I think that Definition P is great because it removes all inconsistencies between Euler's initial conjecture and the refutations. At the same time, it makes the result completely irrefutable which is not necessarily bad. It is really favorable toward (implicitly accepts) the idea (ex. some polygons are not polyhedra) that things aren't valid unless they adhere to a dogmatic notion of absolute or necessary truth. Definition P resolves the conflicts inherent to this notion.

Essentially, it would be better to clarify which shapes are Eulerian; the conjecture shouldn't be extended to non-convex polyhedra. We could also just recognize that polyhedra are generally Eulerian because the vast majority of them are. Then we could perhaps derive some more interesting results from Euler's insight.

Definition P nullifies any possibility of falsifying Euler's theorem and continuing the process of scientific discovery. Polygons and vertices, etc. are still vaguely defined and do not even exist. So Definition P doesn't really contribute anything to mathematical knowledge. Also, it essentially does the same thing that all the other proposed axioms do except instead of redefining polyhedra in response to specific counterexamples, it just redefines them in a way that excludes all counterexamples and makes refutation impossible.

As Lakatos mentions we already have a notion of familiarity with polyhedrons. And it is arguable that if we take any one of these definitions (particularly that a polyhedron is a system of polygons for which V-E+F=2 holds) and put it in a textbook, the people reading it will see that V-E+F=2 or that "exactly two polygons meet at every edge" with confusion as to why it was defined that way (to prove a particular point). Definition P is good in a way because it is trying to achieve absolute certainty without departing from what we are trying to prove.