



- Volume reduction
- Recovery of coolants
- Reduction of storage space
- Simplified logistics
- Increased scrap revenue
- Sustainability
- Remelting
- Cleanliness at workspace

Stainless Steel  
Construction steel  
Machining steel

Case hardened steel  
X5CrNi18-10  
Tool steel

V2A & V4A

Heat treated steel

Duplex steel

Ball bearing steel

Alloy steel

100 Cr6

Energy technology  
Machining

Linear technology

Mechanical engineering

Contract manufacturing

Drive technology

Parts manufacturing

Aviation

Foundries

Steelworks

Consumable goods

Automobile industry

# Steel & Stainless Steel Briquetting

15 PROJECT EXAMPLES

**RUF**  
BRIKETTIERSYSTEME



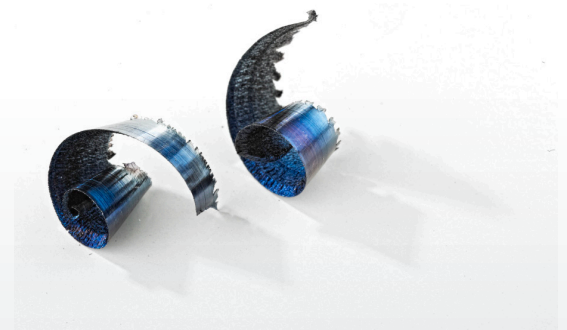
## ADDING VALUE, ASSURE QUALITY, REDUCE COSTS.

Ruf Maschinenbau GmbH & Co. KG is a family run company in the second generation which has specialised in the development and production of briquetting systems for over 35 years.

More than 5,000 RUF briquetting systems are in operation in over 100 countries worldwide.

Our systems are pressing steel and stainless steel chips into high quality briquettes. Being able to offer a wide range, we produce briquetting systems with throughput rates between 30 and 3,000 kg/hour.

Our hydraulic presses for steel and stainless steel work with a specific pressing force of up to 5,000 kg/cm<sup>2</sup>. The results of this process are solid briquettes, which leads to a variety of advantages. The following collection of customer projects will demonstrate the benefits of processing steel and stainless steel.



# PROJECT EXAMPLES FOR STEEL AND STAINLESS STEEL ACCORDING TO INDUSTRIES



## AUTOMOBILE

**Page 5:** Steel chips  
**Page 6:** Steel chips  
**Page 7:** Steel chips  
**Page 8:** Steel chips  
**Page 10:** Steel chips



## CONTRACT MANUFACTURING

**Page 8:** Steel chips



## ENERGY TECHNOLOGY

**Page 6:** High alloy steel chips (various qualities)  
**Page 9:** Austenitic, cold formed steel (P900, Nr. 1.3816)



## PARTS MANUFACTURING

**Page 6:** Steel  
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## MECHANICAL ENGINEERING

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**Page 10:** Stainless steel material 1.4571 resp. V4A



## CONSUMABLE GOODS

**Page 10:** Case hardened steel

# PROJECT EXAMPLES FOR STEEL AND STAINLESS STEEL ACCORDING TO MAIN BENEFITS



## INCOME & MARKET VALUE

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- Page 8:** Increased scrap income
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- Page 11:** Oil & minimising cutting oil losses



## COST SAVINGS

- Page 5:** New construction costs
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- Page 11:** Storage
- Page 11:** Transport



## LOGISTICS

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- Page 6:** Chip logistics simplified
- Page 6:** Simplified internally
- Page 7:** Improved chip logistics
- Page 8:** Improved chip logistics
- Page 9:** Chip processing simplified
- Page 10:** Improved chip logistics
- Page 11:** Chip logistics simplified



## STORAGE & VOLUME REDUCTION

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- Page 6:** Storage, simple and clean
- Page 6:** Area reduction
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- Page 8:** Area reduction
- Page 10:** Area and volumes reduced
- Page 11:** Area reduction



## REMELTING

- Page 9:** Remelting of briquettes



## CLEANLINESS

- Page 5:**
- Page 6:** Reduced oil in waste
- Page 6:**
- Page 8:**



## ENVIRONMENTAL PROTECTION

- Page 8:**
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## INTERNAL LOGISTICS SIMPLIFIED - COSTS SIGNIFICANTLY REDUCED

The factory calculated the time spent on the processing of loose chips with about 16 wagons produced in each shift. It was enormous. A briquetting process reduced the efforts on chip logistics greatly. This was achieved with a system equipped with a tipping device and slat-band chain conveyor to discharge the briquettes into a container. This resulted in 100 - 120 tons of steel chips being automatically processed per month. Over sixty man hours are saved each month which had been previously, exclusively expended on internal logistics. In addition an extra revenue of 10 EUR per ton of briquettes is achieved. In order to prevent premature wear, superior quality parts have been utilised. Since start up, the system has run for around 7,000 hours.

**Industry | Customer** Components for mechanical engineering  
**Production** Linear and Profile rail feed

**Briquetting system** RB 15/3000/80  
**Material** Ball bearing steel 100CrMo 7-3 and 100Cr6

**Benefits** ▶ Simplified chip logistics internally ▶ Cost savings ▶ More income from briquettes



## BRIQUETTING CREATES SPACE FOR PRODUCTION

A components factory for a major automobile manufacturer expanded their production capacity. Previously a large area was used for the chip containers in a covered storage area. The briquetting of chips has brought about a drastic reduction of container storage space. This in turn meant a markedly smaller expansion building was necessary which seriously reduced the construction costs. Before briquetting, the sometimes wooly steel chips need to be compacted at around 500 kg/h. Now, after the material is fed by a forklift, the system runs completely automatically.

**Industry | Customer** Automobile - BMW  
**Production** Components power train

**Briquetting system** RUF 15/3000/80  
**Material** Steel chips

**Benefits** ▶ Storage area reduced ▶ Therefore new construction costs reduced ▶ Cleanliness

## RELIABLE OPERATION AND MINIMAL EFFORT FOR MAINTENANCE - OVER 14 YEARS

The customer produces connecting elements for various industrial sectors. Alongside a production site for brass parts, the location at Sonnewalde is responsible for the annual production of around 23 million turned parts from M4x6 - M16x20. The steel chips produced here have been briquetted since 2006, recovering processing oil is simplifying the storage. The system is equipped with a tipping device to facilitate the automatic feeding of the chip wagons. It runs reliably and the maintenance effort is minimal. At the start of 2020, 7 million briquettes had already been produced and the system has over 32,000 hours.

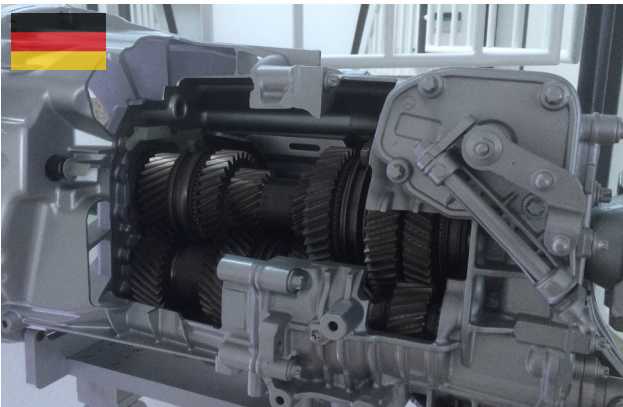


**Industry | Customer** Parts manufacturing - Fa. Böllhoff  
**Production** Connecting elements

**Briquetting system** RUF 4/3700/60x40  
**Material** Steel

### Benefits

- ▶ Oil recovery
- ▶ Cleanliness of storage (Reduced oil content in waste)
- ▶ Simplification of storage and logistics



## SAVINGS THROUGH OIL RECOVERY - AMORTISATION AFTER ONLY 2 YEARS

During the production, chips containing oil are produced. Subsequently these chips are briquetted. The oil recovered during briquetting is filtered and then re-used. The amortisation period for the system was about 2 years. In addition the factory has shifted the entire processing of chips, which alongside the steel also includes about 500 tons of aluminium chips per year, to a briquetting process. The benefits are cleanliness of workplaces and container spaces and an optimisation of the logistics process. Internally as well as externally: Chips leave the factory site exclusively as briquettes.

**Industry | Customer** Automobile industry supplier  
**Production** Rocker arms (Valve parts)

**Briquetting system** RUF 4/3700/60x40  
**Material** Steel chips

### Benefits

- ▶ Oil recovery
- ▶ Simplified internal chip logistics
- ▶ Cleanliness

## CHIP HANDLING AT 1.5 t/h

In the gas turbine plant from Siemens Energy in Berlin-Moabit, high alloy steels and nickel based alloys are used to produce the turbine blades. The produced chips are compressed to briquettes. The system is composed of a tipping device, a shredder and the RUF briquetting system. This results in a drastic reduction of chip volumes. This in turn means reduced space requirements for storage and also cost savings for transportation. In addition the various chip alloys can be distributed better. The system is constructed on a frame utilising the available space optimal and works completely automatically.



**Industry | Customer** Siemens Energy  
**Production** Production of gas turbines

**Briquetting system** RUF 55/3700/100  
**Material** High alloy steel chips, various qualities

### Benefits

- ▶ Simplified chip logistics
- ▶ Cleanliness
- ▶ Savings on storage space and costs
- ▶ Improved market value of briquettes



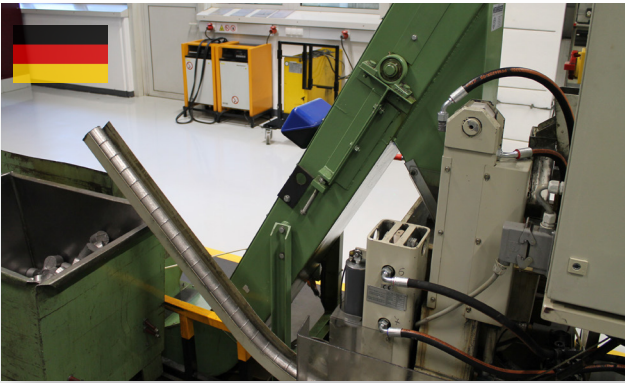
## BRIQUETTES OPTIMISE CHIP LOGISTICS AND CUTTING OIL RECOVERY

Now using two briquetting systems, Lauble GmbH has simplified the handling of chips which are produced in enormous quantities during the production of precision turned parts. Thanks to the switch from centrifuging to briquetting, space has been saved, large skip trailers can be removed and forklift traffic has been remarkably reduced. The chips which are compressed to briquettes are in the main dry, as the compression reduces the proportion of cutting oils from between 10 - 15 % to 3 %. The pressed out cutting oil is then processed in order to be reintroduced into the machining centres in the company.

**Industry | Customer** Parts manufacturing - Lauble GmbH  
**Production** Precision turned parts

**Briquetting system** RUF 5,5/3700/60x40, RUF 15/4000/70  
**Material** Case hardened steel, Stainless steel

- Benefits**
- ▶ Oil recovery
  - ▶ Improved chip logistics
  - ▶ Container storage space freed-up
  - ▶ Storage area reduced



## AUTOMOBILE INDUSTRY SUPPLIER RECOVERS OIL

In 2001 a briquetting system was sold to Siemens VDO. Later it was taken over by another automobile industry supplier (beginning of 2018 with 22,000 operating hours). Briquetting is carried out reliably up to this day. The steel chips are briquetted in order to recover the cutting oil. In 2017 this was a total of 300 tons, from which 30,000 litres of oil could be recovered. This means the system has paid for itself many times over.

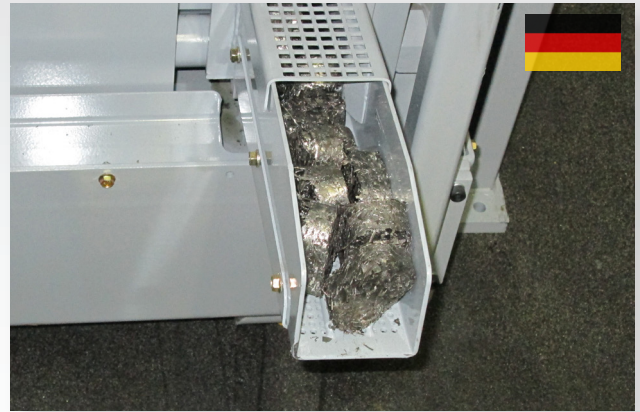
**Industry | Customer** Automobile industry supplier  
**Production** Shafts (Steering, Window regulators)

**Briquetting system** RUF 4/2500/60  
**Material** Steel chips

- Benefits**
- ▶ Oil recovery
  - ▶ Simplified chip logistics

## BRIQUETTING DIRECTLY AT THE MACHINING CENTRES: INCREASE IN VALUE OF STAINLESS STEEL

The customer produces for diverse industrial branches like e.g. measuring and control technology, in the sector of stainless steel machining. The produced chips are crushed directly at the processing centres and briquetted immediately. This means the various alloys can be cleanly separated from each other and thereby the highest possible market value can be achieved. Furthermore, recovered cooling lubricants are directly reintroduced into the processing machines. The chip logistics are notably reduced at the moment of chip production. The customer is currently running 18 separate systems from RUF. The first one has been in operation since 2008, and is still pressing at a high level of reliability.



<b>Industry   Customer</b>	Parts manufacturing - Grieshaber GmbH & Co. KG	<b>Briquetting system</b>	18 units RAP 4/3800/60x40
<b>Production</b>	Precision turned parts	<b>Material</b>	Various V2A and V4A qualities and Duplex steels like 1.4305, 1.4404, 1.4462
<b>Benefits</b>	<ul style="list-style-type: none"> <li>▶ Simplified chip logistics</li> <li>▶ Increase of scrap income through separation of alloys</li> <li>▶ Recovery of coolants</li> </ul>		



## BRIQUETTING CLEANS UP CHIP MESS

Bergbauer operates as a supplier to the mechanical engineering and optical goods industry. The chips produced during processing are briquetted (steel and aluminium). Therefore the open air space for storing containers is no longer necessary and the possible environmental hazards from cooling lubrication pollution are eliminated. The recovered cooling lubricants can be brought back into the production process. An economic solution to the chip problem was achieved by implementing the cost-effective RAP as the centre point of the system to compensate for the relatively small amount of chips produced annually (under 50 tons).

<b>Industry   Customer</b>	Contract manufacturing - Bergbauer GmbH	<b>Briquetting system</b>	RAP 4/3800/60x40
<b>Production</b>	Diverse turned and milled parts	<b>Material</b>	Steel chips
<b>Benefits</b>	<ul style="list-style-type: none"> <li>▶ Cleanliness</li> <li>▶ Savings on storage space and costs</li> <li>▶ Recovery of coolants</li> </ul>		

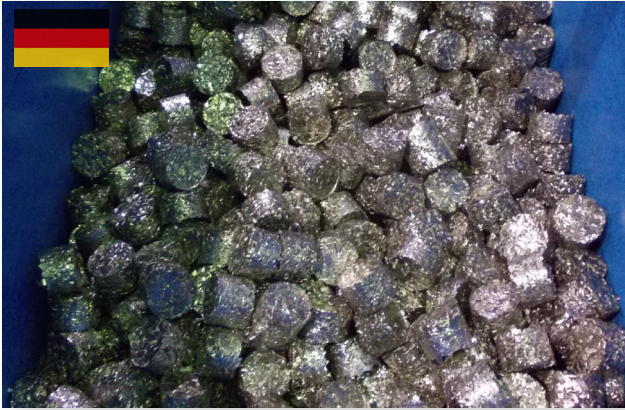
## BEST-PRACTICE IN CHIP HANDLING FOR OVER 15 YEARS

There are several reasons which moved the customer, world leader in forestry machines, to briquette the chips which were produced. The recovered coolant contributes to savings of around 10,000 EUR per year, while simultaneously creating mainly dry briquettes. Furthermore forklift traffic was reduced by 95%, bringing additional savings of about 20,000 EUR. The two factors together are important. The plant lies in a water-protection area, and the risk of pollution due to coolants is remarkably reduced. Finally the required container storage space could be reduced. The amortisation period was 3 years. In the 15 years to 2019 around 7,000 tons of steel chips have been processed.



<b>Industry   Customer</b>	Automotive - OEM Ponsse OY	<b>Briquetting system</b>	RB 7.5/3000/80
<b>Production</b>	Components for Automotive industry	<b>Material</b>	Steel chips
<b>Benefits</b>	<ul style="list-style-type: none"> <li>▶ Improved chip logistics</li> <li>▶ Savings on storage</li> <li>▶ Recovery of coolants</li> <li>▶ Cleanliness &amp; Environmental protection</li> </ul>		





## RE MELTING OF SPECIAL STEEL IN THE FORM OF BRIQUETTES

The crushed chips with extreme mechanical characteristics are compressed to solid briquettes under very high pressure. Using a RUF 30 specially adapted to the circumstances at 250kg/h. This enables re-melting in the steelworks. The expensive material can be re-used in the form of briquettes for the production of P900. This brings a major financial benefit (several hundred Euros per ton) and justifies the high investment for operating costs which are higher than usual due to the increased wear. The amortisation period for the entire system is at under three years and it has been in operation since 2014.

**Industry | Customer** Power plant technology - Energietechnik Essen  
**Production** Retaining rings for turbines in the power plant sector  
**Benefits** ▶ Remelting of chips in briquette form

**Briquetting system** RUF 30/5000/80  
**Material** Austenitic, cold formed steel (P900, Nr 1.3816)



## CONVERSION OF CHIP DISPOSAL TO BRIQUETTING

The customer produces standard turned parts like complex turned/milled parts as well as screws in special design on automatic lathes and machining centres for the automotive industry and the mechanical engineering sector. The chip disposal has been converted mainly to briquetting for over ten years now. This simplifies the internal chip logistics, saves storage space and increases cleanliness. Moreover it brings increased income from the different stainless steel grades. The customer has been operating two RUF systems since 2009, partly with an automated feed via a tipping device and a screen drum to sort out extraneous material. Spare parts have only been required when too many foreign materials got inside the system.

**Industry | Customer** Mechanical engineering - Freund Drehtechnik  
**Production** Turned and milled parts  
**Benefits** ▶ Simplified chip handling

**Briquetting system** RUF 4/2400/60x60 & RUF 5,5/3700/60x40  
**Material** Machined and heat treated steel (e.g. 42CrMoS4), C- and St-goods as well as rust free steels

▶ More income from briquettes

## FOUR RUF-SYSTEMS OPTIMISE CHIP HANDLING AT FITTINGS MANUFACTURER

PH Hydraulik has relied on RUF systems in their production location in Romania since 2012. Currently there are four machines in operation, three with chips containing emulsions and one with chips containing oil. This alone recovers oil to a value of around 10,000 Euros/year. The oil, like the emulsions, can be re-used after filtration. The uniform quality ensures a higher value for the briquettes, and of course higher prices are achieved. Thanks to storage in Big-Bags (ca. 60 tons per month), space has been saved. The material is only transported in briquette form, meaning it has been de-oiled.



**Industry | Customer** Mechanical engineering components - PH Hydraulik

**Production** Fittings and screw fittings

### Benefits

- ▶ CL-reintroduction
- ▶ Volume reduction
- ▶ Improved market value of briquettes (environmental guidelines and logistics)

**Briquetting system** 2 x RAP 4/3700/60x40, 2 x RUF 11/3000/80

**Material** Stainless steel material 1.4571 resp. V4A



## KNIFE MANUFACTURER SIMPLIFIES LOGISTICS AND RECOVERS OIL

Victorinox from Switzerland have been using several briquetting systems for decades to compress grinding sludge produced during blade sharpening. Furthermore a system from RUF has been in use since 2018 in Delémont for briquetting alloyed steel chips. The chips are produced during the cutting processes and are short and sometimes wooly. They are collected in wagons which are then emptied into the hopper of the briquetting system using a tipping device (multiple shaft feed). The chip volume is reduced to a factor of 1:5. Thereby the processing oils can be recovered and re-used.

**Industry | Customer** Consumable goods - Victorinox

**Production** Knives

### Benefits

- ▶ Improved chip logistics
- ▶ CL-reintroduction

**Briquetting system** RUF 5.5/3700/60x40

**Material** Case hardened steel

## OIL RECOVERY AND SPACE SAVINGS

Christ & Heiri produce finely geared parts of highest precision. Hereby, brass as well as alloyed steels are machined. Until now, centrifuges as well as competitor's briquetting systems had been used for handling the chips. In 2018 these systems were replaced by two RUF systems, one for briquetting brass chips and the other is in operation for their steel chips. The systems have proved their worth through reduced space requirements, high levels of oil recovery and reliable operation, linked with the high quality of the locally available service.



**Industry | Customer** Automotive, watches and medical industries - Christ & Heiri

**Production** Precision geared parts

### Benefits

- ▶ CL-reintroduction
- ▶ Savings on storage

**Briquetting system** RUF 4/2800/60S & RUF 4/3700/60x40

**Material** Steel chips

# OTHER REFERENCES



## VOLUME REDUCTION BY A FACTOR OF 1:10

Thanks to briquetting of steel chips, separated according to V2A, V4A and chips from machining steel, the customer is able to minimise cutting oil losses and recover valuable oil for the production process. Moreover the customer can massively reduce the produced chip volume of 70 tons per year. Hereby the customer can demonstrate significantly reduced transport costs. The machines have paid for themselves within three years. The machine is reliable and the maintenance effort is small.

**Briquetting system** RUF 4/3700/60x40

**Material** Stainless steel chips

### Benefits

- ▶ Oil recovery
- ▶ Minimisation of cutting oils loss
- ▶ Savings on storage space and costs
- ▶ Simplified chip logistics
- ▶ Savings on Transport costs
- ▶ Environment



## CHIP LOGISTICS SIMPLIFIED AT AUTOMOBILE INDUSTRY SUPPLIER

During the production of piston pins in several machining centres, short and slightly wooly chips are produced. These are collected in wagons, and fed into the briquetting system automatically via a tipping device and from there are compressed to solid briquettes. According to the operator this results to a saving on man hours for chip handling which has paid the investment off. The briquetting system has been in operation since 2008.

**Briquetting system** RUF 7.5/3000/80

**Material** Case hardened steel e.g.

### Benefits

- ▶ Simplified chip logistics
- ▶ Savings on storage space and costs



## IMMENSE SAVINGS THROUGH OIL RECOVERY

The company has been compressing chips to high value briquettes using a RUF 11/3000/80 for several years now. In the process around 352 tons of oil is recovered annually. This leads to enormous savings of more than 500,000 EUR per year. Furthermore the sale of steel briquettes brings an income of 5 EUR per ton extra in comparison to loose steel chips.

**Briquetting system** RUF 11/3000/80

**Material** Steel chips

### Benefits

- ▶ Oil recovery
- ▶ More income from briquettes



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