



The Performance Advantage.

High Performance  
Protection & Durability

Physical Vapor Deposition (PVD)

PVD CERTESS®NITRO

DLC CERTESS®CARBON

Super Finishing

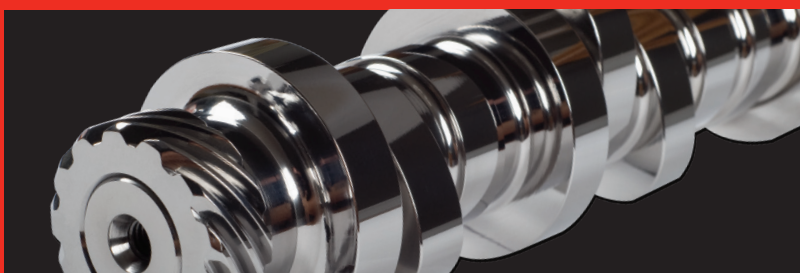
Super Micro Finishing

THIN COATINGS PERFORM

## Our Approach

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At Calico Coatings, we pride ourselves on thoroughly understanding our customers' business challenges and working with them to customize coating solutions that meet their needs.





“Race teams are the some of the most demanding clients that we have. Professional auto racing has been the proving ground for our coatings due to the demanding environment. Applying what we’ve learned from the racing industry is how we’ve been able to adjust and perfect coating solutions for numerous other industries across the spectrum.”

Tracy Trotter  
Owner, Calico Coatings



## About Calico

Across various high-performance industries Calico provides a wide range of advantages to engineers and manufacturers worldwide. We’re applying coatings that can withstand extreme pressure to provide the needed edge for outstanding results.

## Industries

Aerospace  
Automotive  
Chemical  
Diesel  
Energy  
Food Processing  
General Manufacturing

Marine  
Metal Forming  
Military  
Molds & Dies  
Nuclear  
Oil & Gas  
Weaponry

# PVD COATINGS

Calico's thin film PVD coatings are high in hardness, increase wear resistance and have high reliability in dry operations to promote increased part lifespan. They are typically used in extreme environments and have excellent abrasive wear resistance. Our thin film technology is sound, customizable in structure, eco-friendly and embodies our advancements in surface engineering.

These tables show a summary of properties such as hardness, typical coating thickness, deposition temperature and maximum usage temperature. Parameters such as deposition temperature are important to ensure that the component being coated is not exposed to conditions that are above its tempering temperature and the base / core hardness is not compromised.

## Applications

Punches & Dies  
Mechanical Components  
Stamping  
Forming  
Injection Molding  
Sawing  
Tapping  
Automotive Parts  
Pump Parts  
Shafts  
Dry Deep Drawing

PVD Coating	Architecture	Thickness	Hardness (HV)	Treatment Temperature	Maximum Use Temperature	Coefficient of Friction (Dry)	Colors
Calico D	nACo-G	<5 microns	4200 4500	448°C	1093°C	0.45	Violet, Blue
Calico D-2	nACRo	<5 microns	3500 4000	448°C	1093°C	0.35	Silver, Gray
Titanium Carbo-Nitride	TiCN	<4 microns	2200 2500	448°C	398°C	0.20	Rose Gold
Titanium Carbo-Nitride	TiCN	<4 microns	2300 2600	448°C	498°C	0.20	Gray
Titanium Nitride	TiN	<7 microns	2400 2800	448°C	598°C	0.55	Gold
Titanium Aluminum Nitride	TiAlN	<4 microns	2600 2800	476°C	748°C	0.60	Violet, Black
Aluminum Titanium Nitride	AlTiN	<4 microns	3200 3400	476°C	898°C	0.70	Black, Gray
Chromium Nitride	CrN	<4 microns	1800 2200	398°C	704°C	0.30	Metallic Silver

Calico's PVD CERTESS<sup>®</sup>NITRO coatings contain the deposition of thin (2-10 microns; 0.0001"– 0.0004") films on the surface of parts and materials.

Our complete range of ultra-hard PVD coatings are available to help eliminate all of your wear challenges.

## Applications

Punches & Dies  
Mechanical Components  
Stamping  
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Shafts  
Dry Deep Drawing

PVD CERTESS <sup>®</sup> NITRO Coating	Architecture	Thickness	Hardness (HV)	Treatment Temperature	Maximum Use Temperature	Coefficient of Friction (Dry)
CERTESS <sup>®</sup> NITRO Ti	TiN	<5 microns	25-30 GPa	<200°C	500°C	0.20-0.25
CERTESS <sup>®</sup> NITRO T	TiAlN	<5 microns	25-30 GPa	<200°C	800°C	0.20-0.25
CERTESS <sup>®</sup> NITRO TC	TiCN	<5 microns	25-30 GPa	<200°C	800°C	0.20-0.25
CERTESS <sup>®</sup> NITRO SD	TiBN	<5 microns	30-35 GPa	<200°C	800°C	0.20-0.25
CERTESS <sup>®</sup> NITRO X	Cr <sub>x</sub> N <sub>y</sub>	<5 microns	20-25 GPa	<200°C	700°C	0.20-0.25

General remarks: All given data are approximate values that depend on application, environment and test condition:

- Measured by nano-indentation according to ISO 14577
- These are approximate values out of the field. Due to thermodynamic laws there is a dependency of pressure in application
- Determination by ball-on-disc test in dry condition with a coated steel ball according to ASTM G99



# DLC COATINGS

Calico's Diamond Like Carbon (DLC) coatings are a dense, metastable form of hydrogenated amorphous carbon (a-C:H) containing significant SP<sup>3</sup> bonding. The new technological advancement of PVD+PECVD (plasma-enriched CVD) coatings has led to the development of customizable DLC coatings.

These advanced coatings have many different combinations of properties that promote high load-bearing capabilities, making them the most suitable selection for improving the performance of engineered parts.

All of Calico's DLC CERTESS® CARBON coatings can be "made-to-order" based on the terms of hardness, coefficient of friction, roughness, adhesion level, load carrying capacity, resistance to humidity influenced degradation, fatigue tolerance, etc. depending on deposition limitation, deposition technology and the combination of materials establishing the coating. There are many common variants among the Calico DLC CERTESS® CARBON coatings as follows:

## Applications

Punches & Dies  
Mechanical Components  
Stamping  
Forming  
Injection Molding  
Sawing  
Tapping  
Automotive Parts  
Pump Parts  
Shafts  
Dry Deep Drawing

DLC CERTESS® CARBON Coating	Architecture	Thickness	Hardness (HV)	Treatment Temperature	Maximum Use of Temperature	Coefficient of Friction (Dry)
CERTESS® CARBON DT	WCC	< 5 microns	10-15 GPa	<200°C	400°C	0.20 – 0.25
CERTESS® CARBON DCX	CrN + a-C:H	< 5 microns	10 – 25 GPa	<200°C	300°C	0.10 – 0.15
CERTESS® CARBON DCY	Cr+WCC + a-C:H	< 5 microns	10 – 25 GPa	<200°C	300°C	0.10 – 0.15
CERTESS® CARBON DCZ	CrN + WCC + a-C:H	< 5 microns	10 – 25 GPa	<200°C	300°C	0.10 – 0.15
CERTESS® CARBON TC	CrN + taC	< 2 microns	20 – 65 GPa	<200°C	350°C	0.10 – 0.15

Calico's Super Finishing and Super Micro Finishing are two surface finishing technologies used to remove microscopic peaks, component stresses and stress risers generated during the machining cycle. In both processes, a minimal amount of material removal (3/10000 of an inch) leaves an isotropic finish.

These processes remove the "peaks" from manufacturing machined metal components and are completed with a diamond polish to create a high luster finish.

Super Finishing is a chemically accelerated vibratory process while Super Micro Finishing is a high energy process that uses no chemicals.

## Applications

Gears  
Axles  
Camshafts  
Lifters  
Valve Springs  
Rocker Arms  
Crankshafts  
Connecting Rods  
Hand Tools  
Firearm Components

Finishing Process	Substrate	Temperature Ratings	Thickness	Color(s)
Super Finishing	Tool Steels and Maraging Steels	22°C	-0.2 to -0.1 mil	High luster
Super Micro Finishing	Tool Steels and Maraging Steels	22°C	<-0.1 mil	High luster

General remarks: All given data are approximate values that depend on application, environment and test condition:

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- Determination by ball-on-disc test in dry condition with a coated steel ball according to ASTM G99

Defense Logistics  
Cage Code (47SQ4)



Federal Firearms  
Licensee (FFL)



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# PROVIDING ADVANTAGES

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