THE SCIENCE BEHIND LAGLER's WOOD FLOOR FINISH-SANDING PROCESS

A Special Report explaining the science behind the Lagler Trio

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THE LAGLER TRIO BRINGS THE SCIENCE BEHIND THE FINISH-SANDING PROCESS TO THE WOOD FLOOR INDUSTRY

The TRIO 3 Disc Finish Sand/Screen Machine was introduced to the wood floor industry in 1994, and represents yet another enormous technological breakthrough accomplished by Eugen Lagler GmbH. By employing its unique configuration of 3 eight-inch diameter discs mounted in rubber grommets that spin at approximately 720 RPM in one direction while the triangular plate from which they are mounted spins in the opposite direction, the TRIO brings all the attributes of a true finish sander to the wood floor professional's world. As a finish sander, it is important to note that the TRIO has three primary uses: ***Finish Sanding; Sanding in Confined or Hard-To-Reach Areas; and Screening/Buffing Applications including Inner-coat Abrasion.*** In addition to this, the TRIO is endowed with the industry's most advanced on-board separator-type dust collection system – an uncomplicated, easy-to-use system that by far, brings the TRIO closest to that "Dust Free" mark among all floor sanding machines.

What this has meant thus far to the wood floor professional is far more than just another useful tool to be used on the jobsite – it represents for the first time, a real means to actually sand a wood floor the way woodworkers sand their woodwork. That is, to employ 2 dramatically different sanding machines (HUMMEL and TRIO) to divide the floor sanding process into 2 distinctive phases: ***Cut-Sanding*** and ***Finish-Sanding***. This is akin to how the conventional woodworker employs the uses of a hand-held belt sander and a palm finish sander to accomplish his work with premium results. When these two distinct phases common to the woodworker are properly implemented upon the wood floor, the quality of that finished floor's surface is significantly improved – for it truly possesses the woodworker's touch of finish sanding within its creation.

WHAT IS *BETTER* ABOUT A FLOOR SANDED WITH A TRIO?

Asking this question, for many, marks the beginning of becoming an overall better craftsman when it comes to sanding floors. A good craftsman in any trade will know a high quality finished product from a low quality finished product and all points in between by the time he is ever considered 'good' at what he does. An expert wood floor finisher is going to be readily able to pick out a top-notch sand-job from one that is any less than that. So to know a good sand-job when you see one, as distinguished from a not-so-good sand-job, truly is one of the keys that cannot be missed along the way to becoming a true expert in the field of wood floor finishing.

To know a good sand-job on a wood floor, the qualities that define it must be looked at and treated as separate entities. They must not be confused with other aspects of that floor's overall quality – they must stick directly to the subject of the sanding process. In the case of grading the quality of any site-sanded wood floor's sand-job, we have arrived upon establishing 2 clear-cut criteria to be examined and graded separately. These are: ***Sand Job Topography*** and ***Complexion***.

A wood floor's **Sand Job Topography** is typically taken notice of when relatively large expanses (50 - 100 sq. ft.) of the floor's finished surface are viewed at some kind of angle where reflected light (preferably *natural* light) is allowed to detail the characteristics of that floor's sanded surface (Sand Job Topography). (The trick here is that floors nearly always afford their best views and grading of topography when that floor is completed and the finish is dry). We are literally examining and inspecting the shape of the floor's surface. It should be pointed out that it is common in the industry to use the term 'Flat' or 'Flatness' as we describe the desirable aspect of what we are looking for as it pertains to that floor's surface shape. We would agree that this is generally a good way of going about it, providing it is understood that the *wood floor covering* in which we are viewing really isn't flat as in how for example, a pane of glass is flat. The wood floor covering that is sanded *follows* the topography of the subfloor in which it is lain upon, which is seldom, if ever 'flat' by any definition. Sanding these wood floor coverings does not make them flat either, nor is there any intent of doing so. What we are really looking for is a continuity of that sanded surface that is not interrupted or disturbed by any part of the sanding process – we often call it 'flat' even though we know this isn't so in the truest sense. We'll make allowances for that wood floor's surface in terms of what is imparted from the subfloor, and reserve judgments upon the quality of the Sand Job Topography based solely upon what the process of sanding has either accomplished or imposed. Can the floor be described as having that highly desired monolithic surface that exhibits a keen 'flatness' continuously throughout? Or can it be characterized as having conspicuous surface irregularities or flaws in its topography that is highlighted by how light reflects off that surface? With minimal practice, one can readily look over the surface of any site-sanded wood floor and grade its quality from this highly important aspect of Sand Job Topography. It should come as no surprise that today's expert wood floor finisher can frequently be found viewing his finished floors from these angles, as he has a constant interest and concern for his sand-jobs to exhibit a most pleasing Sand Job Topography.

A wood floor's **complexion** is viewed from a variety of angles as well as straight on since various complexion problems will manifest themselves in many different forms. What's immediately different in viewing a floor's Complexion from its Sand Job Topography is the absence of any necessity to view it in large expanses – the goal is to basically scan over the wood's grain and overall character, and make a determination if the sand-job brought all these out to its highest potential. The Complexion aspect is considered by many to be the beauty aspect of the wood in which the floor is comprised of. If there are complexion problems present, the viewer can often kneel down, make a circle with his hands on the floor and still see the undesirable complexion feature. As the term implies, a complexion problem can be described as *any* visible surface flaw generated from at least some part of the sanding process that unnaturally impedes the wood's ability to express its true warmth and grain character. In other words, the wood floor's complexion must be free of any and all machine and abrasives signatures visible in the finished product if it stands to be regarded as having a good or "clean" complexion. Repeating patterns such as cross-grain sandpaper scratches, edger marks, residual course grit scratches due to insufficient finish-sanding, residual Big Machine 'Chatter' and buffer screen swirls are just a few examples of the many complexion flaws commonly encountered.

The key in utilizing the concept of a wood floor's Sand Job Topography and Complexion as an effective means for grading the overall quality of its sand-job is to keep these two criteria entirely separate from each other. Understand that a floor can have a great-looking Complexion, yet exhibit a Sand Job Topography of very poor quality and vice-versa. The importance of developing this skill in grading the sand-job is invaluable and far-reaching, as the goal for every site-sanded floor really is to exhibit quality from both aspects – that is to have a ***'Flat' Sand Job Topography*** and a ***Clean Complexion***.

HOW DOES THE TRIO PRODUCE A FLATTER TOPOGRAPHY AND A CLEANER COMPLEXION IN A WOOD FLOOR?

When the TRIO is incorporated into the wood floor professional's line-up of tools, the ability to sand his floors the way woodworkers sand their woodwork becomes reality. The process of sanding a floor becomes differentiated into the more woodworker-like format that features two distinct sanding phases: the initial **Cut-Sanding Phase** and subsequent **Finish-Sanding Phase**. In the Cut-Sanding Phase, the floor's **topography** is established, using Cut-Sanding tools such as the belt sander (main field) and the edger (along the walls). In the Finish-Sanding Phase, the TRIO is used to refine the sand scratches for a pleasing **complexion**, *while not compromising the floor's* ***topography*** *in the process.* This is a key point, as many who sand wood floors for a living are simply unaware of the problem that the TRIO cures - that using a Belt Sander for Finish-Sanding applications is one of the most common causes for floors ending up with disappointing topographies. To understand why this is true, it's essential to have a better insight as to what factors are in play and what processes are taking place when the finer sandpaper grits are in use.

THE TRIO AS A FINISH-SANDER UNIQUE FOR WOOD FLOORING

The first thing to understand about nearly all wood surfaces such as a wood floor is that the wood materials that comprise that surface ***vary in hardness***. The degree by which this occurs will differ greatly from floor to floor depending on a number of things, primarily the species (Is it open-grained or closed-grained; Knotty and or heavily burled or relatively clear), or in the case of a multi-species or multi-media floor, the relative hardnesses of the species or media installed within the mix. As can be expected, these different hardnesses of material when sanded, will exhibit ***different sand-down rates***. The greater the variance in material hardness within any floor, the more difficult that floor is going to be to keep flat during sanding, particularly when the finer sanding grits are employed.

Picture what happens as a floor is sanded to completion using only a belt or drum sander and suppose it is a #1 Common Oak floor. Understand that within this particular oak floor (a typical Open-Grained Species) there is a mix of boards cut at all sorts of angles in relation to the growth rings of the lumber stock and exhibits your typical mix of flat-grained boards, vertical-grained boards and everything in between. This is a very common floor in the wood floor industry and exhibits a very high degree of material hardness variance. In the first cut, a relatively course grit of sandpaper is used – perhaps it is a 40 grit. The aggressive cutting nature of that 40 grit belt is very effective at cutting away the hardest materials encountered in each pass. The result is a nice, even cutting across the entire width of the sander's drum – that 40 grit sanded surface is by just about anyone's standard, flat. Enter a 60 grit belt, and there is little change in that surface's

flatness from what it was from the 40 grit – the 60 grit was also very effective at cutting the hardest of the wood's grain structures at pace with its softer structures, and the result is a flat surface. Next are the real finishing grits of 80, 100, or maybe 120 grit, and here is where things change. These finer grits do not have the shear cutting ability that the heavier grits exhibited. They do not cut into the hardest grain structures the way these heavier cutting grits do, so the result is that while the hardest grain structures are more or less getting polished, the softer grain structures are getting sanded away at a higher rate and a compromised floor topography is in the making. The wood floor surface that was nice and flat at 60 grit experienced noticeable deformation in these finishing-sanding steps and there stands to be disappointment for any trained eyed viewing its topography. This condition is commonly referred to as ***"Grain Dish-Out"***.

So long as it has been such a common practice to sand wood floors in this manner, it shouldn't be surprising that battling Grain Dish-Out is nothing new to the wood flooring industry. Nor is the battle against other problems in wood floor topography such as the surface irregularities common in multi-directional (parquet) lay-outs and multi-species/multi-media schemes as well as those annoying 'Dips' all too often found at the end-joints in strip floors. The common thread here is that nearly all these types of repeating topographical irregularities take the majority of their shape during the time in which a belt or drum sander is used for these finish-sanding grits. The irregularities take form in these regions because in each case, there is a situation where the relatively hard material to be sanded meets the relatively softer material to be sanded and their sand-down rates do not keep pace with one another when finish-sanding grits are used. The degree by which these topographical irregularities form will vary by the degree in which these different material hardnesses are present in any floor that is sanded in this manner.

It has been known for ages that the uni-directional, rolling dynamic of these belt sanders, whether it's a floor sander or a hand-held sander used by the contemporary woodworker, is well-suited for cutting and shaping the wood with cutting grits, but when it comes to the finer grits, a very different dynamic is in order. It is for this reason that you'll never find a professional cabinet maker or furniture builder that doesn't use some kind of a finish sander. The primary difference in the way a finish-sander sands from that of a belt sander is that it utilizes some form of a varied circular or semi-circular motion within its dynamic that allows for the desired refinement of sand scratches necessary in the sand-job, yet vastly minimizes the effects of the differential sand-down rate problem. The immediate result here is a visibly superior wood surface from its topographical aspect.

Prior to the TRIO's introduction, the wood floor industry has a well-established history of endeavors aimed at improving floor topography, either by way of finish-sanding with machines featuring large-sized vibrating pads (often called **"Square Buff Machines"**) or attempts at correcting bad topography after it has already formed by using a sandpaper disc on a buffer, commonly called **"Hard-Plating"**.

The Square Buff Machines, with their orbital sanding pads were borrowed directly from the contemporary woodworker's world – the dynamics of its vibrating pad were nearly identical to those of the palm finish sander. The Square Buff Machines never achieved significant popularity in the wood floor industry and so the idea of introducing true finish-sanding into the industry

stalled to some degree. The issue was and still is, a true problem relating to the *complexion* aspect – that all too often there would be a visible abundance of tight, curling sand-scratches left behind in the finished wood floor product.

So the question then naturally becomes:

"Why do these orbital sanding dynamics work with such overwhelming success in contemporary woodworking, yet produce such disappointing results in wood floor sanding?"

The answer is simple in that contemporary woodworkers use these types of sanders with much higher sanding grits than a wood floor professional is ever going to use in finishing off his floors. The fact that these tight arcs are not so successfully buffed out in the typical floor sanding procedure brings to light a very important concept in sanding that ALL wood floor professionals should be acquainted with: ***Scratch Pattern***.

The ***Scratch Pattern*** is strictly a complexion perspective and is used to describe the imprint or signature any sanding machine leaves behind on the surface that was sanded. A good belt sanding machine leaves straight lines while a drum sander might leave broken or interrupted straight lines. A Square Buff sander leaves a pattern of tight arcs and a buffer leaves a banana-shaped signature. These are all ***Scratch Patterns***.

In finish-sanding, a finish-sander by definition employs at least some variation of the circular sanding motion/dynamic as described earlier. While this type of a sanding motion has been proven extraordinarily beneficial on one key aspect of the sand-job – that is maintaining a flat **topography -** there exist potentially serious consequences to that sand-job's other key aspect – **complexion**. This is because any such dynamic will unavoidably produce to at least some degree, the biggest complexion enemy of all – ***Cross-Grain Scratches***. So what's good for one key aspect of the sand-job is ruinous to the other key aspect of the sand-job – such is life in the working world!

Now obviously, this is not an impossible situation that isn't dealt with on a regular basis by experienced professionals who finish wood. For starters, the experienced professional in woodworking realizes that sandpaper moving in circles produce cross-grain scratches in wood. It's an inevitable and accepted fact of life here. From there, it's understanding that different species of wood all have their own tolerance levels for cross-grain scratches showing up as undesirable complexion flaws in the finished product. Taking this into account, whether or not a particular wood surface is going to show these cross-grain scratches in its final complexion is going to be a function of what **sandpaper grits** are selected for the finish-sanding process for that particular **species**, whether or not the wood is to be **stained**, as well as the **Scratch Pattern** unique to the sanding machine used. These are the true cornerstones in the science of finish-sanding any woodwork, and it's the decisions made as to how to work these variables that determine the quality of any given sand-job. Make changes to *any one* of these - **Sandpaper Grit, Species, Stain or Scratch Pattern** and you can, for better or worse, alter the outcome of your entire sanding effort. Being mindful of these factors, the experienced professional who has truly mastered the art of sanding and finishing wood naturally forms a plan as to how to sand his work on a case-by-case basis. He is not in any kind of habit to sand all his woodwork the same.

The case of the Square Buff Machines brought into the wood floor finishing industry and their failure to move the science of Finish-Sanding into the industry stands as a perfect example of how vital the issue of Scratch Pattern is in this equation. The primary flaw was that its Scratch Pattern didn't afford the wood floor professional a situation where he could finish off his floor with a typical floor finish-sanding grit and then successfully burnish the scratches out in the screening process. The arcs were simply too tight for such an application. If the wood flooring professionals would have been willing to triple their sanding time and sand their floors up to a grit of 280 or higher, the Square Buffs would've worked. This obviously would have been an unreasonable expectation and it became apparent, at least to a group of people in Southern Germany that the key to bringing the science of finish-sanding to the wood floor industry would be to alter the scratch pattern such that the grits used for finish-sanding in wood floors could be more easily screened out.

Being understanding of these very concepts, the people at Eugen Lagler GmbH set out and focused their design of the TRIO sander to feature a unique sanding dynamic that created a Scratch Pattern far different than any of the previous endeavors. While employing that critical varied, circular motion needed for maintaining superior floor topography, the arcs of its Scratch Pattern were vastly opened up so that the finish-sanding grits typical in a wood floor could be screened out with much greater success. In the TRIO, they created a finish-sander specifically suited for the unique demands of the wood flooring industry, and thereby enabled finish-sanding as a separate discipline, its untimely entry into the industry.

TRIO VS. "HARD-PLATING"

As previously stated, the practice of Hard-Plating involves affixing a sandpaper disc to a standard floor buffer/polisher as an endeavor to sand out bad floor topography after it was allowed to form in the first place. To those who understand wood floor topography, finish-sanding and all the fundamentals involved, it's an idea that more or less says, ***"Let's go break something and then come back and fix it"***. The idea turns a completely blind eye to the science and utility of finish-sanding that through the TRIO, is readily available to the wood floor professional, and runs counter to the teachings that sanding steps should be progressive and complement each other.

The end-results of Hard-Plating can be tenuous as well. From the topographical aspect, the degree by which the floor surface was allowed to become irregular in the first place will certainly factor in as to how effectively it can be brought back. From the complexion aspect, the difficulty in screening out Hard-Plating's Scratch Pattern is a common complaint. This isn't to say it's impossible to ultimately get a finished floor that is pleasing to the eye through Hard-Plating, but the guy who did it sure did take the long way around to get it done when he could have used a TRIO to finish-sand that floor.

From the standpoint of dust control, Hard-Plating is all too often the *Achilles Heel* in anyone's efforts to be a low dust operation. At the time of this writing, there are no sanding discs for this application that are manufactured with any kind of holes or porting to allow sufficient suction from a vacuum to reach the sandpaper-wood interface where the dust is formed. The region of suction is limited to that narrow space between the outside edge of the Drive Plate and the inside

edge of the Buffer's Main Housing. This condition often results in poor dust pick-up performance on the jobsite, making the practice of Hard-Plating a subject often avoided in conversations about dust management.

By comparison, the TRIO's self-contained separator dust pick-up system qualifies it as the industry's very cleanest floor sander. In the interest of jobsite dust control, choosing to Hard-Plate over finish-sanding with a TRIO represents an enormous compromise.

SANDING WITH THE TRIO IN CONFINED AREAS: BETTER QUALITY, BETTER TIME, MUCH EASIER ON THE BODY

The confined floor areas in any jobsite often represent the homely side in the life of the guy who sands floors for a living. These are the square feet of the floor that typically take up the most time, require the most physical exertion and end up looking the ugliest in spite of it all. Stairway landings, pantries, closets, hallways that run oblique to the lay of the wood, areas behind kitchen islands, or any other region of the floor that is claustrophobic due to an intricate or "Cut-Up" floor plan are the common culprits here. The problems in these areas stem from a lack of space to effectively move the sanding machines in the manner necessary for optimum sanding results – access for a straight path that follows the wood's grain for the belt-sander to run is not a luxury to be found here. The traditional route followed is to do the sanding with an edger 2-3 times in ascending sandpaper grits, maybe throw in a hard-plate step, then screen a lot. After the finish is on, there is all-too-often some sense of relief that there isn't much light in these areas and a hope that the sand-job isn't judged at certain times of the day.

One of the fundamental differences between any sander designed for cutting/shaping and one for finish-sanding is that the finish-sander is not required to remain moving while sanding. It is not going to dig an immediate dip or depression into the woodwork when held still. Additionally, it is not necessary for a finish-sander to follow the grain of the wood that is being sanded. It shouldn't be surprising that contemporary woodworkers know this and use their palm finish-sanders extensively in the areas of their woodwork where it isn't prudent to use their hand-held belt-sanders. It is simply the right tool for the right job, which is nearly always a guarantee to deliver efficiency and quality of work. Using the finish-sander in these confined areas is an everyday part of the job and an equally important function as finish-sanding itself. It is for these exact reasons that there is simply not a better-suited machine than the TRIO as a means for coping with these problematic areas.

As opposed to using the often times ill-suited edger to tackle the bulk of the sanding in these confined areas, the TRIO handily affords itself a key role in assuming the most efficient path to completion by providing options that wouldn't otherwise be there. Since the TRIO can be counted on for follow-up sanding steps, the belt-sander can now be free to initially work these areas with less restrictions in terms of the angles it is run in relation to the lay of the boards. Veteran TRIO users commonly run their belt-sanders at angles all the way up to 90 degrees (true cross-cut) in these confined areas when the floor plan calls for it – though it is strongly recommended to back off the Drum Pressure and use a finer grit than normal. As long as the area gets a thorough follow-up regimen of finish-sanding with the TRIO, there are seldom any consequences in using the belt-sander in this manner.

As there are many situations to be coped with in sanding, it might be prudent to use the TRIO for the first sanding step in a cut-sand application for a confined area. Simply remove the red/green cushion rings and place cutting-grit sandpaper discs (36 or 40 grit) directly to the sanding plates, and the TRIO is ready for a cutting/leveling application. It may work well in removing old finishes, or it may hardly work at all – that will depend upon some of the unique properties of the finish to be removed. If not, then simply select another tool for the task – it might end up being the edger that's used in the initial cut-down in a confined area. As long as it's understood to use the TRIO for all subsequent sanding steps in these situations, the time spent behind the edger is still greatly minimized.

Summing it all up for the issue of sanding the confined regions of wood floors, the TRIO wins *all* the battles: time spent sanding these areas; quality of finished product; dust control; and less time behind the edger undoubtedly translates to less physical fatigue suffered by the person sanding them. It's become quite predictable these days as to what a veteran TRIO user will say when asked how he'd like to go back to the days of dealing with those hallways and kitchen islands without his TRIO – he'll often shake his head and say he'd consider doing something else for a living. Yes, the difference really is that much.

TRIO IN TRANSITION AREAS – EDGER/BIG MACHINE

A common problem in wood floor sanding and finishing occurs in the regions of the floor where the edger work meets the work of the big machine. This "transition zone" often carries both topographical and complexion features that can contrast in a very undesirable manner if not blended out effectively. Examples are most common in stained floors, where there will exist a "ring or "halo" around a room that is noticeably different in color from the room's main field. If the final grit used on the edger was too *fine* relative to the final grit used on the big machine, the ring encircling the room will be *lighter*. Conversely, if the final grit used on the edger was too *course* relative to the final grit used on the big machine, the ring will be *darker*. These problems tend to be more pronounced at the end-match regions of the room as the transition zone is wider due to the fact that the big machine does not get as close to the wall at the end of the path vs. the side of the path and more edging is required here.

One of the big benefits a TRIO user experiences while sanding his floors is a greatly reduced size in these transition zones. When his sanding process is differentiated into a cut-sanding phase and a finish-sanding phase, his big machine and edger work are all done before the TRIO is brought out. Some light palm finish-sanding might be carried out in the corners and under cabinets, or if it is a more challenging stain application, there might be some palm finish-sanding done against all walls. In the interest of keeping the transition zone at its minimum, this is all to be done *before* bringing out the TRIO for its finish-sanding and/or screening. This is because the TRIO gets up to within 2 inches of the wall, and the big machine/edger transition zone gets sanded out and blended away in the finish-sanding process. After the floor is screened with the TRIO, the only transition zone left is a very minimal region between TRIO screen and palm finish sander work which seldom, if ever results in a visible flaw in the floor.

USING TRIO TO FERRET OUT TOPOGRAPHICAL FLAWS

The unique sanding dynamic of the TRIO's 3 discs allows for the machine to glide along the floor in a smooth manner so long as the floor is flat. When topographical flaws such as drum or edger digs are encountered, the TRIO machine will begin to shake or list slightly, but noticeably. From this point, the operator may simply hold the TRIO in that spot until the irregularity is sanded out, or he may circle it with a pencil and come back with the edger to smooth it out, and then re-apply the TRIO, depending upon its severity. The value here is, that the topographical flaw was detected and remedied during the sanding process, rather than after a finish was applied to the floor.

TRIO AS A WOOD FLOOR SCREENING MACHINE

The practice of screening the wood floor surface prior to coating is a very common practice to help ensure a 'polishing out' of sandpaper scratches in the floor that might show up after the finish is applied. Up until the development of the TRIO, this practice was carried out almost exclusively by the common Floor Polisher or Buffer. The Buffer typically employs a 1.5 HP motor and turns a 15"-17" diameter disc at 175 RPM. It was never designed specifically to be any kind of a woodworker's tool – its main function had always been for maintenance and janitorial work – cleaning and polishing an assortment of common floor surfaces such as VCT, linoleum, etc. Although manufacturers of wood floor sanding machines might have placed their names on these buffers and marketed them to the wood floor industry, it would still be a misnomer to label one as a woodworking tool.

There is little argument that a screening process properly applied to about any wood floor is going to improve its appearance as a finished product. What the question has become is along the lines of which *kind* of machine – a maintenance tool or a woodworking tool is going to best carry out this process and provide the very best results for your efforts.

The primary flaw with the buffer is **Scratch Pattern**. As the single large screen revolves around, its operator slightly leans or "heels" it to one side – usually at 3:00 from his perspective - primarily to control the machine and secondarily to concentrate a working region. The result is a banana-shaped scratch pattern that provides difficulties for both quality aspects (topography and complexion) in the effort to achieve a premium sanding job.

"Screen-Swirls" are a complexion complaint common in the vocabulary of just about anyone acquainted with the sanding and finishing of wood floors – so much so that there has been a real emphasis in developing techniques to help minimize their occurrence. **"Clocking the Buffer"** is one such endeavor that entails an initial step of lining the banana up to the wood's grain at 45 degrees, followed by a second step of adjusting the operator's position by that 45 degrees to align the banana up with the grain altogether as a means to conceal this unfortunate scratch pattern. While this technique has proved helpful in the more spacious regions of the floor, there is all too often insufficient room for the operator of the buffer to make the required positioning

shift in the more confined regions (hallways, behind kitchen islands, etc.) and so these regions are left to suffer in quality all the more.

"Screening Uniformity" is something of great importance to the wood flooring professional, especially the one who does a lot of staining and is yet another problem inherent within this banana-shaped scratch pattern of the buffer. To move the buffer in such a way so as to keep the banana in line with the wood's grain means to move that banana in an end-to-end fashion. Considering the entire wood surface that inevitably stands to be screened, semi-screened or missed altogether, it is not hard to visualize how screening uniformity is a problem when the buffer is used. The effects of poor screening uniformity extend into the complexion aspect of the sand job. Differential saturation of stain or finish resulting in any kind of visible "blotchiness" in a wood floor surface can be one of the most disappointing and frustrating occurrences a wood floor professional will experience.

Finally, by the manner in which the old floor buffer is used by concentrating an edge to the wood floor's surface, it's often easy to aggravate or bring to life the problems of surface irregularities including **"Grain Dish-Out"** during the screening process.

Once the wood flooring professional begins using the TRIO in place of the old floor buffer, it doesn't take long before the realization sets in that a far superior means for screening that wood floor is at hand. Its ease of use, along with a much greater expediency of creating a visibly superior wood floor surface quickly chimes in the reality that the old floor buffer was never designed as a woodworking tool to begin with. With a combination of its unique "Wood Floor Specific" scratch pattern that spans nearly the entire underside of the machine, a rapid 720 RPM disc speed and the fact that all 3 discs remain flat to the floor during operation solve all the problems of the buffer's banana for all common screening applications (raw wood, inner coat abrasion, screen and coat). The final screened wood floor surface is pronouncedly more uniform with a much smoother burnish, screen-swirls are virtually non-existent, and the confined regions have been screened exactly the same as the rest of the floor. The grain dish-out did not occur and after the final coat of finish has dried, the professional who used the TRIO does not have to be reminded of the buffer and the folly of employing special techniques aimed at overcoming the inadequacies of an ill-suited tool for any given task.

KEYS TO SUCCESS

Like any professional's tool, achieving success at any level with the TRIO in floor sanding stands to involve an informed manner of use that takes the concepts previously discussed into great consideration. Making the monetary investment in a TRIO stands to be the smaller investment when compared to how your sanding skills and instincts can evolve when you invest in yourself by gaining the skills and understanding in how to most effectively use this machine. For many, purchasing a TRIO is the first step toward embarking a new, yet very familiar and exciting learning experience in sanding floors that generously pay back the rewards in both profit and satisfaction in a finished product of superior quality. It should be stressed that mastering the TRIO is not a hard and complicated thing to do, and really is quite fun to see the results of a new machine bringing in some new concepts that stand to put you up on your competition.

One of the first transitions made by accomplished TRIO users is an all-out scrapping of the habit in treating all floors-to-be-sanded the same. The old start with 36 grit, then 60 grit and finished with 80 or 100 regardless of species or installation scheme goes out the window. The floor sanding process is now differentiated into two distinct phases: a **cut-sanding phase** and a **finish-sanding phase** just how it is done in contemporary woodworking.

Understanding the two quality aspects of **topography** and **complexion** in the wood floor's sand job and making them central goals in each sanding and screening step taken in your sand-job is certainly a key. Maintain the order that **topography is created first in the cut-sanding phase, followed by a finish-sanding phase that result in a clean complexion and doesn't compromise the topography during that process.** These concepts are built upon and enabled by a strongly developed sense of **knowing your species** and what tendencies any floor before you may have in the sanding of its wooden materials.

How much **material hardness variation** exists in that floor and how the associated **differential sand-down rates** play into what grit the change from cut-sanding (belt or drum sander) to finish-sanding (TRIO) is best selected. Understand what happens when a finish-sanding grit is used on a belt or drum sander in the wrong instances – where there is a relatively high material hardness variation and how that floor's topography stands to become deformed during the process. On the other side of it all, learn to gauge a wood's tolerance to the **cross-grain scratches** inevitable in all finish-sanding. Understand the consequences of using too coarse a grit during finish-sanding. Overall, know the pros and cons of any potential selection of sanding machine and sandpaper grit for the sanding task you wish to accomplish on any given floor, and expect these selections to vary from job to job. Accept it that in the sanding of wood, there is that collision course of what's good for one key aspect of the sand-job is potentially ruinous to the other and work with it. Solving this riddle is nothing other than finding that balance of where to end your cut-sanding without consequence to your floor's topography and where to begin finish-sanding at a grit that will be successfully sequenced out in that process, leaving behind no compromise to that floor's complexion. It's all in knowing your species, and that different species carry different regions of ease as well as difficulty in sanding. The idea turns out to literally exploit that sand-job where it is easy and spend some time and effort in on where it's greater difficulty lies.

For instance, an open-grained species such as oak stands to be more difficult to retain a good topography during belt-sanding than a closed-grained species such as maple. On the complexion end, the maple is going to be substantially less tolerant of any cross-grain scratches associated with finish-sanding than the oak. The oak is going to be sanded, in general up to 60 grit with the belt-sander, then 80 grit with the TRIO. The maple however, is better to be sanded more along the lines of up to 100 grit with the belt-sander, then 120 grit with the TRIO. On the oak, the belt-sander was put away after 60 grit to avoid a situation in deforming its topography, as this open-grained species carries an abundance of material hardness variation. Because it has such a heavy grain structure, there is little consequence in beginning a finish-sand sequence with 80 grit on the TRIO. As for the maple, it is pretty much the opposite that holds true – because there is so little in the way of material hardness variation in this closed-grained species, a belt-sander can be used to a much higher sanding grit without consequence to that floor's topography. It stands to be much better to not use the TRIO until around a grit of 120 because if 80 grit were used on this

floor like it was on the oak, the likelihood of those 80 grit cross-grain scratches showing up as a complexion problem is too high on this species.

This model comparison of oak and maple come close to representing the ends of the spectrum of the sanding situations encountered for which to create your sanding plan. Remember that the sandpaper grits used by the TRIO in the finish-sanding process of wood floors in better than 95% of the time will either be 80, 100 or 120. Combine all that you know about the sanding process differentiated into its 2 phases and become a student in knowing your species and what their tendencies in the sanding processes are likely to be. Spend time to look at wood floors, and look at them a lot. Never miss an opportunity to grade – either openly or silently – it's aspects of topography and complexion. With just a little practice, a sound planning out of each sand-job will become second nature as it is with all accomplished TRIO users.

CUSTOM GRADE FLOORS VS. PRODUCTION GRADE FLOORS

In recent years, the defining and classifying of wood floors into a custom grade floor vs. a production grade floor has greatly risen to form. This has a lot to do with the fact that today's more opulent homes very often have an abundance of windows – often times those floor-to-ceiling windows – that allow a much greater volume of natural light into the rooms. This condition places any wood floor's sand-job – particularly its topographical aspect – under much more scrutiny than ever before. In these settings, topographical flaws in the floor can be readily picked out by the untrained eye, and so there may not be any greater factor in differentiating between a custom grade floor and a production grade floor than its sand-job.

A custom grade floor is going to be a more expensive floor in a more expensive home than a production grade floor. It should command a higher price per square foot on the sanding contract than the production floor, and therefore, would merit a more intense sanding effort that would include that cut-sand phase/finish-sand phase model described in this writing. The production grade sand-job typically calls for 3 cuts with the belt or drum sander (often times only 2 cuts are actually used, but we won't go there). What's important to know is that the wood floor professional ultimately does not make the call as to whether the sand-job that is being asked for is a custom grade sand-job or a production grade sand-job. The best he can do is to know and properly communicate the difference in what is being paid for and abide by the motto that "Custom grade sand-jobs are called for in highly lighted situations whereas production grade sand-jobs belong in the dark". The TRIO will obviously excel and be a very significant part of that custom grade floor, yet it shouldn't be overlooked on the production grade job as it has plenty of utility in the sanding of confined areas as well as a superior means of screening that floor.

Whatever the case may be, there is little argument these days that many situations call for *more* in the process of wood floor sanding (square-buffs and hard-plating testify to this). The question has now shifted as to which array of tools and methods prove to be the *most efficient*, the *most profitable*, and bring about the *most pleasing results* in the finished product. In viewing the vast number of wood flooring professionals who have mastered the TRIO and would not want to sand any floor without putting the woodworker's touch of finish-sanding into the effort, it is easy to see how and why the TRIO is well on its way towards winning this one. It is, after all,

revolutionary in being the wood floor-specific finish sander that has brought the science of finish-sanding to the industry.

TRIO: THE MACHINE AT A GLANCE

Consistent with the realm of the highest and most sophisticated standards that has set Lagler apart from all the other floor sanding machine manufacturers, the TRIO machine has built within its design, a revolutionary combination of the following attributes:

- **A powerful 220 Volt, 16 amp motor.** Unlike the various 110 Volt, multi-disc machines that have recently appeared in the market as finish sanders for wood floors, the TRIO is equipped to vigorously take on all the necessary tasks associated with a finish-sand/screen machine. This is the long-life, fully sealed, low-maintenance capacitor-type motor that does not require the use carbon brushes. As with all motors in the Lagler line of sanding machines, it is equipped with thermal overload protection.

- **3 sanding disc configuration.** Each disc is 8 inches in diameter and driven at approximately 720 RPM together in the same direction. All 3 discs are mounted in rubber grommets (for easy removal as well as being most conducive to finish sanding) upon a triangular plate that rotates by inertia (speeds will vary during use) in the opposite direction. This unique dynamic is key in providing the TRIO with its unparalleled abilities in finish sanding and screening on hardwood floors.

- **Among the very easiest machines to operate.** The TRIO is truly monumental in providing much-desired relief from the physical strain of sanding hardwood floors. This is obviously a quite popular attribute! Operator is completely free to stand upright and travel any direction regardless of grain direction, as well as stop and change travel direction without disengaging the machine from the floor. There is very little in the way of fighting any torque imparted from the machine (this can vary slightly, depending upon a floor's topography) and is not much different than pushing a shopping cart. Couple these points with the fact that the TRIO eliminates a large portion of edger use in confined areas, and one is left to wonder who wouldn't want to make that trade?

- **Easy and efficient sandpaper/screen change-out.** The full utilization of "Hook and Loop" technology makes the TRIO one of the fastest machines to change out the various abrasive mediums it employs. Whether it's the sandpaper discs themselves or the red/green cushion rings that are *used* for finish sanding, *removed* for screening or when using the lower sanding grits for some of its cutting applications, all such conversions are as simple as can be. Abrasive "scuff-type" pads, along with any variety of sandpaper strips or tabs can be friction-fitted directly to the "Hook" material on each of the TRIO's discs for such inner coat abrasion set-ups commonly performed on water-base jobs. Screens are secured by way of a pushpin, anchoring the screen and scuff pad to the center of each disc for fast and easy changeout. All 8" sanding discs, screens and scuff pads are regularly produced by all the reputable abrasives manufacturers of the wood flooring industry and readily available from your local Lagler distributor.

- **The industry's most sophisticated dust collection system.** There is little dispute to the TRIO's claim of possessing the highest level of dust collection performance – nothing comes closer to the hypothetical "Dust-free Machine". Fully self-contained – no dirty, cumbersome hoses to drag around the homeowner's abode. The dust collection system is also amazingly simple to clean and maintain – its built-in cleaning brush makes for unbelievable ease in cleaning the filter element (no messy, time-consuming routine of dismantlement – blow out – reassembly).

- **Easy dismantlement for transport as well as jobsite portability.** The TRIO dismantles and reassembles into its three main pieces – Chassis/Dust Unit – Main Drive Unit – Additional Weight – in less than 2 minutes without the use of a single tool!

- **Ultra-low maintenance.** With no adjustments for its wheels and having both its belts (serpentine drive and vacuum V) equipped with spring-loaded self-tensioning pulleys, there is no fine-tuning required for this machine, as well as nothing to be worried about in terms of its *coming out of tune*. The TRIO is as close to a "plug in and go" machine as it gets.

FINAL THOUGHTS

If you have question about something that was not addressed in this white paper, please feel free to contact The Philadelphia Floor Store (1-800-737-1786) for more information.