

## Understanding the EDAX Autophase Selection Routine

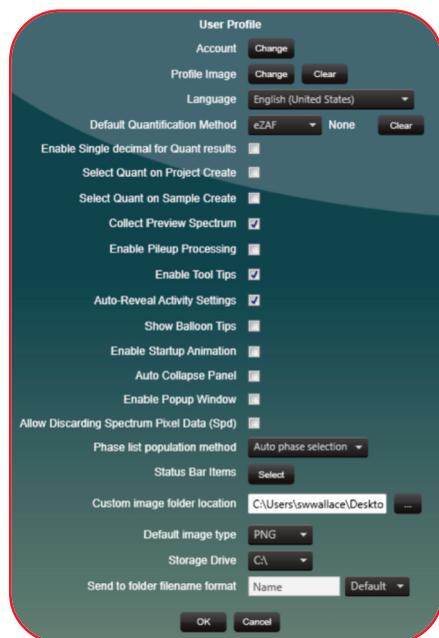


Figure 1. The Auto Phase Selection Routine is turned on by selecting it from the Phase List Population Method pulldown found in the User Profile window.

The most important step of this routine is turning it on. It can be found under the User Profile window under Phase List Population Method (Figure 1). Select “Auto phase selection” and it is now ready to use.

The next step in using this process is making sure that the Energy Dispersive Spectroscopy (EDS) system is ready for use, as it uses the EDS data to populate the phase list. The EDS detector needs to be both inserted and cooled to get optimal results. The routine is started when you image the area inside TEAM™. After the area is imaged, the routine does a full EDS scan over the entire field of view determining what element(s) are present and in what proportions. One word of caution here is that it does use the entire field of view. It is usually best to make sure at this point, that the field of view is the area you want to run. The biggest thing to avoid here is the mounting material. Make sure you do not include epoxy, aluminum stubs, or glass slides in the area as it will include their elemental makeup.

After the EDS survey is done, the found elements are searched for in

Graphite	Austenite	Ferrite	Aluminum	Copper	Nickel	Brass-Alpha
Brass-Beta	Cobalt-Alpha	Cobalt-Beta	Titanium-Alpha	Titanium-Beta	Zirconium-Alpha	Zirconium-Beta
Zinc-Beta	Tungsten	Tantalum	Molybdenum	Manganese-Alpha	Manganese-Beta	Manganese-Gamma
Cadmium Telluride	Aragonite	Calcite	Quartz	Silicon	Gold	Platinum

Table 1. A partial list of phases included in the Autophase Selection Routine.

One of the most common questions received from new Electron Backscatter Diffraction (EBSD) users is “How do I know what phase file to choose from?”. This is not an easy question to answer for some materials, but for many materials, our built in Autophase Selection Routine works well. This routine can help the novice user understand their samples better, removing the need for understanding all the complexities of phase ID.

a special subset of our database. From this search, the phases are added to the phase list and are ready for you to use in your analysis. At this point, it is best practice to confirm the phases via our Survey Mode. You should try multiple spots over the sample and look at our indexing metrics to see if the phases selected are correct for your sample.

The two main metrics to look at are Confidence Index (CI) and Fit. Fit is a relatively straight forward concept. The Fit metric compares the indexed solution versus the Hough Transform and sees how well the triangles we use for indexing overlay the solution. The deviation between the two are measured as the Fit. In general, these values should be  $<2.0^\circ$ , ideally less than  $1^\circ$ . In deformed samples or lower quality patterns, this value can be expected to be higher.

The CI is slightly more complicated to understand than the Fit metric. CI is a measure of uniqueness between the two best solutions. This metric takes the votes for the winning solutions and subtracts from it the second best solution. This value is then divided by the number of ideal solutions to give you the actual CI value. These values range from 0 to 1. Users should feel comfortable knowing that the solution

is correct with any value greater than 0.15. The attached graph (Figure 2) shows that for the value 0.15, we have the solution and orientation for the solution correct over 90% of the time. Any value greater than 0.2 quickly goes to 100%

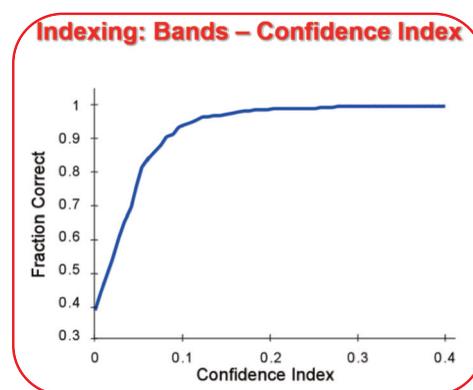


Figure 2. The fraction indexed correctly rapidly increases when the Confidence Index approaches 0.1. At around 0.2, the fraction correctness approaches 100%.

with our solution. With the combination of our Autophase Selection Routine and our indexing metrics, any user can quickly populate a phase list and confidently know that their resulting work will be the best.