MATERIAL SAFETY DATA SHEET

I. PRODUCT IDENTIFICATION

MANUFACTURER'S NAME: Pacific PVD Hardcoat
ADDRESS: 11312 Sunrise Gold Cir.
Rancho Cordova, Ca 95742

Telephone No# (916) 638-0501
Date Prepared: November, 1985
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TRADE NAME (Label Identity): TITANIUM NITRIDE COATING
CHEMICAL NAME (Generic): Titanium Nitride (TiN) (CAS NO.) 25583-20-4

II. HAZARDOUS INGREDIENTS

The terms 'hazardous' and 'hazardous materials as used within this MSDS should be interpreted as defined by, and in accordance with, the OSHA Hazard Communications Standard (29 CFR Part 1910, 1200) including cited Appendices, Lists, References, etc., all of which are hereby incorporated by reference. At present there are no established OSHA PELs or ACGIH TLVs for Titanium Nitride (TiN) Coating.

MATERIAL OR COMPONENT	CAS NO.	Wt %	OSHA PEL (Mg/M^3)	ACGIH TLV (Mg/M^3)
TITANIUM NITRIDE(TiN)	25583-20-4	100	NA	NA

III. PHYSICAL DATA FOR TITANIUM NITRIDE

BOILING POINT:	9000 °F	MELTING POINT:	5306°F
SPECIFIC GRAVITY (H_2O=1)	Approx. 7.0-9.0 (60°F)	VAPOR PRESSURE:	N/A
VAPOR DENSITY (AIR=1):	N/A	SOLUBILITY IN H_2O:	Insoluble
% VOLATILES BY VOLUME:	N/A	EVAPORATION (BUTYL ACETATE=1):	N/A

APPEARANCE & ODOR: Golden colored coating about .0001" thick, odorless. Titanium Nitride is a chemically inert substance. This extremely thin film of Titanium Nitride coating is applied to cutting tools, forming tools, molds and wear parts to extend part life.

IV. FIRE AND EXPLOSION DATA

FLASH POINT: None FIRE POINT: None

V. HEALTH HAZARD INFORMATION

WE DO NOT CONSIDER THE COATING IN THE FORM IT IS SOLD TO CONSTITUTE A PHYSICAL HAZARD OR A HEALTH HAZARD. SUBSEQUENT OPERATIONS SUCH AS ABRADING, MELTING, WELDING, CUTTING OR PROCESSING IN ANY OTHER FASHION, A TITANIUM NITRIDE COATED OBJECT, MAY PRODUCE POTENTIALLY HAZARDOUS DUST OR FUMES WHICH CAN BE INHALED, SWALLOWED, OR COME IN CONTACT WITH THE SKIN OR EYES. THE DUST OR FUME CREATED BY THIS SUBSEQUENT PROCESSING WILL CONSIST OF EXTREMELY MINUTE PARTICLES OF TITANIUM NITRIDE TOGETHER WITH ARTICLES OF MATERIAL FROM THE COATED OBJECT (SUBSTRATE MATERIAL). USERS OF COATED TOOLS SHOULD CHECK MSDS SHEETS FOR SUBSTRATE MATERIAL FOR POSSIBLE HEALTH HAZARD EFFECTS FROM MATERIAL OF COATED OBJECT.

PRIMARY ROUTES OF ENTRY:		EMERGENCY FIRST AID:
	Inhalation	Remove to fresh air, if condition continues, consult physician.
	Eye Contact	Flush well with running water to remove particulate. Get medical attention.
	Skin Contact	Brush off excess dust. Wash area well with soap & water.
	Ingestion	Seek medical help if large quantities of material have been ingested.

EFFECTS OF EXPOSURE: No toxic effects would be expected from exposure to the solid form of Titanium Nitride coated tools. Prolonged, repeated exposure to fumes or dusts generated during heating, cutting, brazing or welding may or may not cause adverse health effects associated with the listed constituents in excess of OSHA permissible exposure limits established in 29 CFR Subpart Z. (See Section II).

V. HEALTH HAZARD INFORMATION (CONT'D)

EXPOSURE LIMITS: Section II lists specific ingredients and permissible exposure limits.
IMPORTANT: Determine actual exposure by industrial hygiene monitoring.

POSSIBLE SIGNS AND SYMPTOMS OF EXPOSURE TO DUST, WELDING, FUME AND GASES:

SHORT TERM EXPOSURE: Metallic taste; nausea, tightness of chest; fever; irritation of eyes, nose, throat and skin; loss of consciousness/death due to welding gases or lack of oxygen.

LONG TERM EXPOSURE: There are no adverse effects from Titanium Nitride coated products in their solid form. Adverse effects may or may not result from long-term (chronic) exposure to dust, fume, gases, etc. that occur by way of subsequent operations on the Titanium Nitride coated product. We believe there are no reliable scientific studies which show that workers exposed to operations upon Titanium Nitride coated products suffer increased incidence of lung cancer or other disease because of exposure to Titanium Nitride.

Some studies would associate elements from various substrate materials (material the coated object is made of) with the potential for neurologic, pulmonary, respiratory, skin or other disease. Chromium, cobalt and nickel in various chemical compounds have been identified as suspect human carcinogens by the I.A.R.C., N.T.P. Annual Report. Users of Titanium Nitride coated products should check MSDS sheets of substrate material for possible health hazard effects from material of coated object.

AGGRAVATION OF PREEXISTING RESPIRATORY OR ALLERGIC CONDITIONS MAY OCCUR IN SOME WORKERS.

VI. REACTIVITY DATA

STABILITY:	Chemically Stable
INCOMPATIBILITY:	Reacts with Strong Acids
HAZARDOUS DECOMPOSITION PRODUCTS:	Metallic Oxides

VII. SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE OF RELEASE OR SPILL: N/A
WASTE DISPOSAL METHOD: Solids - Sale as Scrap for Reuse
Dust, etc. - Follow Federal, State and Local Regulations Regarding Disposal

VIII. SPECIAL PROTECTION INFORMATION

VENTILATION REQUIREMENTS: General - Recommended (To keep airborne concentration of dust and fumes below ACGIH TLV'S)
Local - As Required

PERSONAL PROTECTIVE EQUIPMENT:

Respiratory Protection:	If fumes, misting or dust condition occurs and TLV as indicated in Section II is exceeded, provide NIOSH approved respirators.
Eye Protection:	Recommend approved safety glasses or goggles when working with dusty material.
Gloves:	As Required
Other Clothing or Equipment:	As Required

IX. SPECIAL PRECAUTIONS

USE GOOD HOUSEKEEPING PRACTICES TO PREVENT ACCUMULATIONS OF DUSTS AND TO KEEP AIRBORNE DUST CONCENTRATIONS AT A MINIMUM.

THIS MATERIAL IS POTENTIALLY CONTAMINATED WITH COATINGS SUCH AS OILS FOR PRESERVATIVES AND OTHER CONTAMINANTS. IF THE MATERIAL IS CONTAMINATED, SPECIAL PRECAUTIONS (SUCH AS PROCESS CONTROL, AND PERSONAL PROTECTIVE EQUIPMENT APPROPRIATE TO THE NATURE OF THE SUSPECTED CONTAMINANTS SHOULD BE TAKEN TO AVOID RESULTING EXPOSURES WHEN HANDLING, CUTTING (THERMAL OR MECHANICAL) AND/OR HEATING OR MELTING.

N/A = NOT APPLICABLE