

Table 1 — TDE-LF™ Implementation Levels

TDE-LF™ can be deployed at three progressive implementation levels, depending on the customer’s objectives, available data and desired degree of plant integration.

Integration level:

● **Full live integration** ◐ **Partial / advisory integration** — **No live integration required**

Version	Main purpose	Typical use	Plant integration	Expected output
Offline Simulator	Process study and scenario evaluation	What-if analysis, ladle treatment studies, alloying practice comparison, thermal assessment, training, benchmarking	— No live plant connection required	Simulated treatment trends, thermal and metallurgical analysis, comparison of refining strategies
DSS / Advisory Mode	Decision support during ladle treatment	Operator guidance, temperature and chemistry adjustment support, alloying review, slag practice interpretation, process monitoring	◐ Historical, exported or semi-live plant data	Recommendations, warnings, process interpretation, support for treatment decisions
Online Digital Twin	Real-time synchronized process representation	Live monitoring, predictive supervision, treatment tracking, digital twin deployment	● Integrated with live plant signals and automation architecture	Real-time tracking, predicted process evolution, dynamic advisory output, synchronized digital process view

Each level corresponds to a different operational scope, from offline engineering analysis to real-time synchronized process intelligence.