

## **Making money of chips and meet environmental regulations.**

Large quantities of metal chips are produced in a high production metal working plant. By continuous removal of the chips the productivity of the plant can be improved considerably, because the machine tool operator does not waste his time removing the chips he produces as a by-product.

An economical removal system for chips and recovery of cutting fluids does, however, require tailor-made systems.

The chips are collected and conveyed away from the machine tools by means of specially adapted conveyors. Bushy swarf is crushed to short chips. Wet chips are centrifuged \ briquetted and cutting fluids recovered and cleaned. The process should be continuous and requires a minimum of manual work.

The solution for efficient and economical chip handling will vary from company to company, depending on shop layout, chip volume and the properties of the chips.

**ITL** has experience and know-how to provide the solution which is most Economical just for your company, either it is a matter of single products or complete chip processing systems.

### **Economy:**

The return on investment will vary from company to company. Usually a continuous chip handling system will give very fast pay-off. The savings and profits are basically **Lower labor cost**, because the time-consuming manual handling involved in collecting, loading and transporting chips is eliminated.

**Lower cost for cutting fluids**, because the fluid in the chips can be recovered, filtered, and reused in production.

### **Higher price for the chips.**

Dry chips have a higher value in scrap markets.

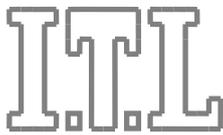
### **Reduced storage volume.**

Short chips take less space taken up by handling of chips.

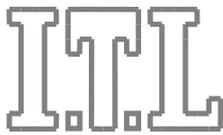
### **Improved environment.**

The indirect savings by improving the environment can be as important as the direct savings. When chips and cutting fluids continuously are removed from the machine tools, the work environment is improved.

The dangerous and dirty manual work connected with chip handling disappears. Dry chips will not leak fluids into the ground water



	<b>Economy</b>	<b>Environment</b>
<p><b>Coolant cleaning :</b> The use and handling of coolant is an extensive matter of great importance for all companies within the workshop industry. ITL has knowledge and ability for cleaning of coolant from particles and tramp oil. Therefore, we can guarantee an optimum solution for cleaning of coolant.</p>	<p>Coolant which is cleaned from particles improves the life-time of the machine tools and the surface finish. If the coolant is cleaned from tramp oil, the life-time of the coolant is prolonged. The consumption of coolant can drastically be cut by increasing the interval between the change of coolant and let the coolant circulate longer. This is possible with an efficient cleaning after every circulation.</p>	<p>Cleaned coolant means less healthy risks, better working environment and reduced effect on the external environment. Cleaner coolant means that the tools must be sharpened at longer intervals and gets a more even machining quality.</p>
<p><b>Conveying :</b> A continuous working chip handling system comprises of one or more chip conveyors. A wide range is available. Which type of conveyor should be used will be decided by conditions of production, the quantity and the type of chips. A good conveyor should have low operating costs, require very little maintenance and at the same time be able to handle both today's requirements and what is foreseen for the future.</p>	<p>The economic gain from efficient handling is obvious: the labor cost is spent on production and not on clean-up. It pays to investigate the advantages of installing conveyors.</p>	<p>Manual chip handling belongs to the undesirable part of the machining industry - it is both unpleasant and un-safe. It is getting increasingly more difficult to hire labor for chip handling.</p>
<p><b>Crushing :</b> The first stage when treating swarf is the crushing. Bushy swarf is crushed or broken down to a uniform short chip material. It is important that the crusher has the ability to dissolve large swarf bundles and give an even flow of crushed swarf. This simplifies the transport and treatment of swarf, such as centrifuging.</p>	<p>Crushed, short chips carry a higher price than long swarf, because it is easier to handle when remelted in steel works and foundries. Long swarf can sometimes be used when melting in cupola furnaces but not always. In addition to the direct economic gain from crushed swarf, there are even other advantages. The volume is reduced three to six times, which gives lower cost for internal and external transportation and less storage space is required.</p>	<p>Bushy swarf and large swarf bundles always contain a lot of fluid and because it has a large surface and low density it will corrode fast. When such swarf is charged in melting furnaces it causes heavy smoke, which causes a heavy load on baghouses. Only after crushing the fluid can be removed and the density be reduced.</p>
<p><b>Centrifuging :</b> In metal cutting operations where cutting fluids are used, the swarf absorbs a large amount of coolant. What is desired is dry chips that are easy to handle and cutting fluids that can be reclaimed and fed back to the cutting operation, either directly or via a filtering stage. Centrifuging, filtering of the cutting fluid and removal of the dry swarf can be handled by a continuously working swarf handling system, where manual labor often can be entirely eliminated.</p>	<p>Less than half of the cutting fluid in the swarf can be recovered through static settling and draining. By means of a wringer \centrifuge\briquetter the recovery can be increased to More than 90%. Installations can be paid-off in a few months.</p>	<p>Through continuous wringing of swarf and reclaiming of cutting fluid, spill is avoided. Centrifuging and recovery of cutting fluids also means that your shop takes on its responsibility for the environment and care for the water-ways.</p>



<b>Briquetting :</b> The last process stage in a chip handling system is briquetting. Here a specially designed hydraulic press compacts the chips to briquettes with a specific weight of about 90 % of the base material. ITL presses exist with capacities from 40 kg of chips per hour to more than 200 kg/hour.	The basic gained by briquetting is the conversion of low density chip to a solid briquette. This gives important advantages for consumers of chips - better melting economy, less burn-off loss and simpler chip handling.	Briquetting of swarf and grinding fines reduces the risks for negative environmental influence as the products can be brought back in a closed cycle.
---	--	---

## **Chips System shorten Review and terminology.**

### **1. Swarf bin.**

The bin is the existing chips bin used by customer to collect chips from the machine. In order to use them, bins must be std. and retrofitted to be suitable with the system.

### **2. Skip Hoist.**

The system is used to turn over full chip bins and empty them into feed conveyor or a holding " Silo". The system is surrounded with safety guards and an access door. Door is used to locate the chips bin in the skip hoist. After closing door and pressing system start , skip hoist lift and empty the chips into the feed conveyor or holding Silo. Empty bin is lowered back and its ready to for recollection next time.

### **3. Feed conveyor or holding Silo.**

System is used to interface between the chips bins and any other possible unit. The conveyor feed step by step under control chips to next stage.

### **4. Bar end separator.**

It is used to remove tramp metals from the chips before they enter process system and damage it. Removed parts are collected in a separate collection bin.

### **5. Crusher or shredder.**

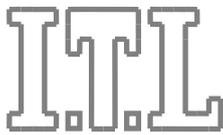
Is used to crush bushy chips into fines before they are moved to next operation.

### **6. Chips centrifuge or briquetter.**

At these stage fine chips are centrifuged and/or briquetted so coolants are removed from chips. The liquids are reclaimed.

Centrifuge only : Dry chips are conveyed to the disposal container via a conveyor. The chips are 80% – 90% dry but at large volume. Need more attention when handling.

If briquetting : compacted 97% dry chips are conveyed from the briquetter to the disposal container via a conveyor. Chips are compacted to very small volume which is ready for remelting. Easy to handle.



**7. Coolant reclamation station.**

Reclaimed coolant is collected and treated so it can be reused again by the machine tools.

**Mode of operation:**

Operator move the chips bin toward the swarf handling system.  
 Operator opens the access door to the system. Opening the door move system to hold position. Nothing moves.  
 Operator replace emptied bin from earlier process with a new full one. Operator close the door. In order to start the system operator push start button.  
 Skip hoist lift the bin and turn it over the feed conveyor or over the "chips Silo".  
 When bin been emptied it moves down again and waits for replacing.  
 Conveyor feed chips to the bar end separator in order to remove any possible tramp metals suspended in the chips which may damage further operation.  
 Tramp metals are separated and collected in a separate bin.  
 In case of bushy chips a crusher will follow so chips are crushed to fine chips.  
 From the crusher chips are conveyed to drying process by a centrifuge or by a briquetting press.  
 When to choose a centrifuge or a briquetter or both see notes below.  
 Chips are separated from the coolant via centrifuge or a briquetter. Dry chips leave system and are conveyed to a disposal container.  
 Reclaimed coolants are collected in the collection tank. The coolant is reconditioned so it can be reused by machine tools.

<b><u>Centrifuging chips.</u></b>	<b><u>Briquetting chips.</u></b>
Fine chips enter centrifuge and rotate at a speed. The coolant is removed by the centrifugal forces. Coolant is collected and moved to a holding tank. Chips comes out of centrifuge continuously. In some cases depend on customers request , that is enough. - Chips dryness is between 80% - 90%. - Chips are disposed to container free but dry. - Further handling is complex. - Possibility to mix different chips. - Hard to separate mixed chips. - Remelting chips is less efficient. - Chips prices are slightly higher.	Fine chips enter briquetter. The machine compact them and squeezes coolant out of chips. Coolant is collected in the collection tank. Chips are pushed out automatically one by one by the machine. - Chips dryness is better than 97%. - Chips are delivered to container compacted. - Further handling is easier. - Hard to mix and separate different chips. - Chips density is appropriate to original. - Remelting chips is very efficient. - Chips price is higher.
If chips are very wet, then a centrifuge must be installed before the briquetter.	

