

Iron Magic

by

 **Toa & Arai**

UNPRECEDENTED TECHNOLOGY INTEGRATION UNVEILED!



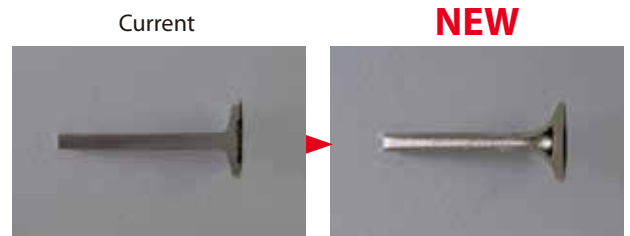
Toa & Arai offers you available solutions for any kinds of VA/VE. Strengths of Toa & Arai lie in:

T&A Strength

- To build close and reliable partnership with customers
- To develop and manufacture products which precisely accommodate with customers' needs
- To guarantee high strength and durability of our products
- To assure high reliability of our products
- To constantly propose high value-added products

1 Machine-less Precision Forging

Materials that are difficult to process, such as hollow valves, are now precisely manufactured through our forging technology. By developing a scheme for forging, we have successfully produced precise shapes and sizes while maximizing the volume of hollow valves.



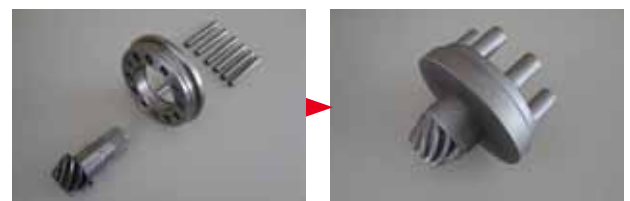
2 All-in-one Forging without Assembling Process

Complicated-shaped products are manufactured through our exclusive "Extrusion" forging technology. It eliminates an assembling process while increasing the intensity and accuracy of the products, thus leading to "high-quality" and "cost-effective" products.



3 Inconceivable Shape Forging

At Toa & Arai, what we have is the list of inconceivable shape forging technologies. Examples include integration of "All-in-one Forging" with "Machine-less Precision Forging", which results in cost and weight reduction while increasing durability of a product.



A State of the Art Invention

Proudly introducing Toa & Arai's Forging Technologies

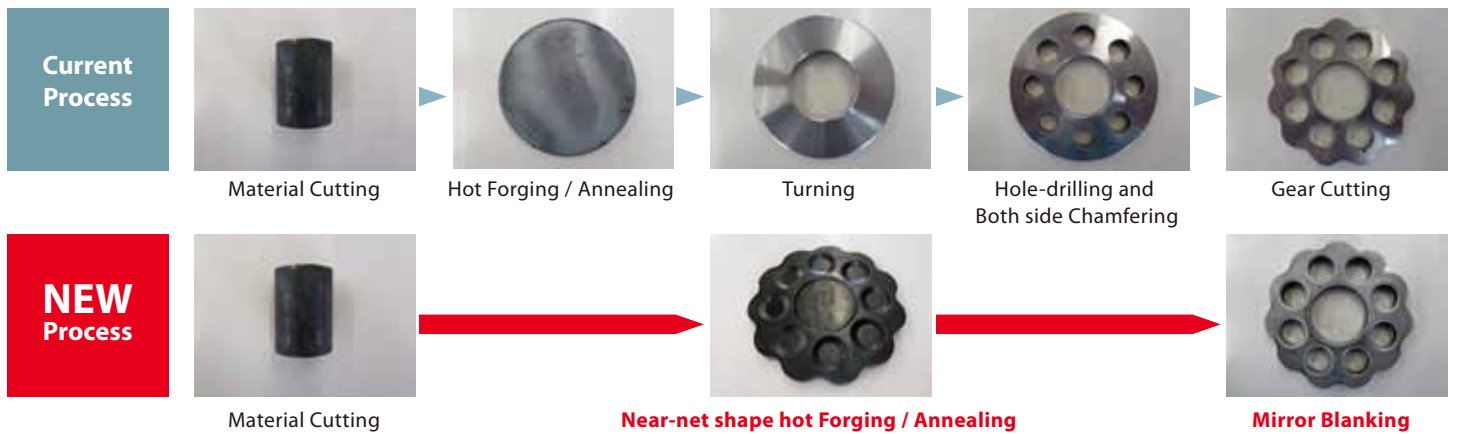
Another ground-breaking technology is invented by Toa & Arai in Japan. It is "Mirror Blanking". By incorporating hot-forging and other new processes in production, "Mirror Blanking" has several advantages over other blanking methods, leading to dramatic improvements in manufacturing time and product quality.

“Mirror Blanking”

“Mirror Blanking” features several remarkable characteristics. Namely, it provides better surface than fine blanking (Rz 1.2). It also allows thicker materials (30~40mm) to be processed. There is No cracking risk in “Mirror Blanking” while it is available for High Carbon Materials (C:1%). It also reduces production time. For more details, see comparison of the processes and blanking methods below.



Comparison between Current and New Process



Comparison Chart among Mirror Blanking and other blanking methods

Comparison Chart		pcs./Lot	Cost Index	Accuracy		Yield rate	C/T Index	Max. thickness (mm)	Quality Blanking Surface
				Geometric Dimension	Surface roughness				
Mirror Blanking		500	40	100+	Ra 0.3	90%	70	30 ~ 40	No Cracking Risk
		25,000*	35*		Rz 1.2				
Fine Blanking		500	1,000	100	Ra 1.6	50%	10	15 ~ 20	Cracking Risk
		25,000*	50*		Rz 6.3				
Current Machining		500	100-130	100	Ra 3.2	60%	100	-	No Cracking Risk
		25,000*	100*		Rz 12.5				

* The asterisk mark indicates production lot and cost index of competing companies in general.