

# Pulse Hard Anodization Process

Hard anodizing process produces a thick ceramic like coatings on Aluminum and its alloys. The micro hardness of the coating is more than 250 HV. These dense anodic coatings are usually thick by normal anodizing standards, and they are produced using special anodizing conditions. The thickness range is usually between 25 and 250  $\mu\text{m}$ . The hard anodic oxide coatings produced under special conditions have high hardness values and very good abrasion resistance compared to normal anodic coating.

## Features

- Pulse hard anodizing process is carried out at +10°C compared to conventional hard anodizing process, which is carried out at -5°C, thus saving a considerable cooling load.
- The burning and powdering problems associated with conventional hard anodizing process are eliminated

## Applications

- Hard anodic oxide coatings find application in the engineering industry for components where

abrasion resistance is the required primary characteristic of the coating. For Ex:

- Automobile Industry ( Pistons, Cylinders, Hydraulic gears)
- Aerospace Industries ( Variety of components like sliding / rotating mechanisms with solid lubricants, Thermal barrier coating, Thermal control coating etc.,)
- Chemical and flame resistant surfaces
- Cooking utensils
- Highly insulating (electrical) dielectric coating

Processing Parameters	Conventional Hard Anodizing	Pulse Hard Anodizing	Advantages
temperature (°C)	-5 ±2	10 ±2	<ul style="list-style-type: none"> <li>• Considerable saving in cooling load and cost.</li> <li>• Solution conductivity is better and permits higher current density processing.</li> </ul>
Current Density(A.ft-2)	35 ±5	45 ±5	• Faster, better and harder coating
Voltage (V)	24 -90	16 - 32	<ul style="list-style-type: none"> <li>• Heating at the interface of Component &amp; electrolyte is eliminated.</li> <li>• Burning problem is eliminated</li> </ul>
time (min)	80 -120	40-60	<ul style="list-style-type: none"> <li>• The time taken to build up a thickness of 50-70 microns is halved.</li> <li>• Results in harder coating without powdering.</li> </ul>
Properties of the Coating			
Thickness (micron )	60±10		
Microhardness (HV)	250-350	250 - 500	• Better and harder coating
Insulation value	30-2.5 GΩ	30-1.5 GΩ	• comparable
Coff. Of friction	0.3 to 0.5	0.3 to 0.4	• Comparable
Corrosion resistance (Rp in Ω .cm <sup>2</sup> )	18.7 X 10 <sup>6</sup>	11.1 X 10 <sup>6</sup>	• Comparabl

## Technology Transfer from ISRO

ISRO is willing to offer the knowhow of this technology to suitable entrepreneurs / industries in India. Capable manufacturing industries interested in acquiring this knowhow may write with details of their present activities, requirements and plans for implementation, infrastructure and technical expertise available with them, their own market assessment, if any, and plans for diversification to the address given below: