VAUTID®
fights wear

Economical Wear Protection with VAUTID®-Technologies

1. VAUTID®-Hardfacing Materials

2. VAUTID®-Wear Plates

3. VAUTID®-Hardfacing Service

4. VAUTID®-Wear Resistant Castings

5. VAUTID®-Hard Materials

6. VAUTID®-Wear Resistant Plastics

VAUTID-VERSCHLEISS-TECHNIK · Dr.-Ing. Hans Wahl GmbH
D-73744 Ostfildern near Stuttgart · P.O.Box 4110 · Tel. 0711/44 04-0 · Telefax 0711/44 20 39
http://www.vautid.de + www.verschleiss.de · E-Mail: vautid@vautid.de

VAUTID®
fights wear

Experience in the Reduction of Abrasion Costs.

1. VAUTID®– Hardfacing Materials

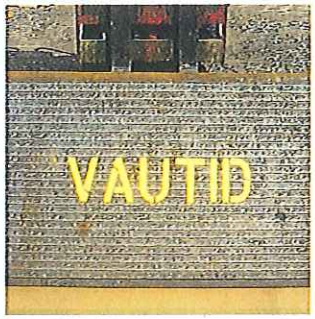
VAUTID hardfacing materials are available in various alloys. Cobalt-based alloys, wear resistant hardfacing materials, stainless steel materials, repair and special alloys.

They are available either as stick electrodes, flux cored wires, continuously cast rods or metal powders.

With VAUTID hardfacing materials it is possible to solve various abrasion problems on site economically and at great speed.

Typical applications for VAUTID hardfacing materials are:
hardfacing of exhaust valves, hardfacing of mixer tools, hardfacing of digger teeth, spraying of fan blades, hardfacing of edges for buckets and sinter crushers.

2. VAUTID®– Wear Plates



VAUTID wear plates are economically produced with a special hardfacing process of high deposition rate, with low dilution. Custom made parts may be made by plasma-cutting the plate. The plates may be rolled cold or hot similar to the rolling of mild steel plates. The plates may be fixed by welding on the back, bolting or as with any other welding construction.

VAUTID wear plates are available with hardfaced layer of VAUTID-100, VAUTID-143, VAUTID-145, VAUTID-150, VAUTID-200 and VAUTID-300.

VAUTID wear plates are used wherever protection against abrasion and high reliability is required on large areas with high mechanical load without using a selfsupporting construction, i.e. screens, liners for bunkers, vibration feeders, ventilators, housings, mixers, cyclones and separators.

3. VAUTID®– Hardfacing Service

The special experience of the VAUTID hardfacing team produces hardfaced components of highest quality and reliability in our welding shop or on site.

You may send your parts for us to hardface them or we send our specialists to train your people on site.

A special achievement of our hardfacing team is the hardfacing of chrome-iron rolls for pulverizing coal and cement. This is an example of how specialists may introduce new technologies.

VAUTID®
fights wear

Your Advantage: Wear Protection from one Source

4. VAUTID®– Wear Resistant Castings

VAUTID wear resistant castings are the economic abrasion solution for large batches. VAUTID wear resistant castings include the alloy-group of iron-nickel types, iron-chromium-molybdenum types, iron-chromium-molybdenum-vanadium types, cobalt- and nickel-chromium-boron qualities as well as composite castings.

The parts are available as precision castings, cast in CO_2-sand or green sand, or as centrifugal castings. The lowest weights are VAUTID cores with 50 gr/part. The largest parts are blow bars with heat treatment with a weight of 600 kg/part.

Due to the use of a high degree of rationalisation VAUTID wear resistant castings represent an economic alternative in the mechanical processing; for instance for crushing, mixing, handling, forming and recycling.

5. VAUTID®– Hard Materials

VAUTID-hard materials are based on sintered AL_2O_3. It is extremely wear resistant and at the same time corrosion resistant with low weight. Bricks in standard dimensions which are either bonded or welded onto the base structure are used. It is possible to produce from these standard bricks formed bricks according to customer's drawings and process them.

VAUTID-hard materials are mainly used for chutes, bunkers, screens, wherever highest abrasion resistance and/or corrosion resistance is required, for instance in steel works, coking plants and large quarries, etc.

6. VAUTID®– Wear Resistant Plastics

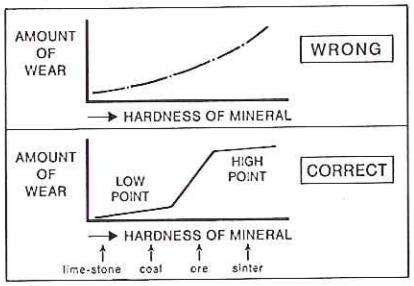
VAUTID wear resistant plastics are cast from special polyurethanes of various hardness in metal-patterns. They prove especially successful wherever abrasive material in watery solutions are processed. An additional advantage is the reduction of sticking of the medium and reduction in noise.

Typical applications are mixing tools, linings, screens, worms for feeding sand, cyclones and linings of polishing machines.

VAUTID®
fights wear

Your Abrasion Problems Solved with VAUTID®-Technologies

VAUTID® Advice



Our company has been involved with the solution of abrasion problems for more than 40 years. By concentrating on abrasion problems in various industries from ore processing to the cement industry we have helped and assisted to solve a great variety of abrasion problems all over Europe. This concentration also means that in our company we have collected more experience in this field than anyone else.

Together with the customer an abrasion analysis is made and based on this we make our proposal taking into consideration the material required from our wide range and any necessary suggestions for alterations in the design of the plant or the process.

Examples of our Developments

Example No. 1:

Screening decks in steel works

Large amounts of most abrasive sinter are handled on these screens. They had previously been made from wear resistant steels.

VAUTID solution: VAUTID wear plates with screen holes cut with a plasma cutting machine. The holes have sharp edges.

Life increases up to 20 times.

Example No. 2:

Mixing tools

Mixing tools for instance in the concrete industry were originally made out of steel cast owing to the danger of breakage. Material and design changes have allowed us to make the tools out of wear resistant casting. This is a reliable solution. Especially effected areas are protected with tungsten carbide.

Life increases up to 5 times.

Example No. 3:

Crusher rolls

Crusher rolls for horizontal crushers for recycling of asphalt were made out of manganese steel. Through hardfacing with VAUTID hardfacing materials the crushing capacity has been increased and the life extended.

Life increases up to 4 times.

Example No. 4:

Rolls for Raymond mills

Rolls for Raymond mills out of wear resistant casting could up to now not be hardfaced. They may now be hardfaced with the VAUTID hardfacing service thus extending life and milling efficiency considerably.

Life increases up to 3 times.

Example No. 5:

Screens in the coke plant

These screens have up to now mainly been made out of rubber or chromium-nickel steels as there is corrosion apart from abrasion. Design adaptations allow now the use of ceramic screens in a reliable way.

Life increases up to 6 times.

Example No. 6:

Liners for sand classifiers

These have until now been made out of mild steel (St 37) which stood not very well up to corrosion and abrasion. A method of using polyurethane liners as segments has proved to be an excellent solution.

Life increases up to 5 times.

VAUTID-VERSCHLEISS-TECHNIK · Dr.-Ing. Hans Wahl GmbH
D-73744 Ostfildern near Stuttgart · P.O.Box 4110 · Tel. 0711/44 04-0 · Telefax 0711/44 20 39
http://www.vautid.de + www.verschleiss.de · E-Mail: vautid@vautid.de

VAUTID®
fights wear

VAUTID®-
Hardfacing Materials

VAUTID®- Hardfacing Materials

1. on Iron Base
2. on Cobalt and Nickel Base
3. on Tungsten Carbide Base

VAUTID-VERSCHLEISS-TECHNIK · Dr.-Ing. Hans Wahl GmbH
D-73744 Ostfildern near Stuttgart · P.O.Box 4110 · Tel. 0711/44 04-0 · Telefax 0711/44 20 39
http://www.vautid.de + www.verschleiss.de · E-Mail: vautid@vautid.de

VAUTID®- Hardfacing Welding Programme on Iron Base

VAUTID-Type	Form	Group to DIN 8555	Alloy type	Hardness (~) Vickers HV 30	Hardness (~) Rockwell HRC	Characteristics	Applications
VAUTID-30	stick electrode tubular wire	1	low alloyed Fe, Cr, Si, Mn	300	30	high impact strength, non-cracking, medium abras. resistance, machinable	build-up and buffer layers, idlers
VAUTID-Alpha	stick electrode tubular wire	6	high alloyed Fe, Cr, C, Mo	600	54	weld hardens, abrasion and impact resistant	crushing jaws, dredger teeth
VAUTID-Beta	stick electrode tubular wire	7	high alloyed Fe, Cr, C, Mn	220 520*	10 50*	high impact strength, non-cracking, cold hardening, manganese character	crushing heads, hammers for crushers, crushing jaws
				* (cold hardened)			
VAUTID-Gamma	tubular wire	7	high alloyed Fe, Cr, C, Mn	220 450*	10 45*	as VAUTID-Beta	as VAUTID-Beta, buffer layers
				* (cold hardened)			
VAUTID-Delta	stick electrode tubular wire	6	high alloyed Fe, Cr, C, Ti	650	57	weld hardens, abrasion and impact resistant, grindable	sealing surfaces, hammers for crushers
VAUTID-100	stick electrode tubular wire	10	high alloyed Fe, Cr, C	750	62	max. abrasion resistance, medium impact strength, limited crack resistance, very hard chromium carbide in hard matrix, grindable only	worms, scrapers, mixer blades, chainwheels, top layer for teeth tips, crusher jaws
VAUTID-100 K	stick electrode tubular wire	10	high alloyed Fe, Cr, C, Ni, Mo	450	45	as VAUTID-100, but corrosion resistant	mixer components
VAUTID-100 T	stick electrode tubular wire	10	high alloyed Fe, Cr, C	750	62	as VAUTID-100, but higher temperature resistance and retention of hardness	sinter bars, coke pushers
VAUTID-105	tubular wire	6	high alloyed Fe, Cr, B	800	63	abrasion resistant, medium impact resistance, for position welding	conveyor worms, bucket teeth, crusher jaws, grinding rollers
VAUTID-110	stick electrode	6	high alloyed Fe, Cr, C, Mo, V	690	59	weld hardens, impact and abrasion resistant, for position welding	hammers for crushers, punching tools, shearing blades, drill heads
VAUTID-143	stick electrode tubular wire	10	high alloyed Fe, Cr, C, Nb	800	63	high abrasion resistance, medium impact resistance	top layer for hammers, excavator teeth, mixing blades
VAUTID-145	stick electrode tubular wire	10	high alloyed Fe, Cr, C, Mo, Nb, W, V	850	65	high abrasion resistance, particularly at high temperatures	sinter crushers and bars
VAUTID-150	stick electrode tubular wire	10	high alloyed Fe, Cr, C, B	880	66	high abrasion resistance already in the 1st layer, medium impact strength, limited crack resistance	worms, grovel pumps, bunbury mixers
VAUTID-18-8-6	stick electrode tubular wire	8	X15CrNiMn1886	200 400*	40*	high impact resistance, abrasion resistant, crack and temperature resistant, corrosion and cavitation resistant	buffer layers, rails, parts for chemical industry
				* (cold hardened)			
VAUTID-29-9	stick electrode	9	X10CrNi299	210	–	high impact strength, abrasion resistant, crack and temperature resistant, corrosion and cavitation resistant, elongation appr. 24 %, strength appr. 850 N/mm²	buffer layers, rails, parts for chemical industry, for materials difficult to weld

Special alloys may be developed and produced according to customers' requirements.

VAUTID®-
Hardfacing Welding Programme on Cobalt and Nickel base

VAUTID-Type		Form	Group to DIN 8555	Alloy type	Hardness ~ Vickers HV 30	Hardness ~ Rock-well HRC	Characteristics	Applications
Cobalt base alloys	Grade 1	powder, bare rods, stick electrodes, tubular wires	20	Co, Cr, W, C	600	54	high temperature strength, heat and corrosion resistant, also highly abrasion resistant, with very good sliding and dry operation qualities	cutting, earth drilling and abrading tools, valve ends, mixing and pulverising tools and sealing surfaces in the chemical industry
	Grade 6	powder, bare rods, stick electrodes, tubular wires	20	Co, Cr, W, C	430	43	high temperature strength, heat and corrosion resistant, non-magnetic, good polishing qualities, crack resistant, good impact strength, plus sufficient abrasion resistance	super heated steam controlling valves, valves in the chemical industry, engine outlet valves, sealing surfaces of armatures, hot tools, extruders, agitators, bearings and bushings, staple fibre cutting tools
	Grade 12	powder, bare rods, stick electrodes, tubular wires	20	Co, Cr, W, C	500	48	high temperature strength, heat and corrosion resistant, non-magnetic, high resistance to abrasive wear, high resistance to oxidation	decanting and pressing screws, guide rails, knives, hot pressure and drawing tools, sealing surfaces
	Grade 21	powder, bare rods, stick electrodes, tubular wires	20	Co, Cr, Ni, Mo	350	36	high temperature strength, heat and corrosion resistant, high impact strength, high abrasion resistance, good sliding and dry operation qualities	valves, gas turbine blades, hot shearing blades, rolling mill rollers and valve seats
	Grade F	powder, bare rods, stick electrodes	20	Co, Cr, W, C, Ni	420	42	heat and corrosion resistant, good impact and pressure resistance plus good resistance to abrasive wear, good sliding and dry operation qualities	standard hardfacing material for hardfacing valves of combustion engines
Nickel base alloys	NICROBOR 20	powder	22	Ni, Cr, B, Si	270	26	very high ductility and corrosion resistance, heat resistance, without cracks, abrasion resistance, well machinable	built-up alloy, glass molds
	NICROBOR 40	powder	22	Ni, Cr, B, Si	400	40	abrasion and impact resistant, corrosion and heat resistant, without cracks	glass molds, guiding pulleys, pump pistons
	NICROBOR 50	powder	22	Ni, Cr, B, Si	570	53	abrasion and impact resistant, corrosion and heat resistant, without cracks	glass molds, plungers, shaft sealings
	NICROBOR 60	powder	22	Ni, Cr, B, Si	760	62	highly abrasion resistant, impact and corrosion resistant, heat resistant	augers, scrapers, cutting tools, pump impellers
	NICROBOR 60 WC	powder	22	Ni, Cr, B, Si + WC	760 Matrix 2000 HV WC	62 Matrix 2000 HV WC	ultra-abrasion resistant, impact and corrosion resistant, heat resistant	augers, stirring components, slicing knives, milling segments, fan blades
	NICROBOR 60 W_2C	powder	22	Ni, Cr, B, Si + W_2C	760 Matrix 2000 HV W_2C	62 Matrix 2000 HV W_2C	ultra-abrasion resistant, impact and corrosion resistant, heat resistant	augers, stirring components, slicing knives, milling segments, fan blades

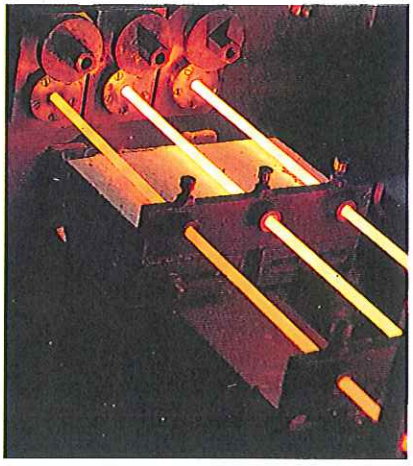
Special alloys may be developed and produced according to customers' requirements.

VAUTID®- Hardfacing Programme on Tungsten Carbide Base

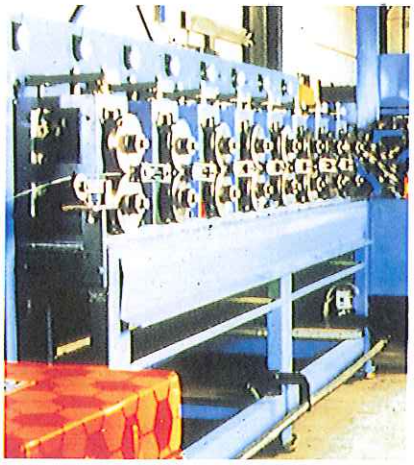
VAUTID-Type	Forms	Group to DIN 8555	Alloy type	Hardness	Characteristics	Applications
VAUTID-Ultra I	rod	21	W_2C in iron matrix	matrix: 650 HV W_2C-grain: 2000 HV	extremely abrasion resistant, medium impact resistance	edges of augers, rock drills, mixer blades
VAUTID-Ultra II	stick electrode	21	W_2C in iron matrix	matrix: 850 HV W_2C-grain: 2000 HV	extremely abrasion resistant, medium impact resistance	scrapers, plough shares, grinding segments
VAUTID-Ultra III	coated wire	21	W_2C in nickel matrix	matrix: 500 HV W_2C-grain: 2000 HV	extremely abrasion resistant, impact and corrosion resistant, cavitation resistant	scrapers, edges of augers, hammers, drill bits, cutting tools, impact bars
VAUTID-Ultra IV	tubular wire	21	W_2C in iron matrix	matrix: 850 HV W_2C-grain: 2000 HV	extremely abrasion resistant, medium impact resistance	scrapers, plough shares, grinding segments
VAUTID-Ultra V	tubular wire	21	W_2C in nickel matrix	matrix: 600 HV W_2C-grain: 2000 HV	extremely abrasion resistant, impact and corrosion resistant, cavitation resistant, weldable with high deposition rate	scrapers, edges of augers, hammers, drill bits, cutting tools, impact bars
VAUTID-Ultra VI	square bar	21	Tungsten carbide in nickel matrix	matrix: 600 HV Tungsten carbide: 2000 HV	extremely abrasion resistant, medium impact resistance	application in case of extreme abrasion, f. e. in the construction and construction materials/equipment industry

VAUTID - Hardfacing Materials of its own production

VAUTID-Powder atomization plant



VAUTID-Continuous casting production



VAUTID-Production of tubular wires

VAUTID-VERSCHLEISS-TECHNIK · Dr.-Ing. Hans Wahl GmbH
D-73744 Ostfildern near Stuttgart · P.O.Box 4110 · Tel. 0711/44 04-0 · Telefax 0711/44 20 39
http://www.vautid.de + www.verschleiss.de · E-Mail: vautid@vautid.de