

# A Breakdown of Costs associated with Routine Tissue Processors vs The Shandon Excelsior™ ES

## Submitted By:

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In the cost conscious world of medicine, it is imperative that everything we purchase be scrutinized for necessity and quality. When we decide to make even the smallest of purchases we have to ask ourselves:

1. Is it necessary to get the work done?
2. Can it be purchased somewhere else for less money but be a comparable product?
3. Is there a better product that makes better use of the resources we already have?

These are all good questions to ask but are also time-consuming in the pursuit of the answers. When my facility decided to purchase a new tissue processor, it became my responsibility to try to determine what instrument would best suit our needs. Being the manager, I was naturally looking at things from a cost perspective; but being a tech I also was looking at making work in the lab easier and safer. These became my objectives to consider when evaluating the purchase of a new tissue processor.

In our facility we evaluated four instruments (Sakura VIP, Ventana Renaissance, Leica ASP300, & Shandon Excelsior ES). Each was looked at for Cost Containment in reference to Reagent Usage, Technician Time, and Safety Issues.

## Reagent Usage:

In document 1 you will see the break down of reagent usage for the four tissue processors we evaluated. The evaluation is based on a one week to one month time period minus start-up costs. Costs of the reagents, for comparison purposes, are based on Thermo Electron reagent pricing (for equivalent price comparison). As you can see, there is a significant amount of savings to be had by using the Excelsior ES verses the other routine tissue processors that were examined. This is because of the Rotation technology that the Excelsior ES is using to make the best use of the reagents. Instead of throwing out perfectly good reagents, the Excelsior ES uses them until they are exhausted. The reagent monitoring feature lets you know that it needs to move the worst reagents off of the machine and add a new reagent onto the machine. By doing this, you will see a sharp decrease in reagent usage as well as Technician time in maintaining the instrument.

| VIP Tissue Processor |                  |                   |
|----------------------|------------------|-------------------|
| Reagents             | Total Gal/ Month | Total cost/ Month |
| Formalin             | 4                | 116.00            |
| Formalin             | 4                | 116.00            |
| 80% Alcohol          | 4                | 128.00            |
| 95% Alcohol          | 4                | 128.00            |
| 95% Alcohol          | 4                | 128.00            |
| 100% Alcohol         | 4                | 128.00            |
| 100% Alcohol         | 4                | 128.00            |
| 100% Alcohol         | 4                | 128.00            |
| 100% Alcohol         | 4                | 128.00            |
| Xylene               | 4                | 128.00            |
| Xylene               | 4                | 128.00            |
| Paraffin             | 4                | 304.00            |
| Paraffin             | 4                | 304.00            |
| Paraffin             | 4                | 304.00            |
| Cleaning Xyl         | 4                | 128.00            |
| Cleaning Alc         | 4                | 128.00            |
| Water                | 4                | NC                |
|                      | <b>64</b>        | <b>2424.00</b>    |

| Ventana Tissue Processor |                  |                   |
|--------------------------|------------------|-------------------|
| Reagents                 | Total Gal/ Month | Total cost/ Month |
| Formalin                 | 4                | 116.00            |
| Formalin                 | 4                | 116.00            |
| 80% Alcohol              | 4                | 128.00            |
| 95% Alcohol              | 4                | 128.00            |
| 95% Alcohol              | 4                | 128.00            |
| 100% Alcohol             | 4                | 128.00            |
| 100% Alcohol             | 4                | 128.00            |
| 100% Alcohol             | 4                | 128.00            |
| 100% Alcohol             | 4                | 128.00            |
| Xylene                   | 4                | 128.00            |
| Xylene                   | 4                | 128.00            |
| Paraffin                 | 4                | 304.00            |
| Paraffin                 | 4                | 304.00            |
| Paraffin                 | 4                | 304.00            |
| Paraffin                 | 4                | 304.00            |
| Cleaning Xyl             | 4                | 128.00            |
| Cleaning Alc             | 4                | 128.00            |
| Water                    | 4                | NC                |
|                          | <b>68</b>        | <b>2728.00</b>    |

| Leica Tissue Processor |                  |                   |
|------------------------|------------------|-------------------|
| Reagents               | Total Gal/ Month | Total cost/ Month |
| Formalin               | 4                | 116.00            |
| Formalin               | 4                | 116.00            |
| 80% Alcohol            | 4                | 128.00            |
| 95% Alcohol            | 4                | 128.00            |
| 95% Alcohol            | 4                | 128.00            |
| 100% Alcohol           | 4                | 128.00            |
| 100% Alcohol           | 4                | 128.00            |
| 100% Alcohol           | 4                | 128.00            |
| Alcohol                | 4                | 128.00            |
| 100% Alcohol           | 4                | 128.00            |
| 100% Alcohol           | 4                | 128.00            |
| Xylene                 | 4                | 128.00            |
| Xylene                 | 4                | 128.00            |
| Paraffin               | 4                | 304.00            |
| Paraffin               | 4                | 304.00            |
| Paraffin               | 4                | 304.00            |
| Paraffin               | 4                | 304.00            |
| Cleaning Xyl           | 4                | 128.00            |
| Cleaning Alc           | 4                | 128.00            |
| Water                  | 4                | NC                |
|                        | <b>64</b>        | <b>2424.00</b>    |

| Excelsior Tissue Processor |                  |                   |
|----------------------------|------------------|-------------------|
| Reagents                   | Total Gal/ Month | Total cost/ Month |
| Formalin                   | 4                | 116.00            |
| Formalin                   | 4                | 116.00            |
| 95% Alcohol                | 0                | 0.00              |
| 100% Alcohol               | 0                | 0.00              |
| 100% Alcohol               | 0                | 0.00              |
| 100% Alcohol               | 0                | 0.00              |
| 100% Alcohol               | 0                | 0.00              |
| 100% Alcohol               | 0                | 0.00              |
| 100% Alcohol               | 0                | 0.00              |
| 100% Alcohol               | 1                | 32.00             |
| Xylene                     | 0                | 0.00              |
| Xylene                     | 0                | 0.00              |
| Xylene                     | 1                | 32.00             |
| Paraffin                   | 0                | 0.00              |
| Paraffin                   | 0                | 0.00              |
| Paraffin                   | 1                | 76.00             |
| Cleaning Xyl               | 4                | 128.00            |
| Cleaning Alc               | 4                | 128.00            |
| Water                      | 4                | NC                |
|                            | <b>23</b>        | <b>628.00</b>     |

| Reagent Cost/ Gal |         |
|-------------------|---------|
| Formalin          | \$29.00 |
| 95% Alcohol       | \$32.00 |
| 100% Alcohol      | \$32.00 |
| Xylene            | \$32.00 |
| Paraffin          | \$76.00 |

## Technician Time:

In document 2 you can see the break down of what it costs on average for a technician to maintain a tissue processor. Most routine Tissue Processors are changed no less than once a week. For purposes of this article, we will say that it takes about five minutes to change each reagent and we will use an average rate of pay/technician of \$18.00/hour. As you can see, the routine tissue processors needed about 20 minutes/reagent/month of changing time at a cost of \$0.30/minute (broken down from the \$18.00/hr).

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This amounted to about \$6.00/reagent for a technician to change it on a monthly basis. With the Excelsior ES, the routine maintenance consists of weekly changing the Formalin and cleaning reagents due to blood in the Formalin and paraffin residue in the cleaning reagents. Then by monitoring the specific gravity of the 1st alcohol, it alerts the operator when the reagents are too dumped to be used. At this point, the machine automatically offloads the reagents and again alerts you to remove the waste and to install fresh reagents into the loading areas. There is no dumping or filling of reagents which limits the amount of tech time even more. The Excelsior ES allows you to uncap a manufacturer's bottle and insert it into the loading area. This is also an added bonus for safety reasons.

| VIP Tissue Processor |                |               |            |                   |
|----------------------|----------------|---------------|------------|-------------------|
| Reagents             | Changes/ Month | Time/ Month** | Rate/ Min* | Total Cost/ Month |
| Formalin             | 4              | 20 min        | \$0.30     | \$6.00            |
| Formalin             | 4              | 20 min        | \$0.30     | \$6.00            |
| 80% Alcohol          | 4              | 20 min        | \$0.30     | \$6.00            |
| 95% Alcohol          | 4              | 20 min        | \$0.30     | \$6.00            |
| 95% Alcohol          | 4              | 20 min        | \$0.30     | \$6.00            |
| 100% Alcohol         | 4              | 20 min        | \$0.30     | \$6.00            |
| 100% Alcohol         | 4              | 20 min        | \$0.30     | \$6.00            |
| 100% Alcohol         | 4              | 20 min        | \$0.30     | \$6.00            |
| Alcohol              | 4              | 20 min        | \$0.30     | \$6.00            |
| Xylene               | 4              | 20 min        | \$0.30     | \$6.00            |
| Xylene               | 4              | 20 min        | \$0.30     | \$6.00            |
| Paraffin             | 4              | 20 min        | \$0.30     | \$6.00            |
| Paraffin             | 4              | 20 min        | \$0.30     | \$6.00            |
| Paraffin             | 4              | 20 min        | \$0.30     | \$6.00            |
| Cleaning Xyl         | 4              | 20 min        | \$0.30     | \$6.00            |
| Cleaning Alc         | 4              | 20 min        | \$0.30     | \$6.00            |
| Water                | 4              | 20 min        | \$0.30     | \$6.00            |
|                      |                |               |            | \$96.00           |

| Ventana Tissue Processor |                |               |            |                   |
|--------------------------|----------------|---------------|------------|-------------------|
| Reagents                 | Changes/ Month | Time/ Month** | Rate/ Min* | Total Cost/ Month |
| Formalin                 | 4              | 20 min        | \$0.30     | \$6.00            |
| Formalin                 | 4              | 20 min        | \$0.30     | \$6.00            |
| 80% Alcohol              | 4              | 20 min        | \$0.30     | \$6.00            |
| 95% Alcohol              | 4              | 20 min        | \$0.30     | \$6.00            |
| 95% Alcohol              | 4              | 20 min        | \$0.30     | \$6.00            |
| 100% Alcohol             | 4              | 20 min        | \$0.30     | \$6.00            |
| 100% Alcohol             | 4              | 20 min        | \$0.30     | \$6.00            |
| 100% Alcohol             | 4              | 20 min        | \$0.30     | \$6.00            |
| 100% Alcohol             | 4              | 20 min        | \$0.30     | \$6.00            |
| Alcohol                  | 4              | 20 min        | \$0.30     | \$6.00            |
| Xylene                   | 4              | 20 min        | \$0.30     | \$6.00            |
| Xylene                   | 4              | 20 min        | \$0.30     | \$6.00            |
| Paraffin                 | 4              | 20 min        | \$0.30     | \$6.00            |
| Paraffin                 | 4              | 20 min        | \$0.30     | \$6.00            |
| Paraffin                 | 4              | 20 min        | \$0.30     | \$6.00            |
| Paraffin                 | 4              | 20 min        | \$0.30     | \$6.00            |
| Cleaning Xyl             | 4              | 20 min        | \$0.30     | \$6.00            |
| Cleaning Alc             | 4              | 20 min        | \$0.30     | \$6.00            |
| Water                    | 4              | 20 min        | \$0.30     | \$6.00            |
|                          |                |               |            | \$102.00          |

| Leica Tissue Processor |                |               |            |                   |
|------------------------|----------------|---------------|------------|-------------------|
| Reagents               | Changes/ Month | Time/ Month** | Rate/ Min* | Total Cost/ Month |
| Formalin               | 4              | 20 min        | \$0.30     | \$6.00            |
| Formalin               | 4              | 20 min        | \$0.30     | \$6.00            |
| 80% Alcohol            | 4              | 20 min        | \$0.30     | \$6.00            |
| 95% Alcohol            | 4              | 20 min        | \$0.30     | \$6.00            |
| 95% Alcohol            | 4              | 20 min        | \$0.30     | \$6.00            |
| 100% Alcohol           | 4              | 20 min        | \$0.30     | \$6.00            |
| 100% Alcohol           | 4              | 20 min        | \$0.30     | \$6.00            |
| 100% Alcohol           | 4              | 20 min        | \$0.30     | \$6.00            |
| Alcohol                | 4              | 20 min        | \$0.30     | \$6.00            |
| Alcohol                | 4              | 20 min        | \$0.30     | \$6.00            |
| Alcohol                | 4              | 20 min        | \$0.30     | \$6.00            |
| Xylene                 | 4              | 20 min        | \$0.30     | \$6.00            |
| Xylene                 | 4              | 20 min        | \$0.30     | \$6.00            |
| Paraffin               | 4              | 20 min        | \$0.30     | \$6.00            |
| Paraffin               | 4              | 20 min        | \$0.30     | \$6.00            |
| Paraffin               | 4              | 20 min        | \$0.30     | \$6.00            |
| Cleaning Xyl           | 4              | 20 min        | \$0.30     | \$6.00            |
| Cleaning Alc           | 4              | 20 min        | \$0.30     | \$6.00            |
| Water                  | 4              | 20 min        | \$0.30     | \$6.00            |
|                        |                |               |            | \$96.00           |

| Excelsior Tissue Processor |                |               |            |                   |
|----------------------------|----------------|---------------|------------|-------------------|
| Reagents                   | Changes/ Month | Time/ Month** | Rate/ Min* | Total Cost/ Month |
| Formalin                   | 4              | 20 min        | \$0.30     | \$6.00            |
| Formalin                   | 4              | 20 min        | \$0.30     | \$6.00            |
| 95% Alcohol                | 0              | 0 min         | \$0.30     | \$0.00            |
| 100% Alcohol               | 0              | 0 min         | \$0.30     | \$0.00            |
| 100% Alcohol               | 0              | 0 min         | \$0.30     | \$0.00            |
| 100% Alcohol               | 0              | 0 min         | \$0.30     | \$0.00            |
| 100% Alcohol               | 0              | 0 min         | \$0.30     | \$0.00            |
| 100% Alcohol               | 0              | 0 min         | \$0.30     | \$0.00            |
| Alcohol                    | 1              | 5 min         | \$0.30     | \$1.50            |
| Xylene                     | 0              | 0 min         | \$0.30     | \$0.00            |
| Xylene                     | 0              | 0 min         | \$0.30     | \$0.00            |
| Xylene                     | 1              | 5 min         | \$0.30     | \$1.50            |
| Paraffin                   | 0              | 0 min         | \$0.30     | \$0.00            |
| Paraffin                   | 0              | 0 min         | \$0.30     | \$0.00            |
| Paraffin                   | 1              | 5 min         | \$0.30     | \$1.50            |
| Cleaning Xyl               | 4              | 20 min        | \$0.30     | \$6.00            |
| Cleaning Alc               | 4              | 20 min        | \$0.30     | \$6.00            |
| Water                      | 4              | 20 min        | \$0.30     | \$6.00            |
|                            |                |               |            | \$34.50           |

\* Rate/ min for Technicians (for purposes of this article) are averaged at \$18.00/hr  
\*\* Time/month to change reagents (for purposes of this article) are averaged at 5 minutes/reagent

## Safety Features:

In Diagram 3 you will see a side-by-side comparison of the safety features of each of the instruments chosen for evaluation. As is clearly demonstrated, the Excelsior ES has the most up to date and extensive safety features of any of the Routine Tissue Processors looked at. One of the safety features I referred to in the Technician Time section of this article was the remote fill and drain feature. The less time a tech is exposed to solvents the better. The fact that you do not have to dump or pour reagents significantly limits that person's exposure time. Also as a note, the remote fill and drain feature on the Excelsior ES varies greatly from the same feature on the Leica. The Excelsior ES option is handled in the ventilated reagent cabinet. The Leica, on the other hand, is done in the open with a tech holding a hose into a bottle. This increases tech time and increases exposure rates.

| Safety Features                                       | Excelsior | Ventana | Leica | VIP |
|---|-----------|---------|-------|-----|
| Filtered Reagent Storage (Tech Safety)                | X         | X       | X     | X   |
| Alarms for Malfunctions (Patient Care)                | X         | X       | X     | X   |
| Tech Free Reagent Removal (Tech Safety)               | X         | X       |       |     |
| Monitors reagent quality (Patient Care)               | X         |         |       |     |
| Down Draft Ventilation when opening lid (Tech Safety) | X         |         |       |     |

Some of the more standard safety features can be found on all four of the instruments like the malfunction alarms or the filtered reagent storage area. Though the latter feature varies in all four instruments. The Excelsior ES has a more innovative filtered reagent area which forces fumes to be evacuated from the area. A door sensor alerts you when you are in the reagent storage area. The Excelsior ES also has two other unique features. The first is the reagent quality monitoring. For patient care purposes it is vital that the reagents on the processor be in good working order. This is what led technicians to the weekly changing of processor reagents, whether they needed it or not. With this unique monitoring system, there is no guesswork on the quality of reagents; which in turn reduces the amount of waste of good reagents. The second unique feature of the Excelsior ES is the Down Draft Ventilation around the reaction chamber. As we all know in the lab there is always going to be last minute specimens added to the tissue processor. These additions always seem to have to go on the processor after it has already been started. So to avoid a face full of toxic fumes, the Excelsior ES offers the Down Draft Ventilation thus cutting down on another potential exposure area.

It should be noted that the tissue processing results from three of the four tissue processors were fairly comparable. The Excelsior performed at a more superior level especially when you factored in all of its enhanced features. There were less reagent costs, less tech time, and much better safety features. Combine these together and you can see who the clear winner is going to be when you have to make your choice for a new tissue processor.