Decorative Aggregates are an option TAKTL provides for flat panels. TAKTL's A|UHPC™ is made from micro aggregates to achieve the high strength and exceptional durability of the material. Decorative aggregates are many times larger than the matrix particles and are therefore these aggregates are a surface element and are not integrally mixed with the base AUHPC matrix. Decorative aggregates are typically broadcast onto a mold surface and are differentiated from the base mix in size, shape, mineral chemistry and color. The reason for this is to limit the degree with which the introduction of aggregates change the mix and the reliable strength profile of the panels as well as preventing the aggregate from interfering in the fiber and mesh reinforcement of the panel. The size of the aggregate will often determine the overall thickness of a panel (i.e.: ¼" diameter aggregate may result in a panel thickness of ¾" instead of 5/8" thickness for a panel without aggregate for the same cladding panel size and engineering design criteria.

Decorative aggregates are used to create surface effects and intentional variations and are sometimes also introduced to enhance the base mix color. These aggregates can be crushed granite and glass as well as a number of other natural and synthetic materials from industrial processes. The aggregates used in TAKTL's standard specialty surfaces, SPA-TI and SPA-PL are tested to be clean and free of salts and checked for chemical compatibility to meet the requirements of the Precast Concrete Institutes PCI MNL 117-13 standards. Custom decorative aggregates often require petrographic tests to certify their use in TAKTL products since many suppliers of aggregates do not test or certify their material.

Like other natural materials such as stone and wood along with manufactured materials, there are variations in distribution of the constituent ingredients resulting in a range of surface patterns or mottling of the surface. Consideration should be made in the design and installation for such variation by anticipating differences in appearance within panels and from one panel to another. Choices in placement of panels may be required to achieve better visual outcomes through evaluating panels and how the adjacent panel will look next to other panels.

Guide to Acceptance Criteria: Aggregate Distribution + Variation

The criteria for acceptance/rejection of architectural ultra high performance concrete panels with a decorative aggregate finish can not be established outside the context of a specific project and panel design. The contributing factors for visual evaluation of material include: panels size, the size of contiguous cladding area on the façade, panel color and the aggregate size and color relative to the base mix color. Below is a set of guidelines to use in formulating the acceptance criteria with the designers, owners representatives and contractors.

- Often the acceptance or call for rejection is subjective. Mock-ups are to be used in establishing expectations and referencing acceptable conditions.
- Panels are to be viewed under normal daylight conditions perpendicular to the cladding surface from a distance of not less than 15 feet.
- Panels should be judged with a group of not less than 3 panels typical to the size and orientation of the project. A panel by itself may be viewed as problematic, however, when in the context of other panels may be acceptable.
- Panels displaying a regular geometric pattern that lacks visible aggregate should be rejected prior to shipment.
- There will be higher and lower densities of aggregate within a panel and this are deemed to be inherent in the material finish. Only when heavier and lighter areas are acutely contrasting and result in a discernable pattern shall the panel be rejected. *(See Fig. 1)*
- The contrast between the base matrix color and the color of the aggregate can shift what is acceptable or rejected. Uneven distribution of aggregate will be less noticeable when the aggregate and base color are similar and the reverse is true for panels where the aggregate is a contrasting hue or value relative to the base matrix. *(See Fig. 2)*
- Panel with a "large" contiguous area lacking visible aggregate should be rejected prior to shipment; the definition of 'large area' is relative to the panel size and the size of the field of panels for which it is a part. Examples: 5ft X 10ft panels missing contiguous aggregate in an area greater than approximately 18"to 20" in diameter should be rejected. 2ft X 4ft panels missing contiguous aggregate greater than approximately 6" to 10" should be rejected. In each case for panel size and acceptance, as noted above, the panel base color the aggregate size and color will have a role along with panel size to arrive at an agreed acceptance criteria.
- Small air voids (¼" or less and not creating a discernable pattern) resulting from the aggregate distribution do not represent a durability or performance defect and there is no technical reason for rejection of this panel. Aesthetically small imperfections such as this would be acceptable under TAKTL's QC procedures given a reasonable viewing distance. *(See Fig. 3)*

Example aggregate distribution in 4'x10' panel. *Figure 1*

Contrast example of base color matrix color to aggregate color. *Figure 2*

Example of air voids (12"x12" Sample)

Detail (12"x12" Sample zoomed in 2X) *Figure 3*