KLINGER CONCEPTS

Chip Processing Quick Guide

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Introduction

If you have been charged with investigating the potential purchase of a Chip Processing System or equipment for your business, you may know already that there are no shortages of solutions.

It must be understood that, even though one of these solutions is your best option, obtaining the information and having the knowledge to know the best fit may not be as simple as reviewing advice from a potential supplier.

More than likely you are speaking with a salesman representing this company (potential supplier) and he is gaining your trust with application knowledge. Some of this trust is well-deserved, but some can also be misplaced. This person is a salesman. It is their job to sell.

In my 15 years of designing conveyors and chip processing systems, I have seen a multitude of applications. I have seen dozens of successes and, unfortunately, been witness to failures. I can say without a doubt, that 95% of failures can be prevented in the application stage prior to a single dollar being invested. In addition, a large number of field modifications can also be prevented with the right understanding of the application and desired outcome by the customer.

It is very unlikely that you, as the person in charge of this task, would have the experience of someone who has been in this particular industry for years. At some point, you are going to have to rely on information from potential suppliers, each one claiming a solution or even a “better” solution.

The selection of machinery for building a Chip Processing system is by far the most important part of your task. The wrong decision can cost tens of thousands of dollars or even more. Looking at a 5-10 page quotes from each of 3 or 4 different suppliers can be overwhelming to someone with extensive experience in the industry, and with that in mind, you can only imagine what it would be like for a person who is charged with this task as a one-time project.

The following pages will guide you through this process.

Chapter 1 – Why do you need a Chip Processing System?

This may seem like a token question but I assure you it is fundamentally important. Nothing can be more wasteful than to purchase equipment to perform a task you have no need for, but can easily be assumed you need because others do. Chip Processing Systems do not all serve the same purpose.

The following is a list of reasons that a company may be interested in processing chips.

1. Increase the value of scrap.
    a. Often times, a business can be penalized for having oil/coolant on chips. These chips are considered "dirty" and have less value than "clean" chips.
    b. Metal chips that are to be re-melted are typically more valuable dry for many obvious reasons.
    c. Some chips can go from being charged for disposal (removal) to being paid for the chips. This is an extreme case but certainly can apply to a few.
2. Reclaim your coolant.
    a. In most cases, the vast majority of your coolant can be reclaimed and the amount spent on coolant each year can be reduced significantly.
    b. You will need to know if the reclaimed coolant will need further cleaning to prepare it for your machines.
    c. You will need to understand how the transport and storage of this coolant will be handled.
3. Environmental Compliance.
    a. Your local/state/federal laws will have guidelines for your particular waste.
    b. The aforementioned guidelines will also include the transport of your byproduct.
4. Transport Costs.
    a. Oftentimes, the scrap chips can be quite bulky, and without processing can cause you to pay for shipping air rather than product.
    b. Transport within your facility can also be of great concern and solutions may be needed to allow for a clean and smooth running production line.
5. All of the above.
    a. Systems can be designed to accomplish all of the previously mentioned needs.
    b. Systems can be designed with a particular need as primary along with others as secondary.

It is imperative that the research be done thoroughly at this stage. A few of the basic steps to follow:

a. Find out how much value you are getting for your chip unprocessed and compare it with processed (dry, clean) chips.
b. Calculate how much coolant is leaving the building with your chips. Looking at the amount of coolant you purchase is also a good way to understand your coolant loses.

c. Determine the costs for scrap removal. Even if you are being paid for your chips, you are being charged for the pick-up of these chips. Fewer pick-ups will ultimately translate into more money for your chips.

Chapter 2 – The Initial Request for Quotation.

When you have selected the manufacturers to request a quotation from, you will be asked for information about your particular operation. This is completely normal and necessary. It must be understood that a supplier can only offer equipment according to their understanding of your application. Their understanding completely relies on the accuracy of information you supply.

The following list is the minimum amount of information that should be requested from a potential customer seeking Chip Processing and/or Coolant Reclamation equipment.

1. Type of Material.
    a. This would include a description along with material property specifications.
    b. It is advised to have pictures available.
    c. It is important to list all types of material to be processed, even if the properties vary slightly.
    d. This should also include disclosure of any tramp metals or objects in the material that could cause harm to machinery or impede the system's processing.
2. Amount of Material to be processed.
    a. This can be asked for in weight or volume measure.
    b. It can be given annually, monthly or daily but ultimately machinery capacity is based on hourly volumetric throughput.
    c. Most machinery is based on continuous feeding. If a system is designed for 1,000 lbs/day, then it cannot process 1,000 lbs at the end of every shift in 1 hour and be idle the remaining 7.
3. Type of Coolant.
    a. If it is oil, this description should include viscosity and/or type.
    b. Solubles are typically not described in depth but if the desired outcome is a CLEAN (as opposed to just dry) chip then this information will be very important.
4. Method of Transport
    a. The method in which the chips are transported within a facility.
    b. The method in which the chips are introduced into the Chip Processing System.
    c. The method in which the chips are discharged and prepared for pick-up by the scrap dealer.

These are basic and fundamental pieces of information needed to generate an accurate quotation for your application. If a supplier does not ask these questions (as a minimum) you should discount any quotation given to you by them. The price cannot possibly be accurate.

If a lack of seriousness is detected on the part of the customer for some reason, the quotation will reflect that. This is quite understandable when you consider suppliers can generate anywhere from 10 to 20+ quotations for each sale made. All of the costs involved with the quotation are absorbed by sales. Those that purchase this equipment would probably rather not have to pay more for, and wait longer for quotations because of inquiries that lack an investment of time by those that request pricing information.

The same can be said from the opposite direction. If you have taken the time to provide complete information then the quotation should reflect that. If you feel it does not, question it immediately. Businesses are operated by humans, and humans make mistakes and commit oversights.

In some instances, you may be looking for budgetary numbers that would give an idea as to whether or not a system is justified. In this case, it is acceptable to receive a quote with little information that may have a certain degree of accuracy, but not priced in a way that is tailored to your specific application. This must be understood for what it is. The price can fluctuate drastically with increased or added requirements.

As the proposal stage continues, the information should be more in depth. If the supplier detects enough sincerity or intent by the customer they will offer to send a knowledgeable salesman to your facility to evaluate your application and arrange for you to send chips to their facility for testing. In addition, it could be very helpful in understanding the equipment if the supplier attaches a diagram or flow chart of the system.

The testing of your chips is a very important stage. Any supplier that is worth considering will insist on testing your chips. Now, I have in the past seen applications where I could look at the chips and deduce that there should be no problem processing them with carefully selected machinery but, this still leaves open possibilities for problems that cannot be seen without actual testing. As a customer, unless the supplier could convince me of an identical application successfully addressed with their equipment, I would insist on a test that generates a documented (detailed) result.

I will now include a story for you in order to highlight the importance of testing and application engineering.

I was doing a sales call for some chip processing equipment. On the shop floor of this customer, I was reviewing some equipment I had in mind. I told him he needed a Crusher/Shredder. He said; I have one let me show you. So, we went to the spot on his floor where I saw a brand new (looking) machine. He said; there it is and it doesn't work. I asked him why, his answer was that it worked for a week, and then broke the gearbox. He had the gearbox replaced and soon after it broke again. He said he will now scrap it. It cost over 100k USD (plus repairs) and there it sits, taking up space. His quote to me was "I got a bit of egg on me face for this one" referring to overseeing the purchase. I was very bothered by this because it took me all of 5 minutes to determine that this was not the right piece of machinery for the job. At the same time, I became frustrated that now my advice may be seen as a sales pitch without concern of the customer's actual needs.

Unfortunately, this is not the only time I have had experiences similar to this one. If you think for a moment that a supplier would not sell you something that doesn't work, you are not being realistic about the task you have been charged with. Whether by mistake, incompetence, or pure greed, it can happen to anyone. The fact is, more than likely, you do not possess the experience that would give you the foresight to avoid something like this.

That being said, it is not the intent for a supplier to have such a failure. There are times in which it is the fault of the customer for not providing accurate information. In addition, suppliers are only as good as the people they put in charge of certain tasks. People make mistakes. When mistakes are this big, suppliers and customers will typically be in conflict as to the origin or cause.

There may be instances where problems arise after commissioning of the machinery. This is the nature of the beast. At times, it is helpful to step back and take a look at the task that you are asking this machinery to perform. Sometimes, it is a difficult task and will require caution, questioning, and patience to get it done right.

Chapter 3 – Machinery Overview and Selection

As you may have already concluded from previous chapters, this is by far the most important part of this project. It may seem obvious, but you do not want to have a budget that does not allow you to properly address your application. A system can be designed to save money, but it is not wise to compromise your objective to a degree that reduces the systems effectiveness.

The following machinery will be reviewed in this document:

1. Conveyor
2. Screener
3. Crusher
4. Centrifuge
5. Briquetting Press
6. Coolant Tank

It must be noted that Chip Processing Systems are not limited to these components or need all of these components. This is a general overview provided to address the majority of applications. The *information* listed is for the majority of applications. It is not possible to address all applications without compromising the intent of this document, which is to provide a manageable amount of critical information to give a basic and initial background of chip processing knowledge.

It should also be noted that I do not make reference to a machine's durability or structural integrity. Most of these machines are built with a "heavy-duty" mentality. Also, the description "heavy-duty" is relative and subjective. It would be wise to do research; a manufacturer's reputation for quality should be strongly considered and investigated.

Prior to listing the components with detailed information, there are some system features that should be looked at and apply to all components.

1. Overall Size of system.
    a. The layout of a system can be the most important part. You may not have the room for the machinery you need. It is not wise to compromise in this matter. There is always a solution and be certain the solution is best for you and not the manufacturer.
    b. Be sure the dimensions are meticulously reviewed for fitting in available space. An error in this stage can cost tens of thousands of dollars to fix.
    c. Installation and erection of system must be heavily considered. As much foresight as possible should be given to this. There is nothing worse than having to put holes in walls because you cannot get the machinery in place where it needs to be.
2. Access to all components.
    a. Most of the machinery will need preventative maintenance.
        i. Lubrication Points.
        ii. Replacement of wear items.
        iii. Will access platforms be needed?
    b. Machinery at some point will have major components replaced.
        i. Belting/Augers for conveyors
        ii. Major parts of components that will need more than human effort to lift out and replace.
3. Safety Requirements.
4. Total energy consumption.
5. Periodic service requirements to be done by manufacturer.

Part I- Conveyors

I think of conveyors as the "intermediate" pieces of a system. This is what is used to get the chips from one machine to the other for processing. Even though their importance should not be overlooked, they rarely have impact on the outcome of a processed chip. Now, that's not to say that they will not have an impact, I'm simply saying, if the correct conveyor is chosen; the other machines will then be 100% accountable for their performance claims. If the wrong conveyor type is selected, or wrong feature works its way into the design, it can have a profound effect on the outcome. I guess you can say the conveyor gets the thankless job. If all is well it gets little praise, but can be subjected to a lot of finger-pointing if something goes wrong.

In general, there are many types of conveyors. The following is a list of conveyors normally used in Chip Processing Systems:

1. Steel Belt Conveyor
2. Drag Link Conveyor
3. Screw Conveyor
4. Rubber Belt Conveyor

5. Pneumatic Conveyor

Each conveyor type will also have multiple features which will allow it to address specific requirements.

We will take a brief look at each one and their common uses.

Steel Belt Conveyors (SBCs) are used for the transport of broken chips and long, stringy chip nests. They are also ideal for use as a loading stage to introduce and meter chips.

Advantages of Steel Belt Conveyors:

1. Versatility. Can range significantly in size. Length, width and height can vary a great deal.
2. Can be used for impact loading.
3. Allows for liquid to drain during transport.
4. Effective tool for metering chips within a system
5. Heavy-duty, and can be made to withstand abuse.
6. With proper maintenance, can last for decades.

It must be understood that nearly every feature of a Steel Belt Conveyor will have a profound impact on its effectiveness. Here are some common features which need to be considered in order to ensure proper selection:

1. Belt specifications.
    a. Thickness of pan.
    b. Thickness of side bars.
    c. Cleat height and spacing.
    d. Skirting and top covers.
2. Drive specifications.
    a. HP and output torque.
    b. Speed of belt.
3. Loading area.
4. Infeed hopper along with discharge chutes.
5. Incline of conveyor (angle of repose).
6. Containment of fluids.

This is by no means a complete list, but is certainly a good framework to get started. Only someone with extensive experience in designing and quoting conveyors will have sufficient skills to select not only the correct conveyor, but the correct features to ensure the smooth transport of chips within a system.

Drag Link Conveyors (DLCs) are very similar to SBCs. The roll of DLCs is limited compared to SBCs but the advantage is in the cost. Quite simply, drag link belting can be made for much less cost than steel belting.

In comparison, it is much simpler to first review what a DLC cannot be used for as an alternative to a SBC. When deciding on one or the other, these are some factors to consider:

1. Cannot be used for a loading area that includes batch dumping.
2. Cannot be used for long, stringy, nesting chips.
3. Should not be use in applications with excessive amounts of "tramp" materials.

For the most part, outside of the above mentioned restrictions, DLCs can be used in a multitude of applications similar to SBCs and have many of the same features and qualities.

Screw Conveyors, also known as Augers, are also used in many applications similar to SBCs. The one feature that stands out with a Screw Conveyor is strength.

An advantage of Screw Conveyors is they are a good choice for being used in a loading area with broken chips. There are times when it is necessary to have an infeed hopper able to hold many hours worth of processing. If this material has a high specific weight (lbs/ft^3), then the conveyor must be able to move with tons of material on it. A screw conveyor is normally the best choice due to its HP: Torque ratio. Much like our understanding of screw threads being used for pressing or pushing; the Auger of a Screw Conveyor can be put in seemingly impossible scenarios with success.

Rubber Belt Conveyors would be considered when more corrosive chemicals are involved and would not be subjected to the same corrosion affects that steel would be. This is the primary standout feature in the case of Chip Processing Systems.

Pneumatic Conveyors are a transport system which involves air pressure (positive or negative) for transporting chips through pipes. This can have many advantages:

1. Very long distances (for transporting to and away from processing equipment).
2. Very clean operation.
3. Minimal space requirements.
4. Multiple stations throughout a facility.

Given the advantages, there are applications where pneumatic transportation cannot be used. Here are a few factors that disqualify any consideration of pneumatic transport of chips:

1. Wetness. Chips should be under 20% moisture content for successful transport.
2. Long strings or nests cannot be transported this way. Chips must be 100% broken into "shovel grade" or finer.
3. Foreign objects cannot be mixed with chips.

Part II – Screeners

In many cases, it is very important to remove "tramp" metals or objects from a CPS. If the tramp objects are infrequent and less destructive, it is possible to have a system without a screener. However, is very important to understand that some machinery is not capable of continuous operation without the segregation and removal of tramp metal objects. In some cases, proper removal of foreign objects has been the primary attention of engineers for a successful processing solution.

It should be noted that there are two principal ways of removing (screening) objects from a system:

1. Grating at the infeed hopper can be used to filter out large (and small) objects. The following should be kept in mind:
    a. The openings in the screen must be carefully selected to allow material to pass through and keep larger objects out.
    b. Objects screened out will need to be removed manually.
    c. An eccentric motor (attached to grating) will need to be mounted to facilitate material flow with a vibrating action.
    d. This feature can only be used with broken chips and not with long strings and nestings.
2. Vibratory Screeners are used as stand-alone components integrated to intercept the flow of chips, remove larger objects including chip nests, and divert them to a separate container. The following should be noted:
    a. These components are indispensible for the protection of some machinery.
    b. It is important the screen "type" be selected correctly.
    c. It is beneficial that the screen be able to rotate away from machinery which requires regular maintenance or repairs.
    d. Screener testing is advisable prior to deciding on type.

Part III – Crusher/Shredder

If the chips from a machining operation are long, stringy, or form nests (large or small), a Crusher/Shredder will be needed to reduce the chips to a broken (shovel grade) consistency conducive for transport and coolant extraction.

The Crusher/Shredder can also be used as an infeed device for a system by receiving batch dumps and metering them (after breaking) to the next component.

There are a number of available Crusher/Shredders on the market. Many different sizes and types are available to address the multitude of applications out there. First, I will list the most used types in the chip processing arena:

1. Vertical Shaft.
2. Horizontal Shaft (double shaft).
3. Horizontal Shaft (single shaft).

We will take a look at some of the features individually. Although all three have advantages and disadvantages to one another, it is a vital component in a CPS and can dictate the success or failure of the process. If you have all the right equipment around the Crusher/Shredder but the wrong Crusher/Shredder selected for your application, the system can be rendered useless. It may sound like a strong statement but I have seen and heard testimony to its accuracy.

Vertical Shaft Crusher – (or VSC) gets its description by having a vertical shaft driving the cutters and grinders and is vertical in nature as it relies heavily on gravity for throughput. There is a pulling (down) action created by the cutting that is working in addition with gravity to maintain material flow.

Advantages:

1. One of the main advantages of VSCs is the precise and defined chip created with the crushing process. By way of selecting internal components and making adjustments to cutting, the VSC can be tuned to cut a variety of chip types and maintain a consistent finished cut chip.
2. Many VSCs come with an effective "tramp metal removal" feature. Although no machine can claim 100% success in this area, the "ejectors" built into these machines have been proven to save many customers a lot of time and resources.
3. Can be driven by Mechanical Gears or Hydraulic Pressure. Hydraulic Pressure drives can have more upfront costs, but if an excessive amount of tramp metals will be processed, they can prove invaluable.
4. Can be used as an infeed component by receiving batch dumps of materials (according to hopper size) and affectively metering the crushed chips as it feeds the next component in the processing system.
5. Replacement of knives and blocks in the initial cutting stage can be done relatively quickly.

Disadvantages:

1. Larger throughput requirements can cause for a large (taller) crusher that will require a lot of vertical space to incorporate into a system.
2. Relies on gravity as the main influence for material flow. This can prove to be an encumbrance in the case of very light chips.

Horizontal Shaft Shredder (double shaft) – (or HSS) gets its name from the two horizontal adjacent set of teeth (grinders) which pulls material by grabbing and forcing it between the grinders that are rotating in opposing directions.

The HSS has some similar advantages to the VSC and some that are unique.

Advantages:

1. Does not rely on gravity for feeding.
2. Can be driven by Mechanical Gears or Hydraulic Pressure. Hydraulic Pressure drives can have more upfront costs, but if an excessive amount of tramp metals will be processed, they can prove invaluable.

Disadvantages:

1. The cut chips are not precisely defined; and nestings/long chips can come out as a product of the shredding. Modifications can be made to improve this but compared to a VSC this will be listed as a disadvantage.

2. Replacing a broken tooth (cutter) can be very involved and time consuming.

Horizontal Shaft Shredder (single shaft) –gets its name from having a single rotating shaft (or drum-like) with cutters attached. The cutting action comes from the tooth profile matching a profile fixed onto the frame. These crushers are typically used in lighter duty applications.

Advantages:

1. Small and compact.
2. Can produce a very defined and consistent broken chip.

Disadvantages:

1. Limited in application use.
2. Tramp metals *can* cause big problems and significant downtime.

Part IV – Centrifuge/Wringer/Spinner

This is often considered to be the heart of the system. In many applications, this is the component that everything is designed around. A Centrifuge (as the name implies), relies on centrifugal force to extract coolant from chips. The following are some criteria most influential in determining what is needed for your particular application:

1. **Chip Dryness** – this is often the most important point.
    a. The drier the chip, the more valuable it can be. Some recyclers require very dry chips (less than 2% moisture) in order to pay a premium on scrap.
    b. Reclaimed coolant results in less purchased coolant.
2. **Machine Type** – there are many different types of centrifuges. These machines have very different methods of processing. Although there may be similarities, the differences are more important when considering them for a particular application. Here are some common types we will review in depth later in this chapter:
    a. Parametric Bowl.
    b. Lifting Bottom (push bottom).
    c. Pneumatic Discharge (wring-and-fling).
    d. Batch (manual loading).
3. **Size** (typically indicates bowl diameter) – This will dictate the amount of material that can be processed within a given amount of time.
    a. Important to know maximum and average throughput claimed by manufacturer.
        i. This can only be known with 100% accuracy after testing.
        ii. Test results can only be accurate if the simulation contains chips (with coolant) representative of a customer's actual material.
        iii. Test should also consider proposed method of delivering chips to the centrifuge.

4. **Discharge Method** – Depending on the layout of a particular facility this can be a major factor. Although the dryness requirement will typically dictate the type, if all are adequate, other types of centrifuges can save or cost more money in designing the system.
5. **Maintenance Requirements** – Due to the nature of this application, careful consideration should be taken in the area of maintenance. A machine that is easy to work on or maintain will cost far less during the life of operation.

The following is a review of advantages and disadvantages of the types listed above:

Parametric Bowl Centrifuge – This is basically a bowl that spins which contains holes or a sieve for coolant to exit. Gravity is the force used for feeding and discharging chips.

Advantages:

1. Simple design and function with fewest moving parts.
2. Minimal space requirements.
3. Minimal energy consumption.

Disadvantages:

1. Dwell time cannot be controlled and has no influence on chip flow.
2. Exit area for coolant (screen inside bowl) is normally not as generous as other centrifuge types.
3. Chip flow is entirely dependent on how the chips enter the bowl. In the case of a chip that does not flow consistently or uniformly, the Parametric Bowl will offer no relief.

Lifting Bottom Centrifuge – has a bottom plate that acts similar to a piston and pushes the chips over the sieve for coolant extraction and chip discharge. Gravity is the force used for feeding and discharging chips.

Advantages:

1. Dwell time can be controlled, therefore giving the possibility of a very dry chip.
2. Lifting Bottom acts as a cleaning action to keep material flowing even in stubborn applications.
3. Sieve (Screen), for coolant exit, is typically very generous in area allowing for efficient extraction.
4. Because of the increased area for coolant exit, there will be fewer problems with blockage.

Disadvantages:

1. Considerably more moving parts than other types.
    a. More wear parts.
    b. Better access needed.
2. Will consume more energy than other models.

Pneumatic Discharge – also known as a wring-and-fling (wringer) uses a combination of gravity, centrifugal force, and air pressure for the flow, coolant extraction, and discharge of chips respectively.

Advantages:

1. Sieve (Screen) for coolant exit is typically very generous in area allowing for efficient extraction.
2. Discharge air pressure also creates a "negative" pressure allowing for a tramp metal removal device preceding the wringer.
3. Pneumatic Discharge allows for a multi-directional discharge of chips to containers without the need for additional conveying components.

Disadvantages:

1. Dwell time cannot be controlled and has no influence on chip flow.
2. More difficult to keep balanced.
3. The nature of transporting chips (and occasional parts) through pipes can involve dangers if something were to escape the discharge piping.

Batch Centrifuge – is probably the oldest and simplest form of removing coolant from chips. Typically sold as stand-alone units requiring manual loading and unloading.

Advantages:

1. Minimal space requirements
2. Minimal moving parts.
3. Dwell time can be controlled therefore giving the possibility of a very dry chip.
4. Can process a variety of chips without regard to material flow.
5. Can be used to *clean (rinse)* chips and *dry* them as additional processes to spinning out coolant.

Disadvantages:

1. Very labor intensive if stand-alone unit is purchased.
2. Very low rates of throughput comparable to continuous feed types.

There is no shortage of parameters to explore when selecting the type of Centrifuge for processing your particular chips.

PART V – Briquette Press

A more recent addition to metal chip processing; this is the process of pressing broken chips into a solid (85-90%) and squeezing out the coolant. This is achieved with hydraulic pressure and molds designed for a variety of briquette shapes and sizes.

Advantages:

1. Space saving. The reduction of volume can be over 90% therefore saving in the following ways:
    a. Less space needed on shop floor for storage.
    b. Reduced number of pick-ups by a scrap buyer.
    c. It can be more viable to ship/sell scrap much further distances.

2. Single machine system. Many times, a manufacturer can have a single machine unit as a turnkey solution. This eliminates the need for multiple machine components to create a system.
3. Some smelters will pay more for chips in a briquette form.

Disadvantages:

1. Chips must be a relatively consistent size (small) and cannot contain tramp metals; otherwise, severe damage to the machine can result.
2. Can cost double or more (pound for pound) vs. centrifuges to reclaim coolant from chips.

There are a host of additional considerations to take before the purchase a Briquetting Machine. The very first thing that must be done is to determine who will buy these briquettes. I will give an example from personal experience that goes to the importance of this statement.

Some time ago, when I was selling chip processing machinery, it occurred to me that I could make some additional money in my shop by utilizing the test equipment. By securing a small contract, I could process some chips and make some money with the investment already made on test equipment. One of the first things I wanted to know was if it would benefit me to have a Briquetting Machine. I spent dozens of hours talking to scrap dealers and smelters about this subject and was very surprised in the range of answers I received.

I had a booth at a well-known and large trade show. I wanted to use this opportunity to get a feeling for the general consensus. Within a one hour period I had two gentlemen approach my booth with interest in the machinery I sold. They were both smelters with large operations. I asked both of them the same question; would you purchase briquettes to melt? I received two completely polar opposite responses. One said he would never put a briquette in his furnace, the other stated he would put nothing but briquettes in his furnace. It is pretty clear that some furnaces are made for smelting briquettes and some for loose chips.

I also spent dozens of hours researching on the internet for testimonies about experiences with briquetting machines. I found some that were very positive and some that were very negative. The fact is, it doesn't matter if one person has a bad experience if it is the right choice for you. This can be true in the opposite scenario as well.

Part VI – Coolant Tanks

When the coolant is removed from chips, it must be considered where this coolant will go and how it will be reused.

The following is a list of questions I would ask myself in order to determine what will be needed to reuse the coolant and the features which will need to be incorporated into the design of a tank.

1. How much coolant is expected to be coming from the chips?
    a. From the Centrifuge.
    b. From the loading area (if initial gravity drain is required).

2. Will the coolant contain a large amount of very fine chips (sludge) which will need to be separated from the coolant before being filtered?
    a. This will determine the shape and size of the tank.
    b. This will determine if the tank will need features for automatically dealing with the sludge from the extracted coolant.
3. Will the coolant need further filtration to be reused?
4. What is the distance from the collection tank on the Chip Processing System and coolant supply or filtration area?

The coolant tank is something that may not get as much attention as other components of a system, but if a tank is poorly designed, it can profoundly influence the effectiveness of a system.

CHAPTER 4 – Conclusion and Final Suggestions

In this Quick Guide, I have discussed some hard facts about Chip Processing. It must be understood that every manufacturer you contact will have the goal of selling machinery. Some will be more honest than others but they are not in existence to give free advice. This is not to say that you will not get some good advice or information from them, but each manufacturer of CPSs will have success stories for their products and their competition will have horror stories to counter. As you can imagine, the truth is that neither party can give you an unbiased opinion.

Since I no longer sell Chip Processing Systems or machinery, I can apply my knowledge and experience in giving my customers an unbiased recommendation and opinion. I have no alliance or allegiance to any manufacturer of this machinery. It is my opinion that they all have good equipment and that's why they are in business. You simply must perform due diligence to be certain you are one of the success stories and not one of the unfortunate cases.

If you are interested in purchasing our services, we can be found here: www.klingerconcepts.com