Trey: Hello everyone, and thank you all for joining us today. Today's webinar "How to Choose the Right Purge Compound For You" is presented by Sun Plastech. Your presenter today is Eric Procunier.

Eric is the product development manager for Sun Plastech, the manufacturer of ASACLEAN Purging Compound. Eric joined the company from one of the world's leading custom blow molders where he held several positions in engineering and managerial over the years. He was experiences with various blow molding applications and is widely considered to be a leading expert in the development and usage of purging compounds across all applications. He holds a Bachelor of Science in Plastic Engineering from Ferris State University and an MBA from Northeastern University.

My name is Trey McDonald with you all and I'll be moderating today's event. You can send us your questions by typing them in the question box that's located on your screen and our panelist will answer them at the end of the presentation. We are recording today's event and we'll send you a link by e-mail when the slides and video have been posted to the UL Prospector Knowledge Center. With that, let's turn the presentation over to Eric. Eric.

Eric: Thanks, Trey. Good morning, everyone. So we will discuss "How to Choose the Proper Purging Compound For Your Application Today." As Trey mentioned, I come from Sun Plastech. We are the sole distributor and sales arm of Asahi Kasei for ASACLEAN Purging Compounds in North and South America as well as Australia.

Asahi Kasei is a global company located, stationed in Tokyo, Japan. Asahi owns many different types of companies including building materials, healthcare and performance plastics. I am part of Sun Plastech as part of the performance plastics division as well as Asahi Plastic North America, also known as APNA located in Fowlerville, Michigan, their sister company, and they manufacture many of our ASACLEAN Purging Compounds here in the U.S. So with that, I will begin.

So what are we looking to do here? With purging compounds, we want to use purging compounds to gain a competitive edge, of course. You know, we want to be able to produce more parts per hour, we want to lower production costs, and we want to reduce machine time. So there goes three key areas. That's how you're going to gain an edge against your competition, much of your competition may be already using purging compound. So you want to at least get to that level and hopefully exceed.

So why do we need purging compounds in the first place? You can see on the illustration below. What we're representing here is that over time, you know, if you start with a clean screw, you're going to have material. As soon as you start running it through, you're going to start forming a skin on those hot metal surfaces. You know, after you purge out and move on to another color or another resin, the next material, all it's going to do is layer over the first. Virgin and scrap resin, they can't effectively remove previous resins. Once you get that skin on there, it adheres to the metal. It has affinity for the metal surfaces, and the next resin just simply can't get everything off. You might get most of it out, but there will be remnants of it, and then you're just going to layer over top. And as you layer over it, you're basically sealing it in, allowing it to decompose, eventually all plastics will decompose to carbon, being that they are carbon-based. And then over time, that carbon is going to be released into your product stream at the most inopportune times generally. And it can also create for difficult start-ups if you're shutdown for the weekend or for a PM. So what we want to do is, you know, prevent that layering, address that layering as early as possible in the process.

We have an example here of natural ABS at 460 degrees Fahrenheit. You can see after 15 minutes under heat, you've already begun degradation. You have that light caramel color, oxidation is occurring. And at that stage, you're already going to be sticking, adhering to your metal surfaces within the screw and barrel, downstream equipment, manifolds, dies, etc. After 30 minutes, you know, the process is continuing quite quickly, only 15 minutes later you can see a heavy darkening of the material. You know, as we darken, the affinity for metal is increasing preferably. Then after 60 minutes, you can see, it's fully carbonized. At that point, it's going to be stuck to the metal surfaces. It has that affinity because, you know, essentially your screw and barrel, they're all metal, steel, so carbon-based, so you know, degraded carbon is going to absolutely want to stick to those surfaces. And then it becomes very difficult to get off, as I'm sure you've seen when you've done a screw-pull and people have to take, you know, wire, wire wheels affixed to drills or scrub it by hand to get that, you know, that carbon and those deposits off the screw and barrel.

Here, we're again showing that the ABS at 460 degrees Fahrenheit. In this case, you know, many people believe, you know, if you're going to be down for a short period of time, just kill the heat, or if you're going to be down over a weekend or a holiday shutdown, but what we're showing here is that even shutting the heats off, all those metal components were chain heat for a long time, hours. And you can see after one hour, you begin, you know, getting that caramel color, you're starting to oxidize, adhering to the metal surfaces. So, you can see it along the flights as well. You know, that's where it can become the most difficult to get it off is along the flights.

After five hours, that process has continued. So even after one hour without the heat on, that process is continuing, the decomposition is continuing. And then, you know, Monday morning, we go to start up, we're going into polystyrene for the next job. You run some fresh polystyrene through. You can see it gets a good amount of that layering off but, you know, especially along the flights, you can see some of that contamination is still present. That natural polystyrene, as viscous as it is, still can't get everything off. Now, imagine you know, a less viscous material, a nylon for instance, is going to have an even harder time getting that decomposed material off.

And the right side, what we've done is what we call sealing, where we fill the screw barrel downstream equipment, you know, whether it's a hot runner for injection molding or a die, a melt pump, you know, blow molding head, you know, whatever downstream equipment you have. We fill it with the heat stable purging compound, and what that does is it seals the machine. You know, it helps keep oxygen out, keep oxygen off those metal surfaces. And essentially when you start up Monday morning, or after your layoff or after your PM, the purging compound has cleaned before you shut down, and it hasn't decomposed, you know, as the machine gives off that heat over that 1 hour, or 5 hours, 10 hours. So you start up with a nice, clean screw, you're ready to go, you don't have, you know, those long, difficult start-ups that you may be running into after long shutdowns. So you're getting right back into production a lot more quickly, you're making good parts right away. So you know, this is again is what we call the shutdown and seal. It's an important aspect of, you know, using purging compounds and it's really a maintenance purge.

So maintenance purging is something that we strongly recommend. You know, what it does is it attacks those deposits in their beginning stages. You're getting at them before they have a chance to really settle in and fully carbonize. In this case here, we show that, you know, purging with a good purging compound, you can get those deposits off. You know, those look like pretty stubborn deposits, but we'll still be able to get them off through just purging and without having to pull the screw. And if you can do that before you shut down or if you can do that, you know, even regardless of whether you're shutting down or not, you know, if you're in a long production or maybe you pull out for 15 minutes, run some purging compounds then get back into production, and you know, you're going to avoid getting that contamination that you're possibly running into during long production runs.

So here, we have a visual representation of what I'm speaking about of getting at those deposits in the early stages of formation. At the bottom, in the pink area, you know, that's the area in which the next resin, you know, not a purging compound necessarily, but just the next resin can remove deposits. And temperature-wise, it's hard to say because temperature is different for every resin, so it's more of a conceptual representation, you know. That's going to be a pretty low temperature range, you know. Running the next resin, as I said, it's not going to effectively over time remove deposit. So what you're doing there is you're hoping that you can get at them before they settle in.

The blue band across the middle is where deposits are beginning to form. So if we go up that dotted line, you know, that parabolic state there, as you climb, you go through that deposit formation stage. And then, you know, as you keep adding heat, your degradation is progressing. And once you get out of that blue band area, then you're basically you're too far gone as far as the ability to purge, you know, to purge the carbon out with even a commercial purging compound. You can get to a point that your, you know, that your contamination is so that you really have no option except to pull your screw or pull your tooling apart, or send your hot runner to the manufacturer to disassemble and clean by hand. So again, what we really want to do is we want to get at that contamination in the early stages in that blue area or below.

The green line is showing, you know, what we call maintenance purging. So you run for a while, you purge, you run for a while, you purge, you know, with the idea of always staying within that blue band or below so that we never get to the point that, you know, we have no choice except to pull the tooling apart to clean manually.

Now the red arrow solid line shows sealing purging. So you know, if you're running, you know, one or two shifts and maybe you shut down for third shift, or if you run five days a week and you shut down for weekends, you can get away with, you know, just running a sealing purge for doing a shut down, starting back up, running all week, do the same the thing the next weekend, or sealing varying job changes, things like that, can have the similar impact where you're actually doing the purge, you know, as part of the seal, so it access both the maintenance purge as well as a protective measure to keep that, you know, that contamination from adhering to your metal surfaces.

So what are we talking about when we say commercial purging compound? You know, we often refer to them as CPCs. We're not talking about, like I said, before production resin or regrind. I've seen metal polish added to resin, water, Tide, even Coca-Cola, any number of things that, you know, that I've seen people, add the resin or put into a feed in place of resin to help dislodge contamination and, you know, help with purging. But what we're talking about here, commercial purging compounds or CPCs, here are engineered compounds. They contain a base resin and then other additives that are used to clean the screw, barrel, downstream equipment, but also at the same time to help their additives that help you get the purging compound back out. It's no good if you can clean out the first material but then you can't get the purging compound out. So you know, you want to be able to purge and then purge and purge.

The two main types of commercial purging compounds are mechanical and chemical. There are others like liquid or detergent purging compounds, but they represent a very small market share. So mostly what you're going to come across are mechanical and chemical, so that's really what I'll speak about today.

So mechanical purging compounds first. Most mechanical purging compounds rely on shear force and differences in viscosity. So essentially what you want to do is you're letting the screw do the work for you. It's shearing material off the walls, off the surfaces. And then the differences in the viscosity, you're running something more viscous behind your production material, and it's going to help drive it out more easily and help kind of scrub things off the metal surfaces. Some mechanical purges also rely on material affinity. So that's kind of a double-edged sword there. So they have an affinity for the carbon, the resin that you're trying to remove, but they also lack an affinity for the metal surfaces. So your purging compound is not adhering to the metal surfaces which would be counterproductive. So you know, it's helping you in addition to the shear and the differences in viscosity, it's helping you to pull material out of there without leaving the purging compound behind.

Some key characteristics of mechanical purging compounds, there's no chemical reaction. There's no soak time which is the amount of time that you would leave a purge inside the screw, barrel, hot runner or whatever, dies, etc. Mechanical purges work across a wide range of applications, and again we're using the machine power to do the work itself.

Chemical purging compounds act differently. What you're doing there is you're experiencing the chemical reaction inside this one. That's the heat-based reaction. The goal there is to break chemical bonds of the contaminant and of the production resin that you're trying to remove. And what that will do is basically reduce the viscosity of the material and help, you know, push it out, get it out of the tooling. Soak times are required with chemical purges, anywhere between 5 and 30 minutes. The reason that you're soaking is because the heat is what's causing the chemical reaction. So the hotter you're running, the less soak time you need. Conversely if you're running at lower temperatures, maybe in a 20 to 30-minute range on soak time. So it's something to keep in mind. Often foaming agents are added. These foaming agents will allow the compounds to get into low flow areas. So areas of, say, a very large sheet die to get out to the edges there where a mechanical purge might have trouble getting out there or might be less effective.

So we want to, you know, the basics of commercial purging compounds, you know, again that is kind of what we what talked about earlier is periodic purging. You want to basically purge before contamination begins to affect your process. We want to purge it. Shut down, we want to seal the machine and we want to watch for diminished performances and adjust accordingly. So there's really no, you know, there's really no way for me to tell you how often you're going to have purge because it's completely dependent on your process, and everyone has different combinations of temperature process and conditions and materials. So you want to use your performance numbers to adjust accordingly, things like scrap rate and changeover times, that sort of thing.

We want to correct screw-pulls. It's a critical aspect of using commercial purging compounds. You can see the picture on the right there. Someone's using a wheel on a drill to clean and polish the screw. You know, the sparks flying off, there are material, whether they're from the bit or the screw itself, hopefully they're from the bit, and that's what's wearing. But you know, over time, this is going to, you know, wear your screw down. And if you have plating or special alloys that are coating the screw, you know, it's going to be far more difficult to keep that erosion of those platings from occurring when you're manually scrubbing at the screw. So we want to avoid screw-pulls as much as possible. Periodic purging will help you do that.

So let's get into the meat of the presentation. We want to help you identify what type of purging compound is going to be right for you. So we'll go through these six different types of molding and extrusion operations and address each of them accordingly.

Injection molding, standard injection molding for color and material changes, mechanical purges are preferred. You're able to generate high pressure in injection molding machines, and this pressure, high pressure, high speed area is what's required for mechanical purge. Mechanical purges tend to be less expensive and you don't have soak times, so you want to use a mechanical purge, unless there's a compelling reason not to. So in injection molding and in standard injection molding processes, a viscous base resin with or without a cast acrylic, they're generally acceptable and they're the most cost effective alternatives to scrub the contamination off your tooling.

For heavy contamination, you can work to glass-filled and acrylic grades. They're going to help to, you know, scrub more of that contamination off the surfaces. With these though, you want to be aware of tight tolerances. You know, if you have, you know, a small gate or something like that, you need to be working with your supplier on what's the type of tolerance I can run this material through. And that's a really good rule of thumb for any purging compound.

For hot runners, you don't want to use a glass-filled or acrylic grade. The worst thing you can do is get fiber agglomeration outside of a hot runner gate. It's going to be extremely difficult to get out. Similar with acrylic, you know, the whole idea of using cast acrylic is that you get some un-melted material coming through, so the last thing you want is a chunk of acrylic setting up inside your hot runner. If the manifold is well-designed, mechanical purging is great. If it's poorly designed where you have some dead spots in there, then we want to start to look at chemical purging compounds, or glass bead-filled mechanical purges are also effective. Chemical purges will weaken the chemical bonds and the contamination and generally expand in the low flow areas. So that's when, you know, again I said it, if you have a compelling reason, then it's good to try to switch from a mechanical to a chemical purge.

So you need to know the smallest restriction in your hot runner, make sure you're using a purge that's rated for that restriction, whether it's the gate or any other characteristic is generally the gate that's the smallest restriction within the flow. It's also good that you can do it to increase your manifold temperatures. We'd say generally 50 degrees Fahrenheit prior to purging. What that will do is that will help dislodge contamination and also help improve flow through the hot runner. But if you're using a heat-sensitive resin, you know, you certainly want to make sure that you're staying within the upper recommended usage temperature. So we don't want to increase by 50 and go into an area where we're decomposing and being counterproductive.

A simple extrusion, we know there really are no simple plastics processes. What I mean by simple extrusion is, you know, profile type dies for pipe, for cable extrusion systems, for siding, things that are, you know, fixed cross-section I would say. For these types of extrusion processes, mechanical purges are often preferable. Again, you know, because there's limited areas of low flow, and you're not generally an ability to generate a good amount of pressure within the system, especially if you can rig the spring path or break a plate in place, that will help increase pressure, and mechanical purges are going to be quite effective in that environment.

So in simple extrusion, you want to get a strong cleaning purging compound such as glass-filled, in some cases stiff base resins like styrenic bases make for good purging compounds and extrusion. Keeping screen packs in place will again help to maximize pressure, create a high pressure environment, but you want to make sure that the grade is designed for, you know, again we're talking the smallest restriction in your system. So how tight a mesh is that spring path. You know, if it's too tight then we're going to have to take it out or use a different purging compound.

There are also mechanical grades in the market that have foaming additives. So there's no soak time, but you're getting some foaming action which will give you some expansion into low flow areas, and this might allow you to use a mechanical grade with a larger sheet die where a purely mechanical purging compound may have trouble getting out to the corners, where if you have, you know, a melt pump or something along those lines, the foaming additive may be enough to help you. Compounding lines are often...you know, we recommend glass-filled grades specifically, and that's due to the heavy use of pigments and flame retardants. Additives that are very difficult to clean and that oil adhere to metal quite readily. Compounding lines are kind of a different animal. You know, they are a simple extrusion in that, you know, the strands of resin coming out are a profile, but again you want to make sure that you have something that's a very strong cleaner.

With complex extrusion, what I'm talking about here is talking about downstream equipment. So do you have melt pumps? Do you have melt pipes? Do you have very large or complex dies, areas of low flow? These are where chemical purges are going to be by far the best option for you. They're going to expand in those low flow areas. You'll get some attacking of the chemical or the carbon back lounge in the plastics. So you know, you get that dual benefit there. And that's really what makes chemical purges so good in more complex extrusion process. In the complex extrusion process, you want to pay close attention to your base resin viscosity and try to match it up with your production resin. So you know, if you're running a very viscous material, you're going to want a very viscous purging compound. Chemical purges are available with base resins ranging anywhere from linear low to high molecular weight-HDPE. They're generally olefin-based carrier resins. So you know, across the ethylene family, you can get a wide range of viscosities to work with.

Extrusion blow molding, you know, still extrusion but, you know, now our downstream again is getting complex. If you have a simple setup without accumulators, you know, just a regular blow molding head, you can often clean them effectively with a mechanical purging compound, especially one with some foaming agent added. They're off to get to the dead spots in the head. But the mechanical purge will allow you to not have to, you know, have that, you know, 5 to 30-minute soak time that's going to be required for chemical purges. Most mechanical purging compounds can also hold a parison so that's going to make for easier cleanup. You're not going to have purging compound in a spitting and foaming out of the die. If you can hold the parison, it makes cleanup that much easier. So that's another good reason to try a mechanical purging compound first. And then again, you know, the cost considerations.

Now when you have accumulators like you see for automotive parts, these accumulators are prone to becoming heavily contaminated. They're very low pressure environments. You'll have plastic sitting in there under heat for a large periods of time especially during shutdown. You generally aren't using the entire accumulator so that that often will, you know, give you areas where plastic just kind of sits and bakes on the surfaces. So in these cases, a mechanical purge with a glass-filled grade, the glass that, you know, the glass can really help scrub those stubborn deposits. There are also newer mechanical-chemical hybrid purges that are giving you kind of, you know, the best of both worlds in that and that you're getting a good scrubbing with the mechanical purge. You're also getting some chemical action but you're not getting long soak times. You know, you just tend to five-minute range as far as soak times go. So definitely at the lower end. Soak times are, you know, something that, you know, you experiment with, and obviously you could the least time required for your process, but generally the more cleaning you need the longer you're going to soak. These hybrid purges work quite well in extrusion blow molding.

Now extrusion blown film, you know, different animal again. You know, we're talking spiral dies, melt pumps, and many, many applications. So areas where, you know, you get low flow, low pressure, so the recommendation here is going to really be based on what your expectations are and the level of contamination. So if you're heavily contaminated in the spiral die, you're going to want to try chemical purge. Something that, you know, that you can leave it in there and that will really attack those carbon bonds, and it's also stiffing off. You know, most films are polyethylene and propylene based. So using a good stiff linear low or low density carrier resin is also recommended. As long as the contamination is under control and you're just looking to job change, color change or feel, you know, over the weekend or for a long downtime, mechanical purges are often sufficient and cost effective there. Again, chemical purges tend to be more expensive than mechanical on a per pound basis.

In here we're showing extrusion blown film. There are new grades on the market, mechanical purges that can actually hold a bubble. So if holding the bubble is critical for you and it's critical to your ability to rapidly change over, there are grades that are drop end grades that will allow you to maintain the bubble. You won't have to restring it, you won't have to take the amount of time that's required to do that. You just purge directly from your production resin into the purging compound and then into your next resin or color or, you know, whatever it is you're purging from into. So you know, these tend to be lower cleaning, you know, that's the trade off but, you know, you can usually strike a balance there. There are multiple compounds that are on the market that are designed for this. So you know, there's a variety of cleaning options as well.

In injection molding, the average industry scrap rate is about 3%. So you know, if you're a large processor and running let's say 25 million pounds a year, if you can reduce your scrap rate by just a half a percent, you know, you can save in the hundreds of thousands of dollars per year just in resin cost. That's assuming you're paying about 90 cents a pound. You know, it all depends on what resin you're running obviously. ASACLEAN Purging Compounds typically lower scrap rates 1% to 2% in injection molding application.

So I want to go through some tips real quickly here. Often we hear, you know, that purging compound costs too much. When you look at a per pound basis, yes, purging compound is generally more per pound unless you're talking about the super engineering resins like PEEK or the [inaudible 00:34:08] family of resins, then your resin is definitely going to be more expensive than the purging compound. What you want to look at is you want to look at the total effective cost of purging. If it takes you 50 pounds of, you know, a dollar a pound on resin to change over, but it takes you 5 pounds of purging compound that costs let's say

\$3 or \$4 a pound, you know, are you further ahead using the purging compound? Quite possibly.

So you want to look at the savings obtained from using an effective purging compound and generally they will outweigh the cost. If not, then you're fine doing what you're doing. But you know, in the long run you're generally going to find if you find the right purging compound for your process, that you're going to be able to reduce machine downtime, scrap, reject rates, all those things are going to lead to greater productivity, and of course corresponding process.

All right. Here's an example for the compounders out there. Most compounders are extruding 4,000 to 10,000 pounds per hour depending on machine size and whether you're running a polypropylene or, you know, let's say a more complex styrenic-based PPE styrene blend, something like that.

Typical margin in compounding industry is about 20 cents a pound. So one hour downtime is equating to anywhere from \$800 to \$2,000 of lost profit in opportunity cost. That's for each hour that you're down. So the screw-pull takes 2 to 4 hours, now you're looking at up to \$8,000 of lost revenue during that screw-pull because you're not making good product. Screw-pulls also require manual labor, abrasive cleaning materials, and then obviously the safety concerns of pulling a 30-foot long piece of, you know, 450 degree metal out by hand and handling it. And then also, you know, using the abrasive cleaners and things like that, you know, there are safety concerns for your operators there. So you know, if you can clean it in place, you know, eliminating just one screw-pull a month, you know, you're looking at savings of up to \$96,000 a year for that one line. So pulling multiple lines, you can see how much cost impacts you have there.

I know a lot of, you know, people that are running medical products for compounders, you know, you have to pull your screw in between each job. In those cases, the savings are going to be astronomical if you have an effective purging compound. You know, if you're doing a screw-pull a day for your plant, you know, you can see these numbers would add up quite quickly. So you get, you know, you get the benefit of the purging compound up into cleaning the screw in place. And then also under purging compounds that are designed to help with screw-pulls, so they actually reduce the force required to pull the screw out of the barrel. So you know, it's kind of, you know, you get to kill two birds with one stone there, so very effective.

As always, you want to follow directions. Each supplier is going to give you directions, instructions for using the purging compound. Generally speaking with mechanical purges, you want to maximize your back pressure so that you can keep the screw fully forward, and then you want to run with the fastest safe screw speed. And what that's going to do is the combination of pressure, screw speed is going to create the most shear and then the most scrubbing, it's going to break down the material that's adhered to your screw and barrel, downstream equipment, etc. So the faster and the more pressure you can generate, the better the environment for mechanical purging compound.

For the chemical purges, we're talking primarily soak time. And what's associated with soak time is going to be primarily temperature and time. So the hotter you can get it, the better, the more vigorous chemical reaction you're going to get. And the longer you soak, the better, the more reaction you get. Typically you're going to plateau at a certain period of time, generally in the 30-minute area where you've expended all chemical reaction and further soak time is, you know, not going to get you anything in return.

With liquid purges which I mentioned briefly at the beginning, typically you're looking at mixing ratio. So these are purging compounds that you'd kind of squirt into your resin and kind of hand-mix it. So with that you're looking at, you know, what's the ratio, what's the [inaudible 00:39:18].

How do you determine how much purging compound you're going to need? The best way to know is through data. You know, you're going to want to track how long changeovers are taking, how much scrap are you generating. And then what does it drop to after you do a preventative purge? What's your reject rate? And what types of parts are you making? You know, that's often going to go hand in hand with how often you're going to need the purge and what type of purging compound you're going to need to use. So if you can track and, you know, your process might be something different, you know, that might be different data that you want to track, offset material or you know pounds per hour, you know, whatever it is that you look at and that you track, and use that data, you know, draft it out, overlay it with when you do purges, and you'll see how often you're going to need to purge. So basically you want to wait as long as you can without getting to a point that, you know, it's impacting the bottom line. So there is no one size fits all when it comes to how much purge you need or how often you're going to need to purge. It's going to be an experimental thing and it's going to be data driven.

So if you want to learn more, you know, we're available at asaclean.com. There's lots of information on there, or you can call, speak to a technical representative. With that, I will turn it back over to Trey and we'll take some questions. Thank you.

Trey: Well, thank you, Eric. And a big thank you for that really great, informative presentation. At this time we are going to move over to our question and answer session. We can submit questions by typing in the question box that's located on your screen. So we do suggest you guys send us your questions by typing them in there, Eric is going to be taking a look at those as we do have those come in. Just a reminder to everybody, we will be sending you a copy of the slides and a recorded presentation to your e-mails so do be checking your e-mail for that. But with that, I will go ahead and send that back over to Eric. Eric.

Eric: Thank you, Trey. All right, I see a couple of questions coming in. So the first one here, "Can I run in a recycle to purge and put it back into my process?"

Typically, we don't recommend that you do that. You're going to be adding basically the contamination that you just pulled out, you're going to turn around that right back into the process. So, you know, the heat history that's already on that contamination, you know, because of that we don't tend to recommend that you add it back into your process. What we typically would recommend is that you deal with it the way you deal with your contaminator production resin. So whether it's, you know, going to a landfill or you're selling it to a second hand recycler, you know, there are a number of ways to handle it once you're done.

And I see, "What is the best purging compound for polycarbonate overnight stopover?"

I'm assuming that means for a shutdown overnight. There are polycarbonate-based purging compounds on the market that are, you know, good for shutdown and sealing applications. So typically a mechanical purging compound with a polycarbonate base, or there are also low residue purging compounds available where, you know, you're not going to get the cleaning action but you're going to get really low residue, which is typically critical for clearer polycarbonate applications where you're really going to be able to see any purging compound residue in the polycarbonate. So I would also recommend using a low residue greater purging compound. So call your supplier, they should be able to point you in the right direction.

Our next question I see is, "Can I reuse the ASACLEAN?"

You know, that kind of goes back to the first question. You know. if you wanted to grind it up and put it back in the process, the problem there is you're going to have production resin and contamination in there. So I really wouldn't want to put contaminated products through my system again. I'd hate to see tons of carbon get caught up in your gates or in your screen packs, things like that. So yeah, I don't recommend reusing it. You might find other suppliers that do it but typically we don't recommend that, you know, for the reasons I mentioned.

"Running rigid PVC, will this remove all carbon from the die without removing the die?"

You know, that's going to depend on the die. Is it a profile pipe or tubing die? Typically if you're purging often enough, you can get the contamination out. PVC is notoriously difficult because it will decompose at a rather low temperature and it decomposes quite readily. So you're going to need to be aggressive with your purging, with your purging schedule when running PVC. But there are certainly both mechanical and chemical grades from the market that are made for this very application, which is, you know, removing carbon and contamination from the die without having to pull the die. So Dan, my answer to that would be yes.

The same with sheet dies. You know, sheet dies, if they're especially large sheet dies, we recommend the chemical purging compound for that's going to really have the expansion that you need to get out to those corners. And the last thing you want to do is, you know, purge most of your die but introduce some contamination out in the corners there, that's where we tend to see difficulty with the mechanical purge. It is getting, you know, all the way out there and still having enough pressure available for the mechanical purge to get the cleaning that you're looking for. So large sheet dies, I'm definitely recommending chemical purge all the way. Thanks for the question, Dan.

"Should we use the foam with," I'm assuming with the sheet die as a follow-up question.

Yes, you're going to want something that's going to have foaming action. That's what's going to help you get out to the edges there. It's not just the chemical reaction that's occurring that's attacking the chemical bonds of your material and of your contamination, but it's also the foaming action included that's really helping you with large sheet dies or melt pumps, you know, low pressure areas in general. So if you can find a mechanical purging compound that has some foaming, you know, some foaming agent in it, that could get the job done for you and you won't have the soak time to worry about, so definitely worth a try. If that doesn't get you what you need, then I recommend trying a chemical purge that has a foaming agent in it. So you're going to sacrifice the soak time there but, you know, if the mechanical purge doesn't get it done for you, then that's when you go with the chemical purge that has foaming action.

Next question I have is, "Will chemical purges react with my resins in a negative way?"

The answer to there is no. The chemical reaction that's occurring is more of...it's an endothermic chemical decomposition. So you're not reacting with the product that's in there. You're more decomposing, like, the purging compound so that steam or other gases like carbon dioxide, things like that, are created so, you know, and those are what's attacking the chemical bonds. Typically the only thing created are going to be like a carbon dioxide and then a salt of some sort after the chemical reaction. So you're not going to react with what's in your screw and barrel and create some, you know, bizarre compound or anything like that. So that's safe.

The last question I see here, "Are commercial purging compounds harmful for users?"

I would say the answer to that is they're no more harmful than running your production resin. So, you know, if you're using, if you're running an olefin and you're using olefin-based purging compound, you know, you're really not going to see any difference. I'm always going to recommend local ventilation, whether you're using a purging compound or not for, you know, worker safety reasons. What we do see sometimes is if a plant is running only olefin and we try a styrenic-based purging compound, for instance, the workers might complain about the smell because they're not used to it. It's really not a safety issue, you know, and as you well know, I mean styrenics represent a large portion of the plastic set of process in the world today. So, you know, if you were working in a plant that made styrenics, you wouldn't even notice the smell, but the smell can seem a little different. Same with acrylic-based purges, if you're not running acrylic, then, you know, the smell is going to appear different to you.

Something you can do to kind of minimize those is have a bucket of water on hand, drop the purge in there, that'll quench it and keep the gases from coming out. Also have local ventilation, that's really going to be critical for you. But again these purging compounds are really no more harmful than the plastic that you're running.

Well, Trey, I don't see any more questions. So I guess with that I'll turn it back over to you.

Trey: All right. Eric, thank you so much. Again, a big thank you to Sun Plastech and Eric for this presentation. We also do encourage you guys to check out some of the other webinars that we have from Eric and the Sun Plastech team on the Prospector Knowledge Center. Really great information there, a lot of great stuff and some different presentations that way. Again, we will be sending you guys a copy of the presentation to your e-mails, so do be checking for that in the coming days. Again, a big thank you for everybody for attending and have a great rest of the day.