The technology developments and changes in the composition of the labor force have reshaped the relationship between capital and workers, making the interaction between technological capital and labor an important topic of study. To evaluate whether capital–skill and capital–experience complementarity holds within different age and skill group, we construct a short-run variable cost function and estimate seemingly unrelated regressions with country–industry fixed-effects using data for 13 OECD countries from the EU KLEMS and IFR databases. Our findings show that capital-skill and capital-age complementarities vary by age, skill and technology type. Capital–skill complementarity appears among young workers for robots and among old workers for ICT. For capital-age complementarities, robotic capital complements low-skilled workers, while ICT does not show any capital-age complementarity. In addition to the baseline analysis, we also consider heterogeneity across countries. Focusing on Continental European economies, where wage inequality rose less, we find patterns that closely resemble those in the full sample. However, cross-country differences in population aging and the diffusion of industrial robots influence the magnitude and significance of the estimated effects.