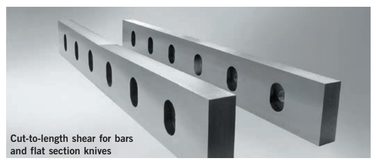
— Flying shear blades
Family of hot and cold (QTB) cutting blades with straight or especially shaped cutting edge, used for head and tail cutting, cut-to-length and emergency cropping.
Blades are made in special, high-alloy steel grades with the best ratio between toughness and wear-resistance.

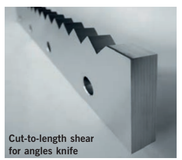

Flying shear knife


Flying shear for bars knife


Flying shear for "C" profile knives


Hot-cutting flying shear for long products knife


Cut-to-length shear for bars and flat section knives


Cut-to-length shear for angles knife


Cut-to-length shear for bars and flat profiles knives


Flying shear for log products knife


Drum shear log products knives

ROLLING MILLS

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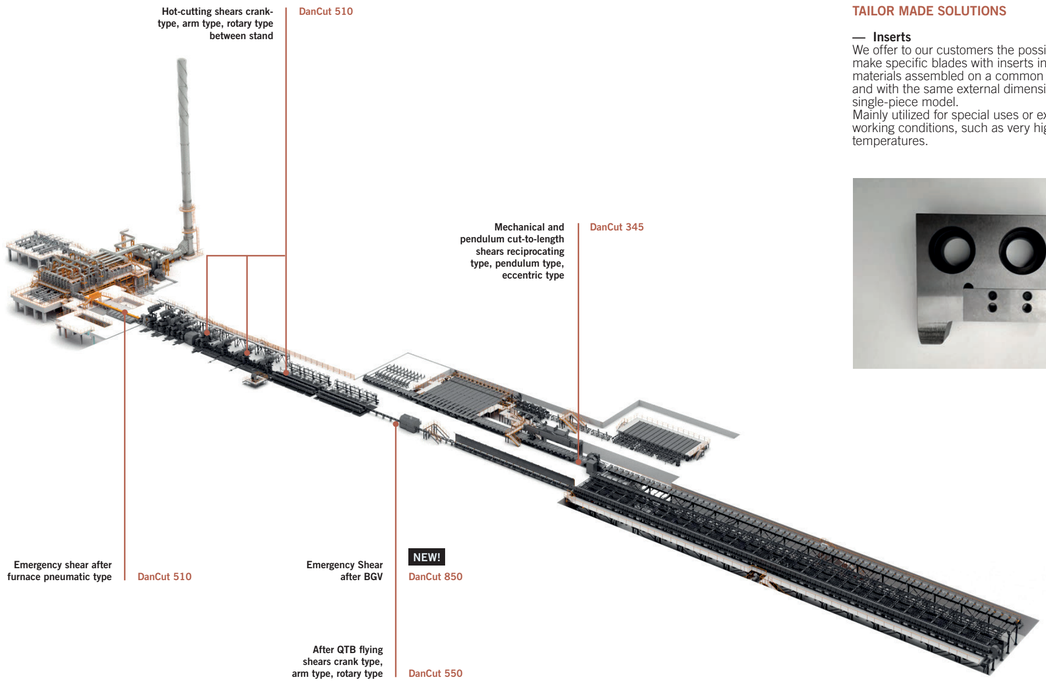
Flying shears Hot-cutting temp. above 700 °C	**DanCut 510**	Standard steel grade for high-temp. applications, with good thermal thermal-shock resistance and wear resistance.
	DanCut 520	Improved steel grade for high-temp. applications, with better thermal shock resistance and wear resistance.
Flying and drum shears Intermediate temperature and QTB temp. from 150 to 700 °C	**DanCut 335**	Specially heat-treated steel grade with improved toughness and good wear resistance.
	DanCut 550	Special long-life steel grade with extreme toughness and high wear resistance.
	DanCut 850	Steel grade with very high toughness and good wear resistance, specifically for intermediate temperature cutting and up to high section profiles
Mechanical and pendulum shears Cut-to-length temp. up to 150°C	**DanCut 345**	Steel grade with very high toughness and good wear resistance, specifically for cold cutting and up to high thickness profiles



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Standard blade after 62,131 CVR shear cuts on ø16: the cutting edge is deeply worn.

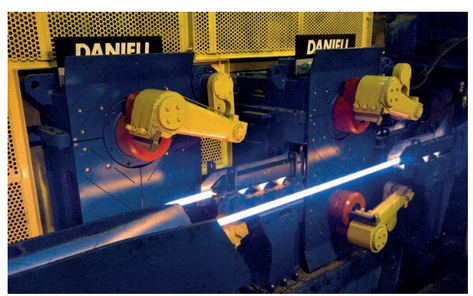
DanCut 550 blade after 422,012 CVR shear cuts on ø16: no chip-off present on the cutting edge and no deep wear cut. The blade has worn correctly with only the cutting edge losing its sharpness.

TAILOR MADE SOLUTIONS

— Inserts
We offer to our customers the possibility to make specific blades with inserts in multiple materials assembled on a common steel body and with the same external dimensions as the single-piece model.
Mainly utilized for special uses or extreme working conditions, such as very high temperatures.

— Cladding
We can produce special blades with cutting profile in cladding high-performance material for extreme working conditions.

— Materials
We can supply alternative materials for blades in dedicated steel grades to ensure even better performances than our excellent standard materials.



DanCut 550

Knives for quenched bars: on-field experience results.

Thanks to continuous investment into research and development of DanCut products, Danieli Service introduced a revolutionary material capable of significant performance improvements, with the flying shears used for quenched and tempered bars cutting. Shears of this kind must cut bars that on their surface present cold material properties (around 200°C) while the core is still hot (650°C), and this means that the same blade must be able to shear both physical states.
Before the introduction of the new DanCut 550 special steel grade there were two main philosophies for material selection on such applications. One approach considers using hot-working tool steels (like DanCut 510) which unfortunately have an unsatisfactory wear-resistance and hardness for cutting the external surface of the bar, and the shear blade cutting edge often becomes knicked and deformed. The second school approach involves the standard cold-working tool steels (like DanCut 330) that present a better wear rate but unfortunately are often subjected to surface cracking and chip-off phenomena, mainly due to insufficient material toughness and inability to withstand thermal shocks.
With the introduction of DanCut 550 steel grade these unwanted effects affecting the shear blades have been solved and the lifetime performances have been improved by achieving the correct cutting-edge wear. **DanCut 550 is a patented, special steel grade** obtained from an unconventional melting process and characterized by a superior toughness combined with an elevated wear resistance, an uncommon final hardness (superior to any other kind of similar steel grade), and a high thermal-shock resistance (very similar to the best heat-resisting hot-working tool steels). The combination of these properties provides to DanCut 550 the capability for both hot and cold material cutting. From the tests performed on-site together with Danieli customers on standard material and DanCut 550, we have obtained the following results:

* Danieli drum shear with 3-blade set.

Test 1*

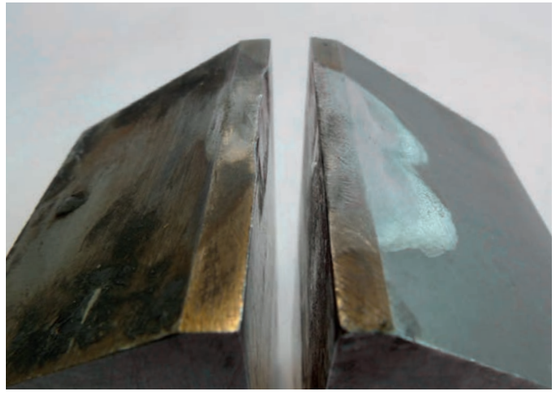
Rolled material	25 mm QTB (600 - 650°C)
Original standard blades	2,400 cuts
DanCut 550 test blades	6,900 cuts

Test 2*

Rolled material	32 mm QTB (600 - 650°C)
Original standard blades	1,410 cuts
DanCut 550 test blades	4,048 cuts

Test 3*

Rolled material	16 mm QTB (600 - 650°C)
Original standard blades	62,131 cuts
DanCut 550 test blades	422,012 cuts



These results were obtained by testing both materials in the same working conditions considering shear setting parameters, shear wear-out state and rolled material steel grade, dimension and temperatures.
The performance difference between those steel grades in first place is given by the toughness difference.
Standard blade material is more fragile and subjected to chip-off, so its cutting edge wears out mainly due to small portions of material detachment.
This sort of phenomena increases the gap between the blades, reducing the cutting quality and forcing the customer to remove the blade from service prematurely.

DanCut 850

High-performance knives for intermediate conditions on cut to-length area

Dancut 850 is a medium medium-alloyed tool steel which, due to its intrinsic characteristics, is very versatile for multiple applications.
Dancut 850 is characterized by excellent chipping resistance (very similar values of toughness and ductility in all picking directions), good hardenability at heart, good workability and grindability, good affinity to EDM, good resistance to adhesive wear and adequate resistance to abrasive wear. In hot applications Dancut 850 has a high hardness and guarantees excellent resistance to wear and high temperatures. It is particularly suitable for precision forging and hot forging. In molding plastic, Dancut 850 offers durability and high wear resistance in molding processes that subject molds to high stresses, for example long production cycles, molding of reinforced plastics and molding by compression.

— The high ductility of Dancut 850 makes it possible to obtain a longer tool life and more constant production thanks to less maintenance.
— The high hardness and strength, together with excellent dimensional stability, make Dancut 850 an excellent substrate for surface coatings.
— Dancut 850 boasts excellent hardenability and unique characteristics that make it particularly suitable for the production of large molds.
For this reason Dancut 850 is supplied in very large formats.
Hardness 54-58 HR

Mechanical and pendulum shears
Cut-to-length temp. from 300 °C to 700°C-850°C.

Steel grade with very high toughness and good wear resistance, specifically for intermediate temperature cutting and up to high section profiles.

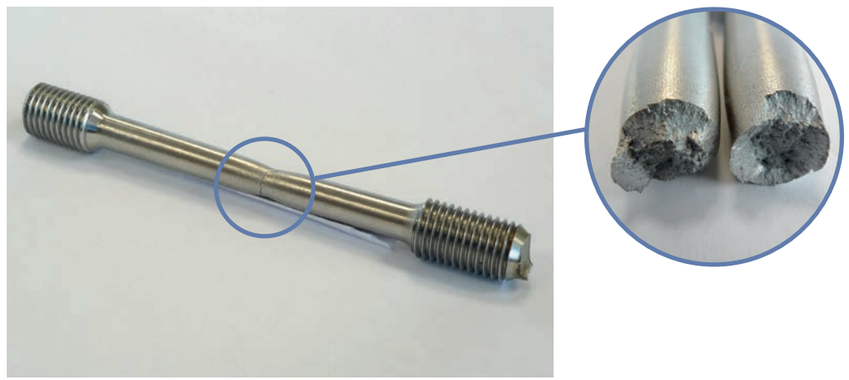
DanCut 710

High-performance knives for slab cutting.

Another remarkable achievement can be obtained by the application of DanCut 710 blades on the thin slab cutting pendulum shear. This shear is used to cut up to 110-mm thick slabs at a temperature between 800 and 1100°C. The combination of high thickness and temperature, together with slow cutting speed, heat radiation, and limited distance between the slab and the blades in rest position, requires a material capable of withstanding high amounts of heat and yet maintain its mechanical properties at elevated temperatures. For such applications, Danieli has introduced DanCut 710 special alloy, which is a Ni-Cr creep-resisting alloy capable of withstanding those extremely heavy working conditions and characterized by very high toughness and wear resistance, including at elevated working temperatures. Among all available steel grades, DanCut 710 is the only one that allows the customer to exploit its shear blades without major problems like excessive cracks that lead to shear blade breakdown and allow multiple regrinding in order to maximize the blades' lifetime performances.
According to Danieli's philosophy for continuous research and development of new shearing solutions, our engineering team is developing new improvements for special applications like the high-speed shears in endless rolling hot-strip mills, as well as for improving standard hot- and cold-cutting applications for high gauges and special steels. This philosophy and continuous innovation make the Danieli DanCut product line a reliable source for high-quality and technologically advanced spare parts.

Engineering department develops knife design and defines materials in function of customers' shear working conditions.

Danieli pendulum shear at the slab caster exit side during the slab-cutting phase. DanCut 710 blade, made of special nickel-chrome alloy with an outstanding resistance to hot work environments, is able to cut up to 110 mm of slab thickness.



Sample of DanCut 710 tensile test after specific precipitation-hardening heat treatment

DanCut 520

Proven steel grade for hot shearing on drum cropping shears

Danieli manufactures different kinds of blades for drum shears up to 3.5 meters length with:
— front radius for transfer bar progressive feed into finishing stands Top blade vectoring for improved in cutting quality.

Danieli hot working tool steel grades are characterized by elevated abrasive wear resistance thanks to the high amount of carbide-forming elements. They have good impact strength in order to shear transfer bars up to 60 mm thick and very good thermal shock resistance, allowing them to make contact with material at 950-1050°C. All steel grades are also suitable for direct water cooling in rest position. Due to through-hardening heat treatment it is suitable for multiple re-sharpening (reconditioning) up to the minimum resisting section. After each reconditioning that blade will have the same original hardness and consequently the same lifetime performances of the first campaign.

Cause of wear	DanCut solution & advantages
Abrasion and cutting-edge wear (lost of sharpness)	Elevated amount of carbide forming elements like Cr, Mo, and V that improve resistance to wear and edge holding properties.
Blade softening due to overheating	Improved retention of hardness properties due to specific balance between alloying elements.
Thermal cracking	High thermal conductivity and resistance to short-term thermal shocks, due to specific balance between alloying elements.

Flying shears.

DanCut 346

High-performance steel grade for cold shearing of high gauges

Danieli manufactures straight and rounded blades up to 7.0 meters length for high-gauge shearing, up to 50 mm at temperatures below 150°C. DanCut 346 blades are characterized by extremely high impact resistance capable of withstanding high loads, combined together with improved edge-holding and wear-resisting properties in order to maximize work campaigns. Due to through-hardening heat treatment it is suitable for multiple re-sharpening (reconditioning) up to the minimum resisting section. After each reconditioning that blade will have the same original hardness and consequently same lifetime performances of the first campaign.

Cause of wear	DanCut solution & advantages
Cracks Cracking and Chipping	Presence of elevated amount on Ni (4%), which improves impact strength (toughness) without jeopardizing blade's hardness.
Cutting edge jagging	Minimized amount of big sizelarge carbide carbide-forming elements (like Cr) that acts as a point of concentration for material internal stresses (tensions.)
Permanent edge deformation	Improved mechanical properties (Yield yield strength) thanks to specific balance between alloying elements.

Detail of rocking-type side-trimming shear

DanCut 100 series

Shear blades for aluminum industry

It is well known that shearing aluminium is a challenging operation, first due to the tendency of aluminium pick-up, which transfers part of the strip material to the blade (adhesion phenomena). Furthermore, there is the presence of aluminium oxide on the surface of the strip, which is very hard and abrasive, and partial plastic deformation of the sheared strip during blades penetration (work hardening) will reduce shearing quality. Finally, there is the impact of temperature of sheared material, which in hot-cutting conditions substantially increases adhesion and plastic deformation effects. In order to withstand all those working conditions, Danieli Service has developed a specific family of DanCut steel grades dedicated for aluminium shearing.
Those steel grades are characterized by:
— Properly chosen amounts and dimensions of carbides present in the steel grade in order to minimize adhesive phenomena and maximize resistance to wear.
— Extremely high-quality surface-finishing starting from high-precision grinding, through lapping, up to mirror-surface polishing. The aim of this quality is to reduce further the adhesive effects with sheared aluminium, and to supply a shear blade with extremely tight dimensional and geometrical tolerances that will make it possible to maintain the tight clearances once installed on the shear.
— Properly chosen mechanical properties of the blades as a function of the shearing application.
— Hardness as well as impact strength of DanCut shear blades are chosen according to the specific cutting application, for both intermediate as-finished products, hot- or cold-rolled, work-hardened, or heat treated.
Below are listed some of the most common aluminium shearing DanCut materials for hot and cold applications.

DanCut	Hardness	Shearing temperature	Material Rm	Thickness range
DanCut 125	59-61 HRC	<100°C	330 Mpa max	0,65-4,45 mm
DanCut 135	60-62 HRC	<100°C	450 Mpa max	0,65-4,45 mm
DanCut 140	58-60 HRC	<100°C	520 Mpa max	0,35-12,0 mm
DanCut 160	54-56 HRC	210-350 °C	190 Mpa @ 210°C	3,00-10,0mm
DanCut 170	52-54 HRC	210-350 °C	190 Mpa @ 210°C	3,00-35,0mm
DanCut 180	49-51 HRC	350-450 °C	100 Mpa @ 350°C	<200 mm

DanCut shear blades are developed in order to cover the following shearing applications:
— Hot-slab head and tail cropping and dividing.
— Hot-strip head and tail cropping and dividing.
— Hot-strip side trimming and scrap chopping.
— Cold-strip dividing.
— Cold-strip side trimming and scrap chopping.
— Cold-strip slitting.

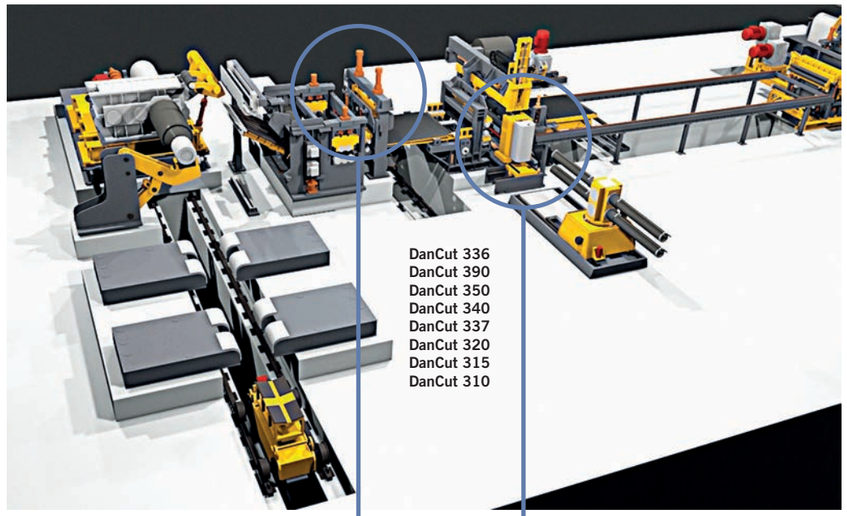
A further important parameter for the shearing quality is the blades' set-up. Proper clearance between blades guarantees a smooth sheared edge without burr and minimal permanent plastic deformation. All DanCut shear blades are manufactured with modern CNC milling centers, grinding machines and polishing machines (super finishing). All blades are through-hardened so they can be re-sharpened or re-ground without changing their original mechanical properties and consequently lifetime performances.
Using DanCut product, customers will always have the possibility to:
— Improve the knives management.
— Grow the cutting quality.
— Minimize equipment downtimes.
— Minimize operation costs.
— Have a continuous support (partnership philosophy).

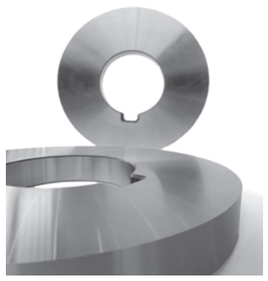
Cold dividing shear blades.

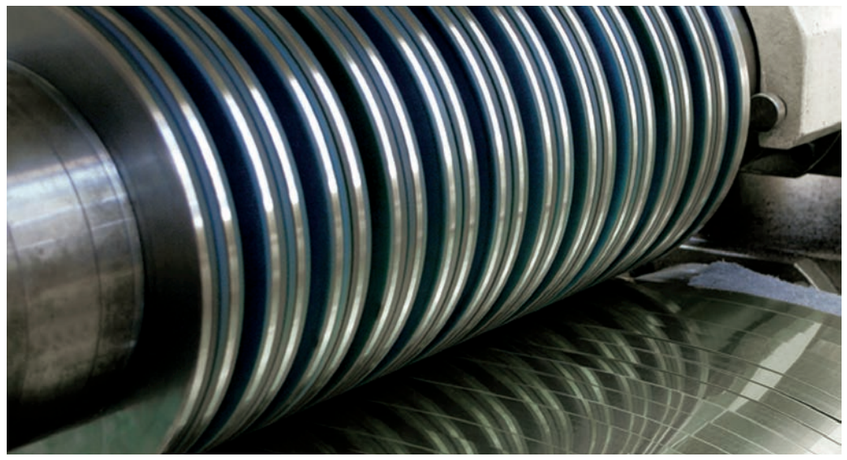
Trimming and slitting - circular shear blades

- Separator rings
- Rubber-coated rings
- Blade holder shafts

Danieli manufactures circular blades up to 1.6 meters in diameter, custom-made for shearing different gauge and steel grades up to 16 mm thickness and temperatures below 150°C.
DanCut blades are characterized by elevated edge holding properties necessary to achieve long lasting campaigns, with high surface quality, free from bur.
Due to through-hardening heat treatment they are suitable for multiple re-sharpenings (reconditioning) up to the minimum resisting section.
After each reconditioning that blade will have the same original hardness and consequently same lifetime performances of the first campaign.







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