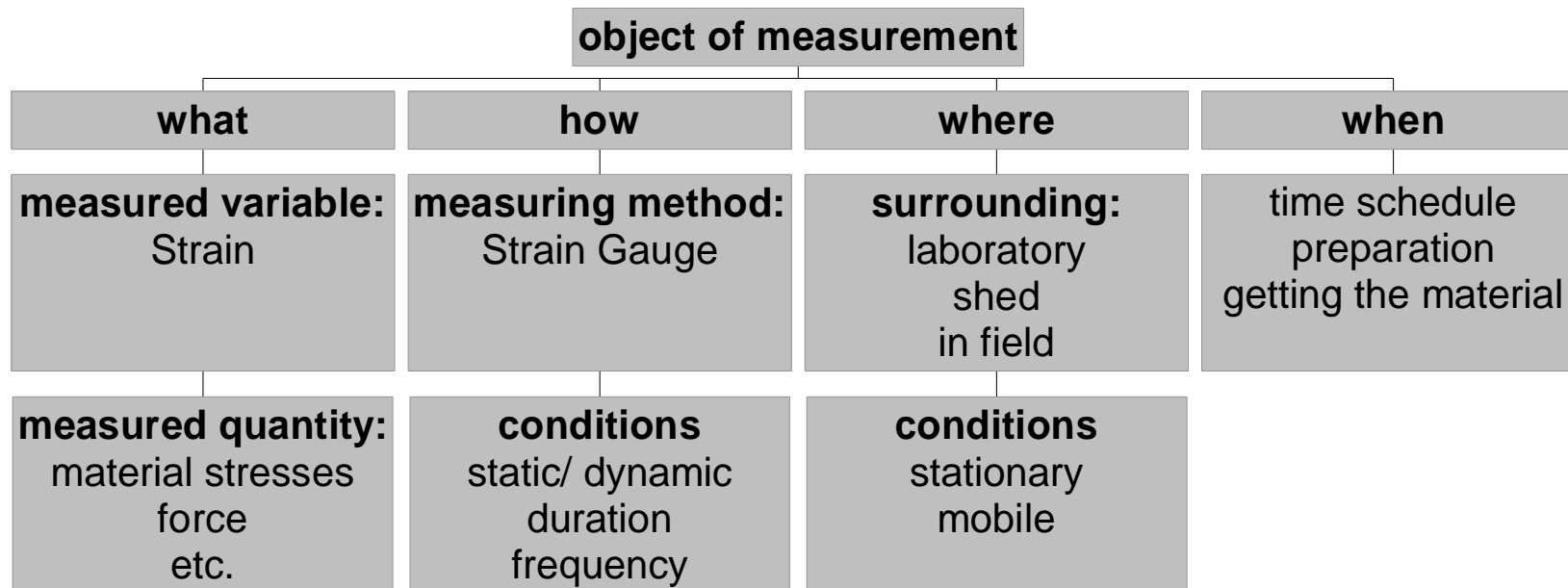


How to install a strain gauges



measurement with confidence

Planing the application



Planing the application

Personnel	Well trained persons available
Signal Conditioning	Amplifier (carrier frequency or DC)
Strain Gauges (SG)	Selection of suitable gauges (SG-Catalogue)
Installation Plan	SG-Type, position of SG, selection of adhesive
Wiring scheme	wire, cable, material to fix the wires....
Protection for the SG	Protective coating, electrical shielding

Planing the application

Criteria for the selection of material

Strain Gauge

- stress state (?-axial)
- temperature
- range of temperature adjustment
- material of workpiece
- accuracy

Adhesive

- surface of workpiece
- temperature
- duration of measurement
- hot curing possible?

Coating

- temperature
- environment
- duration of measurement

Strain gauge application with cold curing adhesiv

- preparation of the workpiece`s surface
- preparation of the strain gauge (*and solder tabs*)
- bonding with Z70
- *wiring*
- optical and electrical check of the application
- (*protection of the strain gauge application*)
- connecting the amplifier CanHead + MGCplus

Surface-preparation of the metal workpiece

- initial removal of grease and dirt with household cleansing agent, if required.
- complete mechanical removal of rust, Oxide etc.
- levelling the surface by filing and sanding
- cleaning with RMS1 (Isopropanol & Acetone).
- roughening of the surface by sanding or sandblasting or chemical
- marking the position of the strain gauge
- final cleaning with RMS 1 Solvant.



Roughen the surface by sandblasting

- result:
 - ideal adhesion
- prerequisite:
 - pressured air, free of any oil or water
 - new, unused blasting material
 - material surface completely degreased
- blasting medium:
 - chose the right grain!
 - Corundum (Aluminuim Dioxide).
 - Boron carbide for extremely hard material

Please follow the manual for the adhesive!

Practical part

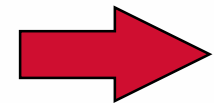
Roughen by sanding

Problem: Sandblasting is impossible

Solution: Sanding

- clean the surface with RMS1 solvent to remove grease.
- move the sand paper in circles to avoid sanding orientation.
- always use new sanding paper.
- choose the right grain, for the adhesive and the hardness of the workpiece.

See instructions of the adhesive !

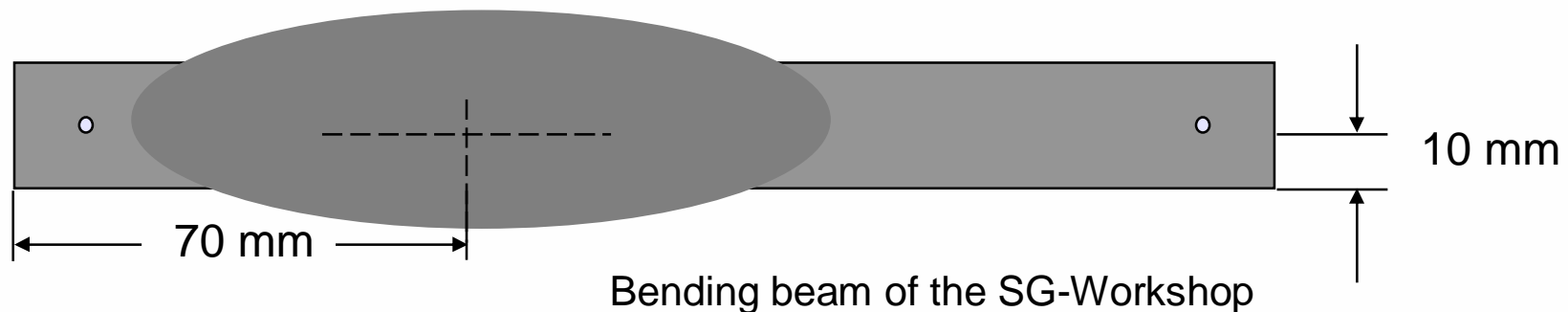


Installation of an strain gauges

Roughening and marking

Sanding has to be done in an extensive area around the installation area.

(for Z70 use grain 220)



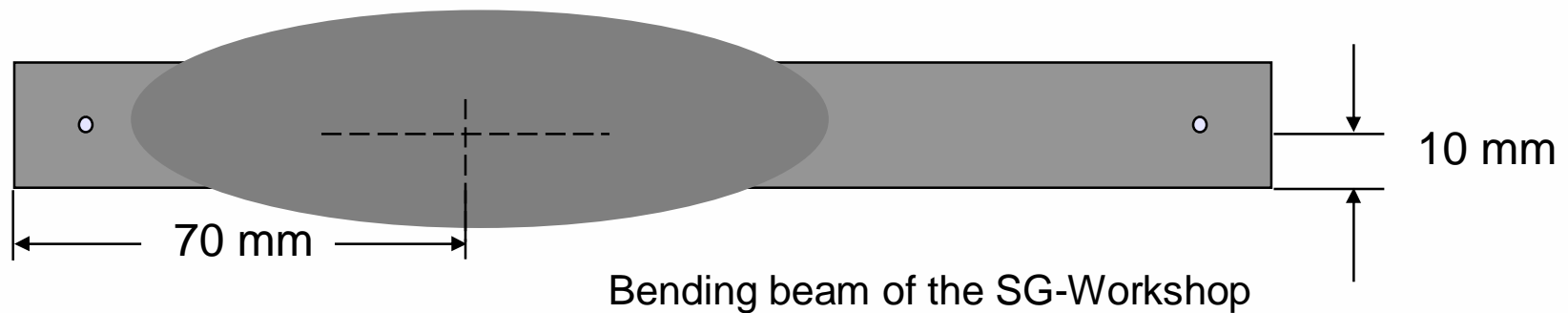
Sanding has to be followed by **cleaning with RMS1**

Installation of an strain gauges

Marking ...

... the strain gauge position with an empty ballpoint.

Never use a sharp scribe.

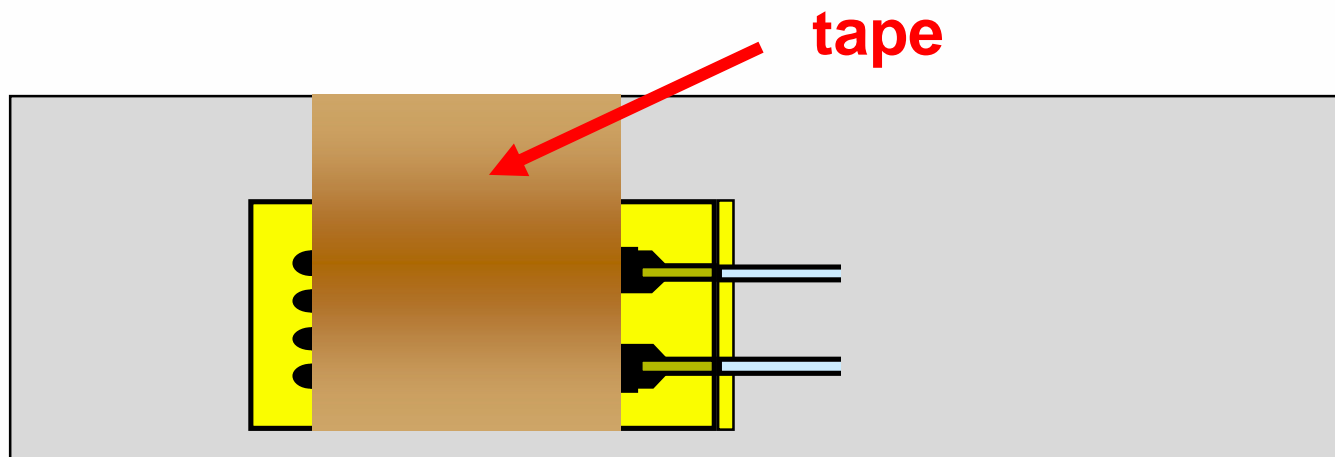


Final Cleaning of the Surface

- Clean an extensive area, then work towards the centre.
- Repeat cleaning, until the cleaning pads become dirt free.
- Do not blow away fluff (or similar) with your breath, as it contains grease.

Preparation of strain gauges *and solder tabs*

- Cut off tape at one side of the prepared strain gauge, by using scissors or scalpel.

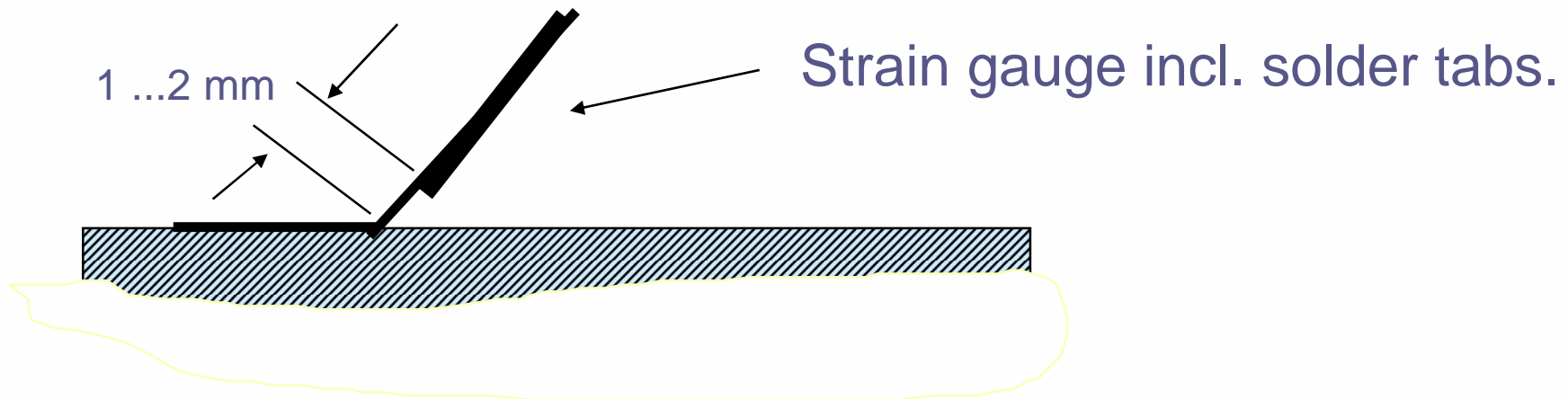


- Lift the strain gauge off and fixing the strain gauge at the material

Installation of an strain gauges

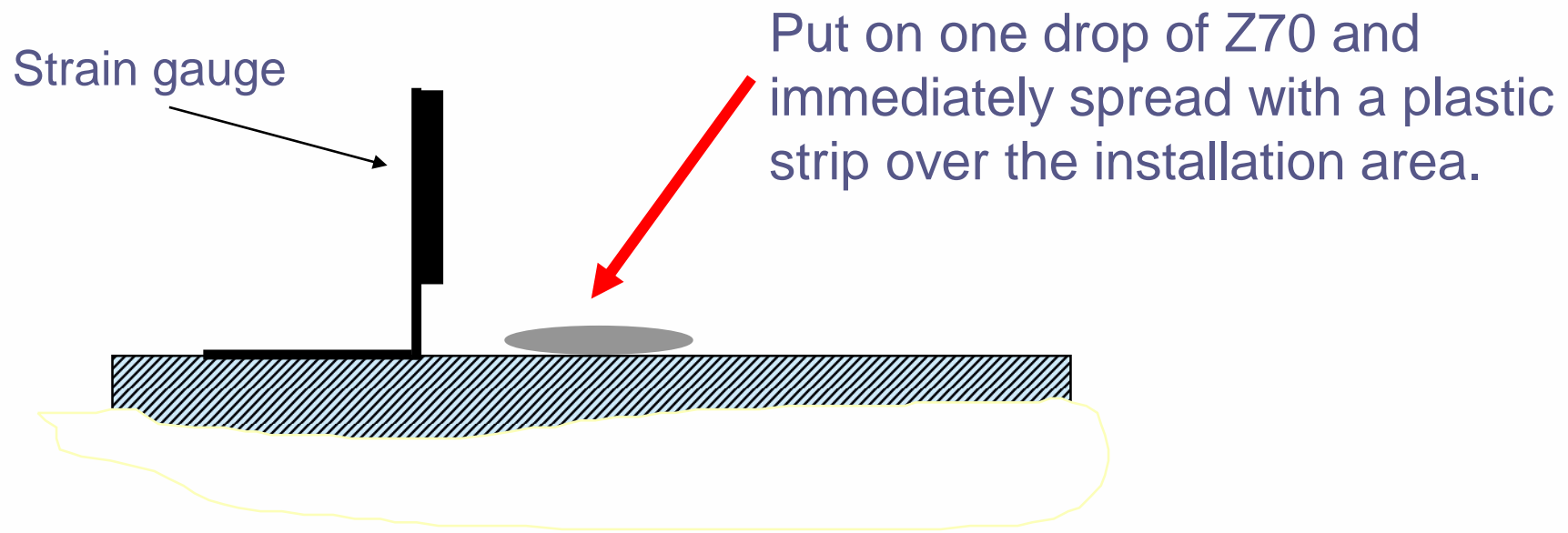
Bonding with Z70

Turn up the strain gauge including the solder tabs like a hinge, using your tweezers.



Bonding with Z70

The Z70 cures very fast, therefore keep everything ready that is needed for bonding.



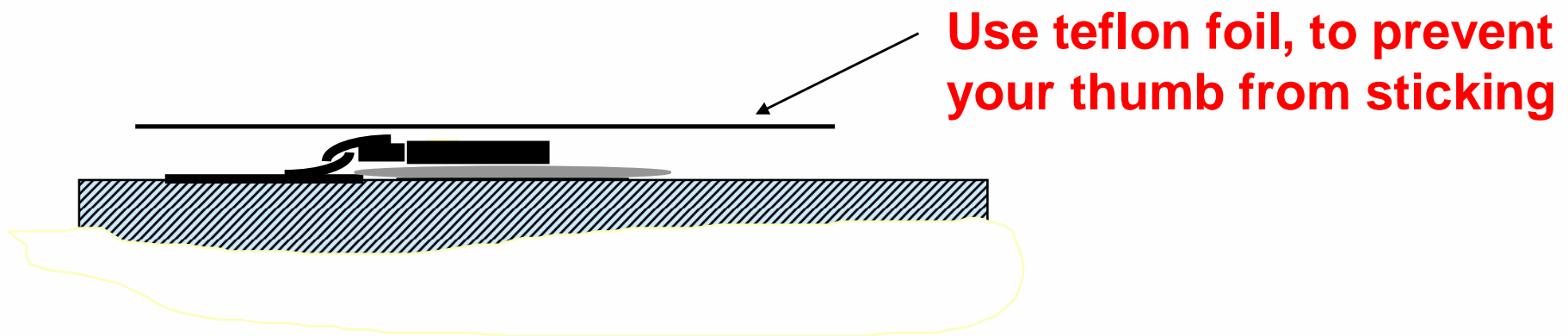
Installation of an strain gauges

Bonding with Z70

- Put down the strain gauge.
- Cover with the teflon foil.
- Press down with your thumb for 1 minute.

Immediately

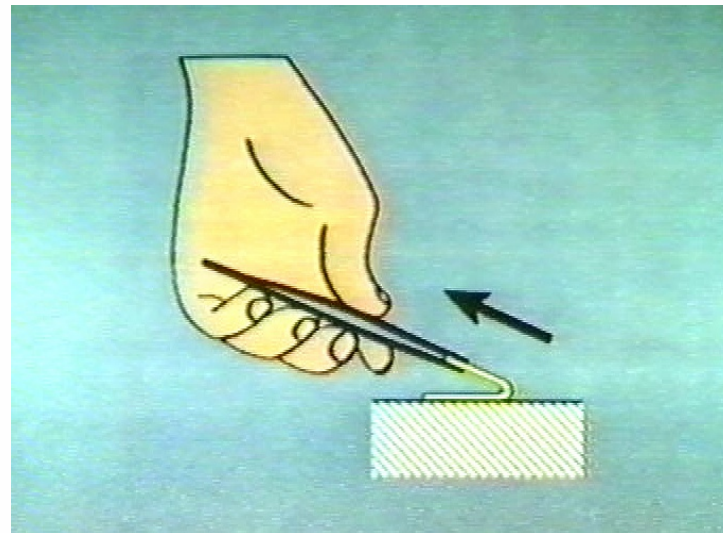
Keep a stable pressure over the installation area.



Bonding with Z70

Z70 needs about **10 Minutes** curing time before the tape can be lifted off.

Lift off the tape ...
...from strain gauge in the
direction of the solder tabs.



Testing the Application

Visual testing, look for:

- inclusion of air or particles below the strain gauge.
- insufficient adhesion at the edges of the gauge.
- poor soldering quality.
- residual flux, which may impair insulation resistance.

Insulation testing:

- resistance between the SG connections (120 ohms).
- resistance between the gauge and the workpiece.

Testing the Application

Insulation resistance

- to be measured between the strain gauge and the workpiece with the Ohmmeter.
- insulation resistance should be about **20.000M Ω** at room temperature.
- A change in the insulation resistance causes an output signal.

This is because the insulation and grid resistances are in a parallel circuit.

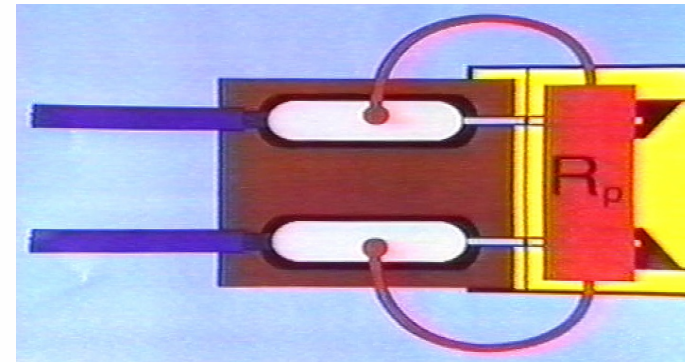
The higher the strain gauge resistance, the greater the influence on the insulation resistance, hence we select a lower resistance where possible.

Testing the Application

Insulation resistance

Example: the reduction of the insulation resistance from $1000\text{M}\Omega$ to $1\text{M}\Omega$ causes a zero shift of:

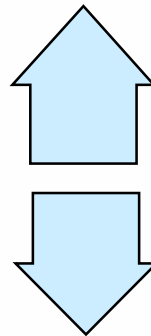
- $-60\mu\text{m}/\text{m}$ at a 120Ω SG
- $-175\mu\text{m}/\text{m}$ at a 350Ω SG
- $-350\mu\text{m}/\text{m}!$ at a 700Ω SG



Protecting the Application

It is a must to protect the strain gauge installation from chemical and mechanical influences

What protection



is necessary ?

To reach absolute protection for unlimited time, hermetical sealing is the only answer



Protecting the Application

Questions to ask:

- surrounding environment?
- the operating life of the application?
- the measurement precision required?

Protecting the Application

Requirements to the coating:

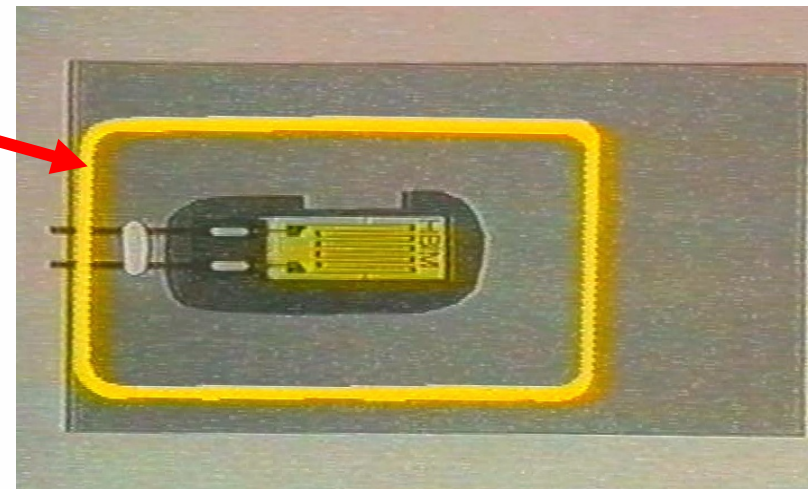
- non corrosive cover - SG250 is acid free.
- must not cause any chemical reaction with the workpiece, adhesive or strain gauge.
- must not be too stiff, so that it mechanically supports a weak workpiece

Installation of an strain gauges

Protecting the Application

The coating should be applied ...

- ... immediately after the strain gauge installation, to avoid contamination.
- ... in an greater area than the adhesive zone, to seal all potential moisture paths.



Connection to Amplifier / Testing in Operation



thank you...
... for your attention

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measurement with confidence