Sorting and Grading the Steel

Smashing apart and sorting the *kera* is an arduous process. Once cooled, the *kera* is hauled to a separate workshop, where it is smashed apart with a drop hammer. In ironworks of the past, the drop hammer was lifted using a waterwheel-powered system, but the machine at Nittōho Tatara is electric. This procedure is then repeated using a smaller drop hammer, producing chunks that can be handled by a single worker. At this stage, the chunks are sorted according to quality, which is determined largely by carbon content and physical structure.

Nittōho Tatara's mission is to produce *tamahagane* steel, which is treasured by swordsmiths for its strength and ductility. *Tamahagane* is graded according to its carbon content and fracture surface (the appearance of a cross section of the metal). The difference in fracture surface can be seen by comparing the microscopic images on the panel. The rougher fracture surface of third-grade steel (third image from the left) is evident in the distinct white bands that are absent in second-grade steel (second image) and first-grade steel (first image).

Grades of *Tamahagane* Steel

Grade	**Carbon content**	**Fracture surface**
First-grade steel	Approx. 1.2%	Homogeneous
Second-grade steel	0.8–1.5%	Heterogeneous
Third-grade steel	0.2–1.0%	Rough