E-NEWSLETTER

June 2021 issue

THE SOCIETY OF ACOUSTICS SINGAPORE

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Registration No: 0331/1989
Year of Registration: 1989

CONTENTS

I.CONFERENCE NEWS

. The 27^{7h} International Congress on Sound and Vibration(ICSV27) will be held in Prague.Czech Republic from 11 to 15 July 2021 and will be a virtual conference.

Woon Siong Gan will be organising three structured sessions on:

1. Nonlinear acoustics and vibration
2. Acoustic metamaterials & phononic crystals: fundamentals and applications
3. Sound propagation in curvilinear spacetime

Please visit www.icsv27.org for more informations.

Due to the coronavirus situation, the ICSV27 will be postponed to 11 to 15 July 2021 and will be a virtual conference.. Please visit www.icsv27.org for further informations.

II.ANNOUNCEMENTS

The Society of Acoustics will be sending out invoices to members with outstanding membership subscriptions. Members are encouraged to make payment in support of the Society.

The E-Newsletters will be made available to industrial contacts in an effort to promote the activities of the Society.

The Society is also exploring the possibility of organising talks and other professional events in collaboration with acoustic societies of other countries.

Membership Certificates will soon be made available to all members who had made full payments of membership dues

The Society aims to increase membership by inviting all persons, including those from the institution of higher learning and other related societies such as the Institute of Architects, Singapore and the members of the mechanical engineering division of the Institution of Engineers, Singapore who are qualified in the various field of Acoustics to join our Society.

We are especially keen to invite students to join our society and we are establishing the Youth Chapter soon.

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III.INTERNATIONAL ACOUSTICS NEWS

International Year of Sound (IYS) 2020/2021 activities

Please find below an International Sound Competition organised as part of the activities of the IYS.

Competition@sound2020.org

Dear IYS National Representatives,
we hope this finds you well.
First of all, we would like to thank you for your efforts in involving schools, students and teachers in the IYS- Student Competition. We received amazing items of national winners from 13 countries both for the I and the II competition categories and it is a very important result, especially considering the difficulties related to the still on-going Covid-19 pandemic.

We would like to inform you that since yesterday and until July 15 the evaluation of the received items is on-going. Specifically, both the IYS steering committee (as expert jury) and the web (popular) jury have started to express their preferences.

We also kindly ask you to inform at national and local level the schools which directly participated to the IYS competition and also everyone you think could be interested that they (as part of the popular jury) are invited to leave a "like" to their favorite drawing and stanza (1 person = 1 vote) on the official facebook page @IYS2020.

Here you can find the direct link to the albums related to each competition category:
I CATEGORY-DRAWINGS
https://www.facebook.com/media/set?vanity=IYS2020&set=a.507658887336158
II CATEGORYSTANZAS
https://www.facebook.com/media/set?vanity=IYS2020&set=a.507661304002583

Finally, we remind you the invitation to look for and involve well-known singers from your country and to make them recording the verse (or just saying the motto… "We are the sound of the world!").
For any further information or clarifications do not hesitate to ask us.

Best Regards

--

ICA IYS 2020 - Competition Coordinator Office
Coordinator:
Sergio Luzzi

Office:
Chiara Bartalucci
Sara Delle Macchie
Rossella Natale

IYS - Certificate of participation

Inbox

Tue, Jun 22, 6:52 PM
(3 days ago)

competition@sound2020.org
to

Dear National Representatives,
we hope this finds you well.

Following the suggestions of some of you, we have prepared a template of Certificate of participation to IYS student competition that you can share with local referents and then deliver to the involved schools.
Please find it attached.

For any questions do not hesitate to write back,
Best regards,

PS Please remember that the voting of the contributions received for the IYS competition is in progress and is open until July 15!

--
ICA IYS 2020 - Competition Coordinator Office
Coordinator:
Sergio Luzzi

Office:
Chiara Bartalucci
Sara Delle Macchie
Rossella Natale

Attachment

CERTIFICATE OF PARTICIPATION

The International Year of Sound Steering committee 2020-2021 certifies that the

NAME OF THE SCHOOL

Primary/Middle/Secondar School

Has participated to the Competition launched in the frame of the International Year of the sound with the item produced by [Name] [Surname] (to be repeated in case of groups of students) Competition category [Drawing related to the own world of sounds, inspired by the motto of IYS 2020 – 2021 "Importance of Sound for Society and the World" / Stanzas inspired by the melody and the refrain of the song "The Sound of the World" as well as by the motto of IYS 2020 – 2021 for Society and the world

For the IYS 2020-2021 Coordination Committee

Marion **Michael**

HEAD-Genuit-Stiftung

For the IYS 2020-2021 Coordination Committee

Sergio

IV.MEMBERSHIP SUBSCRIPTION

Fellow	S$70
Member	S$50
Associate	S$30
Student	S$15
Corporate	S$200

FEE BASED ON ANNUAL RATE

FOR MORE INFORMATION PLEASE CONTACT: Dr. Woon Siong Gan at email: wsgan5@gmail.com

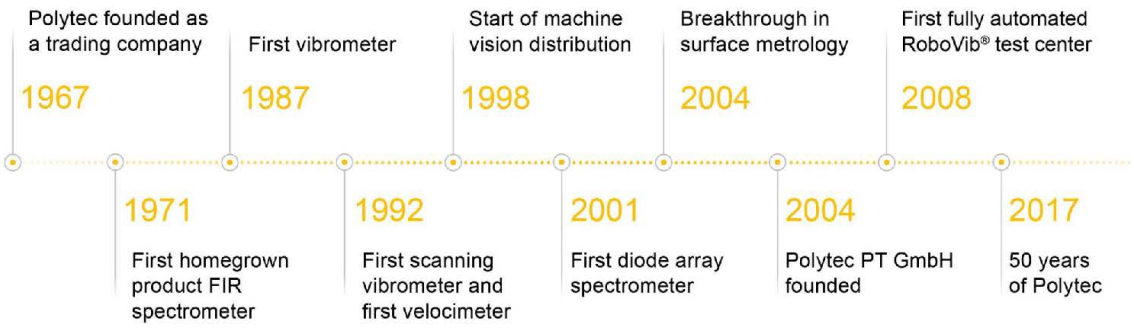
Membership application forms can be downloaded from the society website: www.acousticssingapore.com. Please complete and email to wsgan5@gmail.com

V.ARTICLES

The following is a zoom powerpoint presentation by Jim Chia of Polytec SE Asia Pte Ltd to commemorate the International Nosie Awareness Day on 28 April 2021.

Jim Chia, Polytec South-East Asia Pte Ltd
Optical measurement solutions for noise, vibration and harshness (NVH) testing
The Annual International Noise Awareness Day 28th April 2021

From a pioneer to the
World market leader



www.polytec.com

From a pioneer to the World market leader

Polytec

1967 Polytec founded as a trading company

1971 First homegrown product FIR spectrometer

1987 First vibrometer

1992 First scanning vibrometer and first velocimeter

1998 Start of machine vision distribution

2001 First diode array spectrometer

2004 Breakthrough in surface metrology

2004 Polytec PT GmbH founded

2008 First fully automated RoboVib® test center

2017 50 years of Polytec

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Polytec Worldwide

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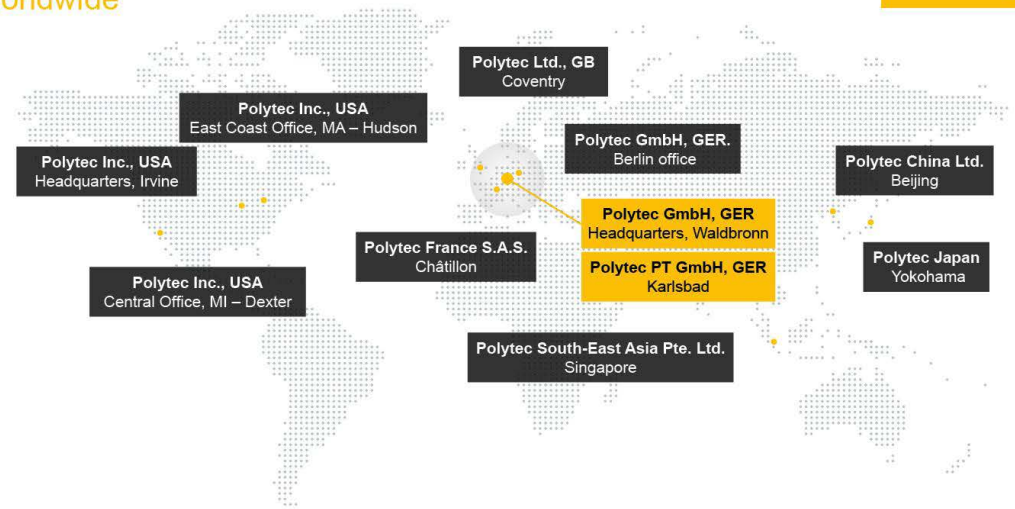

www.polytec.com

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2. Introduction vibrometry

Polytec

Why use laser Doppler vibrometry ?

Vibrations…

- cause unwanted noise (e.g. rattling, squealing,…)
- cause material failure (e.g. crack growth, fatigue, wear,…) and reduce product lifetime
- worsen the accuracy of measuring and positioning systems
- as indicator for product quality

Polytec

Why use laser Doppler vibrometry ?

- Contactless, very accurate vibration measurement
- No mass-loading, no influence on test objects
- Many measuring points within short time
- Reaches difficult to access positions
- Measure on soft, tiny, jointed and hot surfaces
- Large working distances (for high temperatures, high voltage, explosion danger,…)
- Overcome drawbacks of contacting transducers

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Why use laser Doppler vibrometry ?

Measure velocity & displacement and capture

- small to large objects: µm .. xx m
- slow to fast movements: <1 mm/h .. 100 km/h
- small to large amplitudes: pm .. m
- low to high frequencies: DC .. GHz

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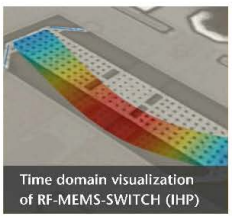
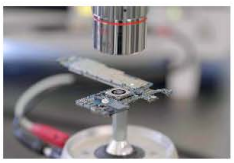
Why use laser Doppler vibrometry ?





- ✓ Non-contact
- ✓ Reactionless
- ✓ Remote
- ✓ Fast
- ✓ Reliable
- ✓ Laser-precise

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3. Portfolio

Optical Vibration Measurement | 3. Portfolio

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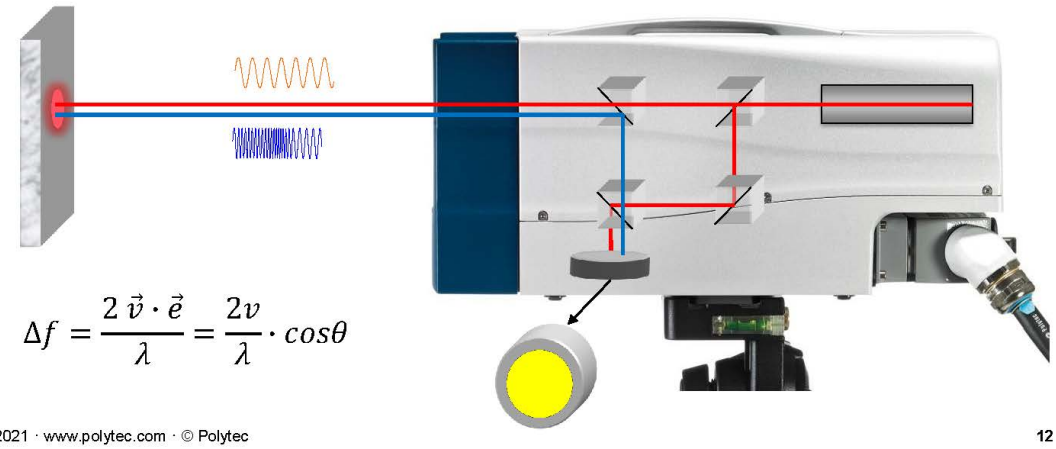
Laser Doppler measuring principle



$$\Delta f = \frac{2\,\vec{v}\cdot\vec{e}}{\lambda} = \frac{2v}{\lambda}\cdot cos\theta$$

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Optical Vibration Measurement | 3. Portfolio

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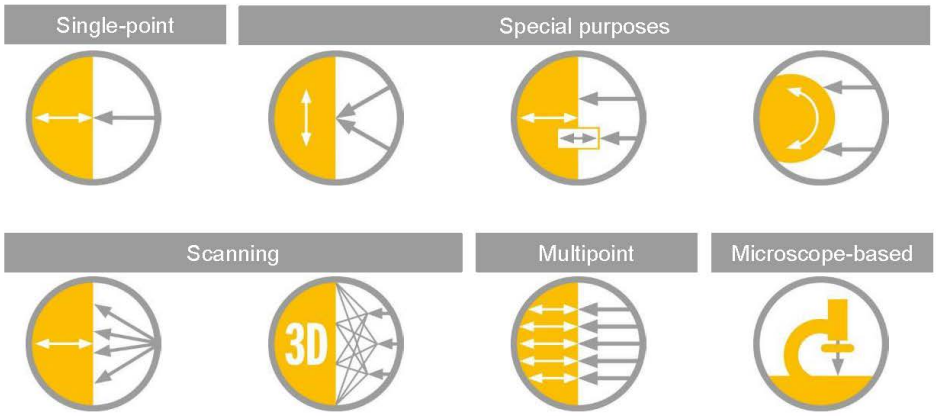
From single-point to scanning vibrometers



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Optical Vibration Measurement | 3. Portfolio

Single-point vibrometers

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Portable / VibroGo

Modular / VibroFlex

Special purpose / RSV

Industrial / IVS

Compact

High-Speed / HSV

10.05.2021

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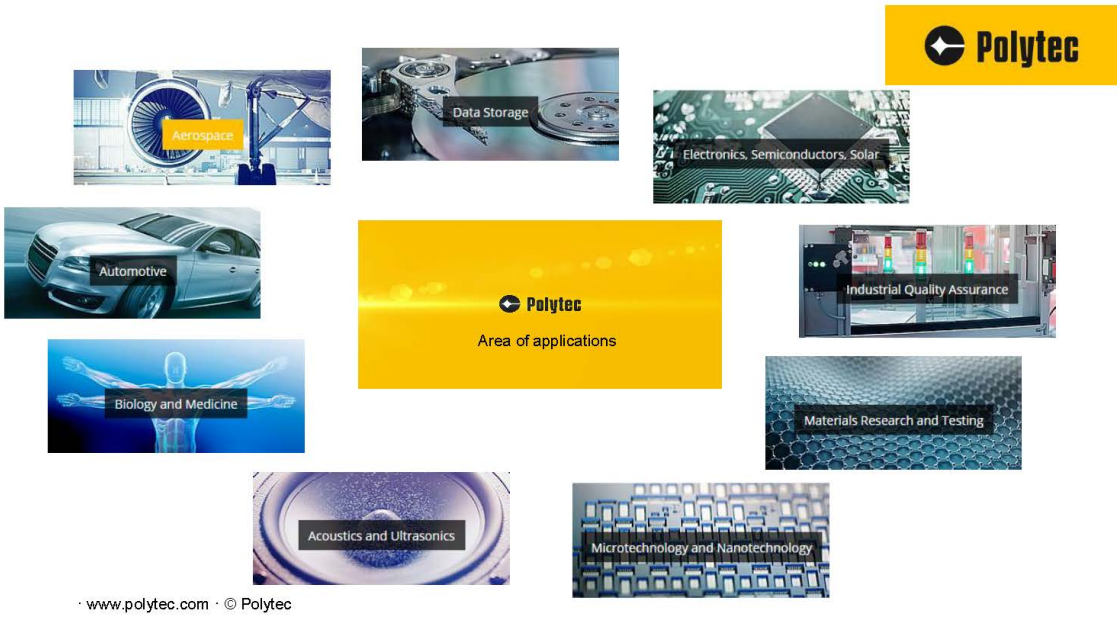
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Aerospace
Data Storage
Electronics, Semiconductors, Solar
Automotive
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Area of applications
Industrial Quality Assurance
Biology and Medicine
Materials Research and Testing
Acoustics and Ultrasonics
Microtechnology and Nanotechnology
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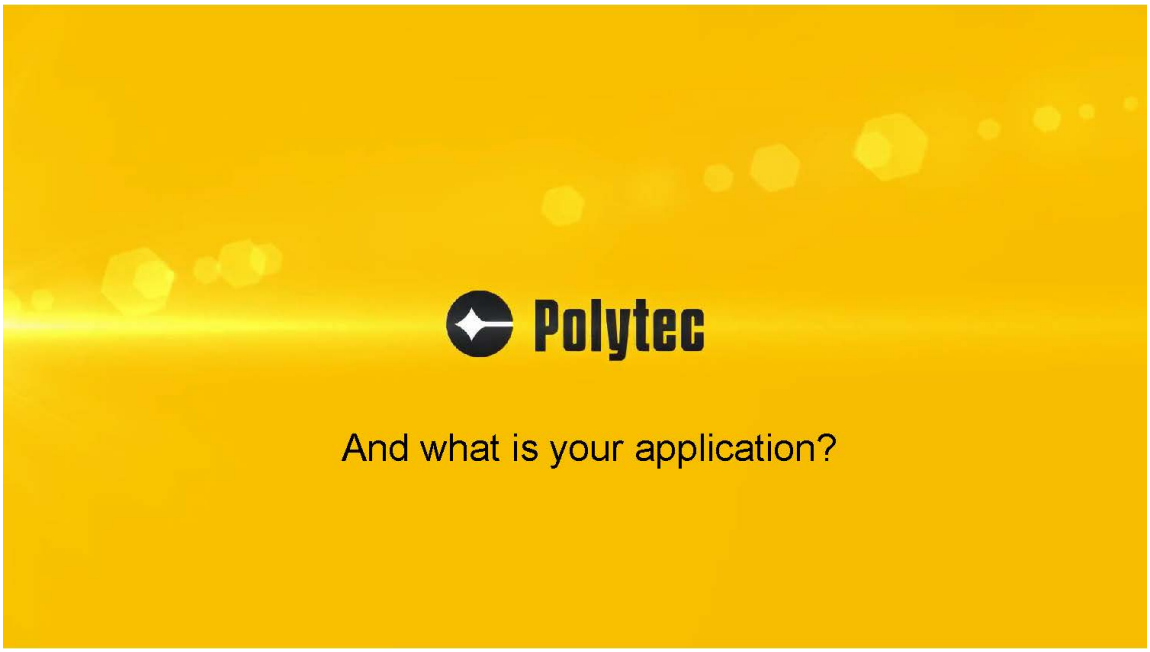
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And what is your application?

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Thank you
for your attention

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Shaping the future since 1967

High-tech for research and industry
Pioneers. Innovators. Perfectionists.

Thank you
for your attention

Jim Chia j.chia@polytec-sea.com / info@polytec-sea.com
For more info: www.polytec.com

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Optical Vibration Measurement | 3. Portfolio

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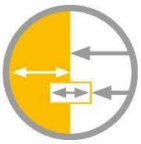
Typology: Special purpose vibrometers

In-plane / IPV	Differential / VibroFlex Fiber	Rotational / RLV
		
		

Optical Vibration Measurement | 3. Portfolio

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Typology: Scanning vibrometers

1D	3D	Automatic 3D
PSV-500	PSV-500-3D	RoboVib
		

Optical Vibration Measurement | 3. Portfolio

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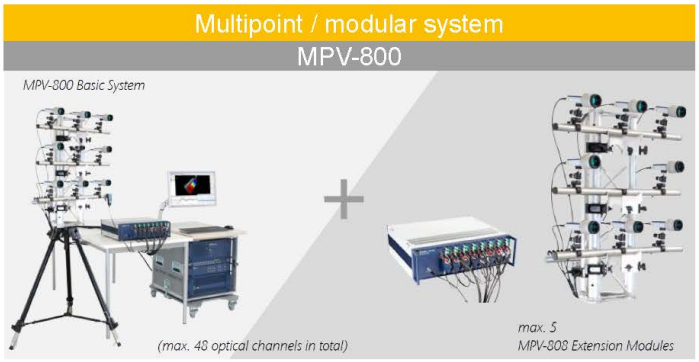
Typology: Multipoint Vibrometer



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Optical Vibration Measurement | 3. Portfolio

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Typology: Microscope-based vibrometers

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4. NVH-Optimization

Web Academy – NVH optimization and troubleshooting with SLV

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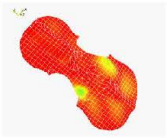
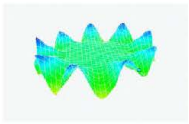
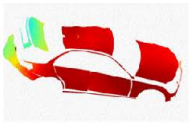
Everything vibrates!

- **acoustic vibrations**
  - beneficial: audio systems, musical instruments
  - annoying: brake squeal, engine noise
- **ultrasonic > 20 kHz**
  - beneficial: ultrasonic inhalers
  - annoying: resonances of hard disk read write heads
- **structural dynamics**
  - beneficial : if tuned right
  - annoying : bad riding comfort







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Web Academy – NVH optimization and troubleshooting with SLV

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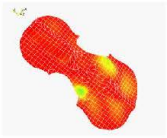

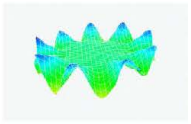

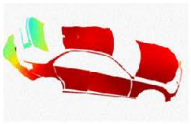

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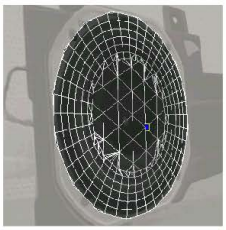
What do you hear?

- **Dynamic change of air pressure / density**
- **Sound is …**
  - **induced by vibrations of a surface**
  - **radiates in the direction of the surface normal (out-of-plane)**
- **Sound pressure level depends on**
  - Acoustic Impedance Z
  - Surface velocity
  - Surface
  - Geometry

time animation of a measured speaker membrane (PSV)



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Web Academy – NVH optimization and troubleshooting with SLV

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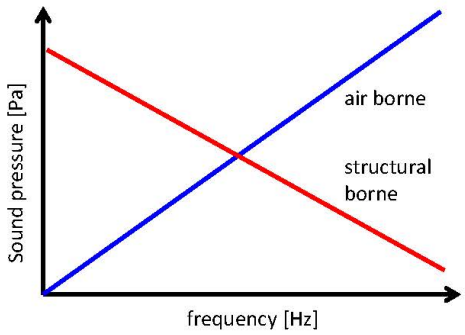
Sound components

Frequencies:

- low frequencies:
  - structural borne
  - haptic sensing
- high frequencies:
  - air borne
  - acoustic sensing



Air borne sound is always induced by structural borne sound.

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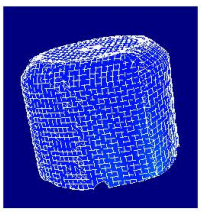
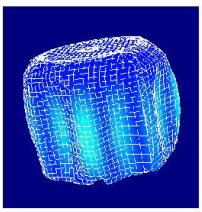
Visualization of a vibrating surface

- Identification of the location of the sound source
  - Spatial resolution should be independent from freq.
- Identify the points of coupling of the source to the radiation surface (e.g. engine mounts)



Hood of an electric motor excited by the 19th order of the 3000 rpm drive. Visualization from SLV-measurement.



Hood of an electric motor excited by the 36th order of the 3000 rpm drive. Visualization form a SLV-measurement.

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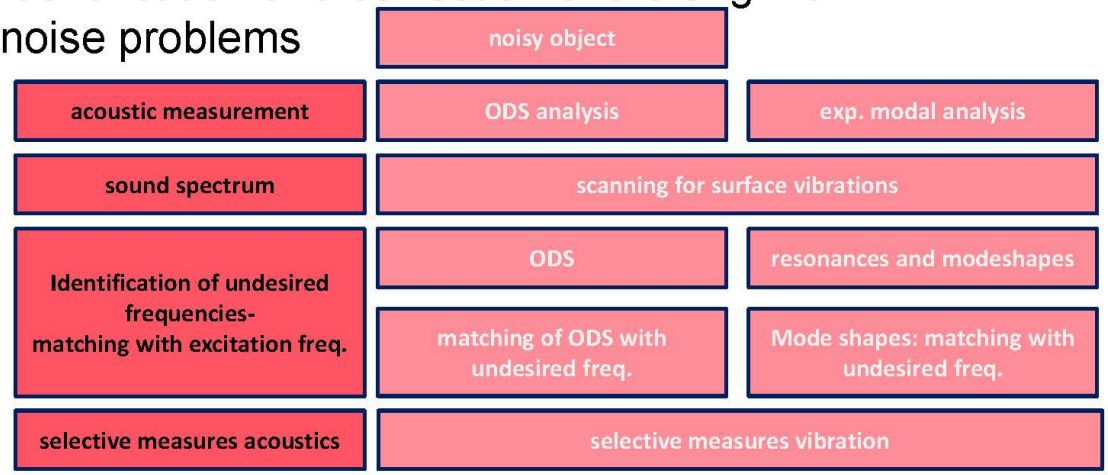
Identification and correction of the origin of noise problems



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Measurement systems

- **Structural borne sound**
  - **practically no influence by ambient conditions**
  - **contact sensors**
    - accelerometers
  - **non-contact**
    - acoustic near-field holography (microphone)
    - P-U-probes (Particle Velocity)
    - **Laser Doppler Vibrometry (far and near field)**
    - Electronic Speckle Pattern Interferometrie

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Scanning Laser Doppler Vibrometry (SLDV/ PSV)

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- **non-contact**
- full-field
- sequential = scanning from point to point
- full bandwidth (- 25 MHz)
- frequency response measurement
- deflection shapes measurement
  - practically unlimited # of locations
  - operational or excited vibrations
  - no mass loading
  - requirement: repeatable conditions

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PSV – Why no contact?

- **light has not mass**
  - no additional damping
  - no shift of eigen frequencies
- **light is robust**
  - high temperatures
    - exhaust systems, engine components
- **light is flexible**
  - stand-off distance
  - arbitrary points
    - by scanning
    - by mirrors and optical fibers

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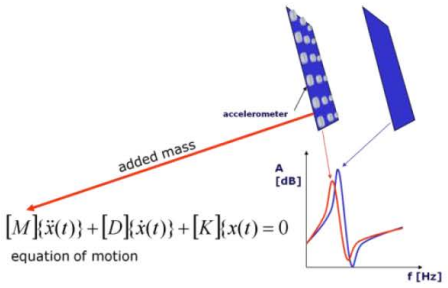

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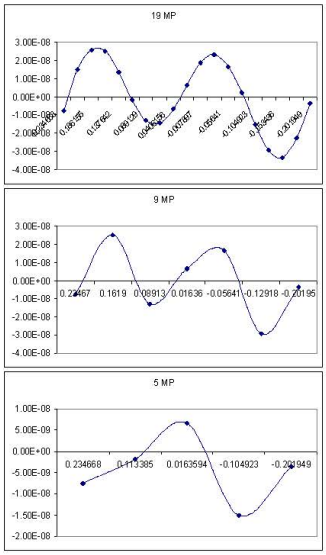
PSV – Why full-field? Spatial Aliasing

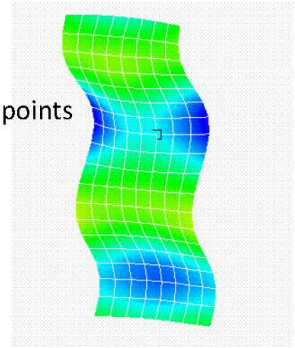
deflection shape at 514 Hz

- low point density:
  - amplitude error
  - distorted shape

location is crucial =
preparation time rise



19 points



9 points

5 points

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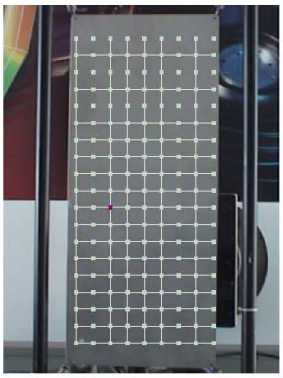
PSV – Example: Visualization as a tool

- **simple case**
  - plate in free-free condition
  - surface size large enough for sound radiation
  - broad band excitation
  - 171 measurement points
  - 430 x 200 mm



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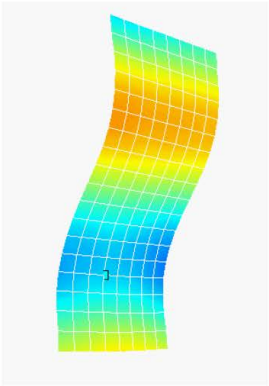
PSV – Example: Visualization as a tool

- **Bending mode**
  - 93 Hz
  - solution
    - Longitudinal stiffening



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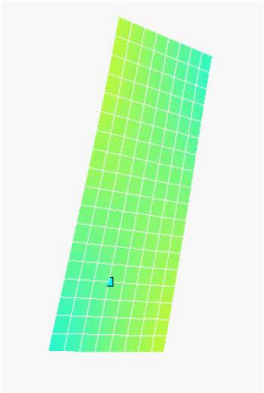
PSV – Example: Visualization as a tool

- **Torsional mode**
  - 43 Hz
  - solution (?)
    - 2 x longitudinal stiffening
    - 2 x cross stiffening
    - application of mass to the corners
  - but:
    - frequency not acoustically relevant
    - (f too low, dB(A) weightening!)



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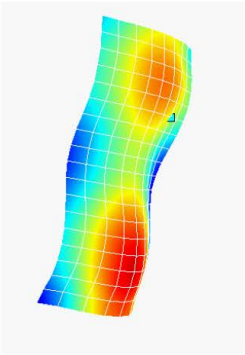
PSV – Example: Visualization as a tool

- **Superimposed ODS**
  - 204 Hz
  - solution (?)
    - 2 x longitudinal stiffening
    - 2 x cross stiffening



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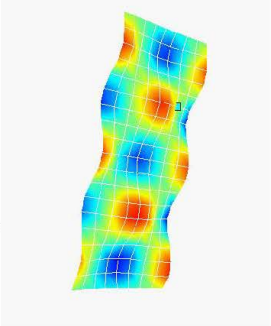
SLDV – Example: Visualization as a tool

- **774 Hz**
  - acoustically relevant
  - solution
    - damping
    - but: active areas get smaller
    - counter phase vibration of the local modes may lead to destructive interference
  - question: 774 Hz dominant in acoustic spectrum (microphone measurement)?



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5a. Applications

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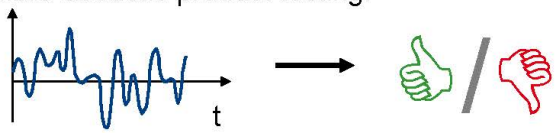
Applications: Production testing

Vibro-acoustic product testing:



based on measurement data, characterize and classify …

- products, defective components, assembly errors
- material defects
- material properties

Optical Vibration Measurement | 4. Applications

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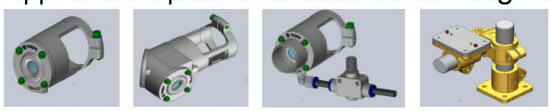
kHz

Applications: Production testing

Benefits for production testing:
- contactless and non-reactive testing
- huge bandwidth up to 100 kHz
- high repeatability
- Measurement not affected by ambient noise

Fast & reliable pass-fail analysis in line

- Application-specific accessories for rough environments…



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kHz

Applications: Production Testing

Complete solution with sensor and analysis software
- IVS-500 and QuickCheck
- easy definition of use cases
- communication with other sensors possible
- interface to the process control system

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Applications: Production testing

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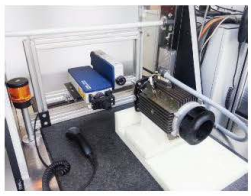
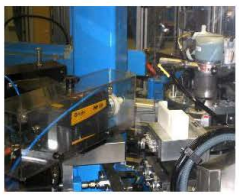
kHz

Applications: Production testing

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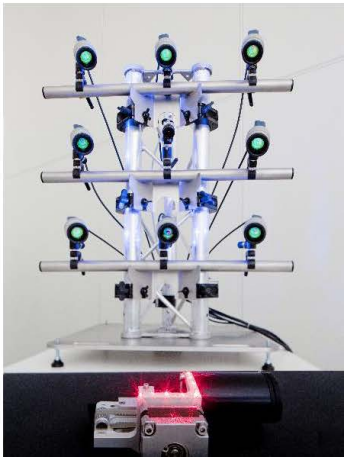
kHz

Applications: What's new?

While scanning vibrometry requires steady-state conditions, the MPV Multipoint Vibrometer describes non-stationary events:

- full-field evaluation of settling & decay events
- non-stationary processes (machines, valves)
- non-repeatable events (impact, door-slam)

- MPV Multipoint Vibrometer
  polytec.com/mpv



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Optical Vibration Measurement | 4. Applications

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kHz

Applications: What's new?

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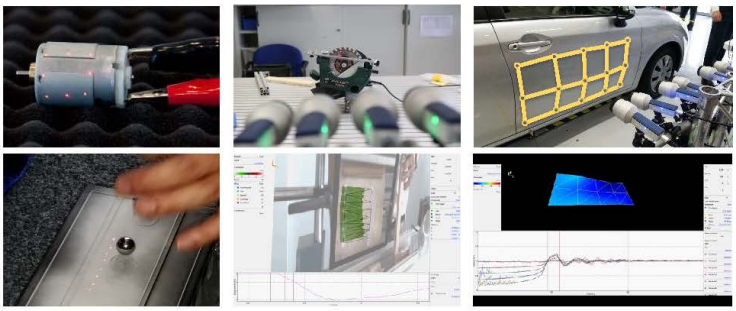
  polytec.com/mpv



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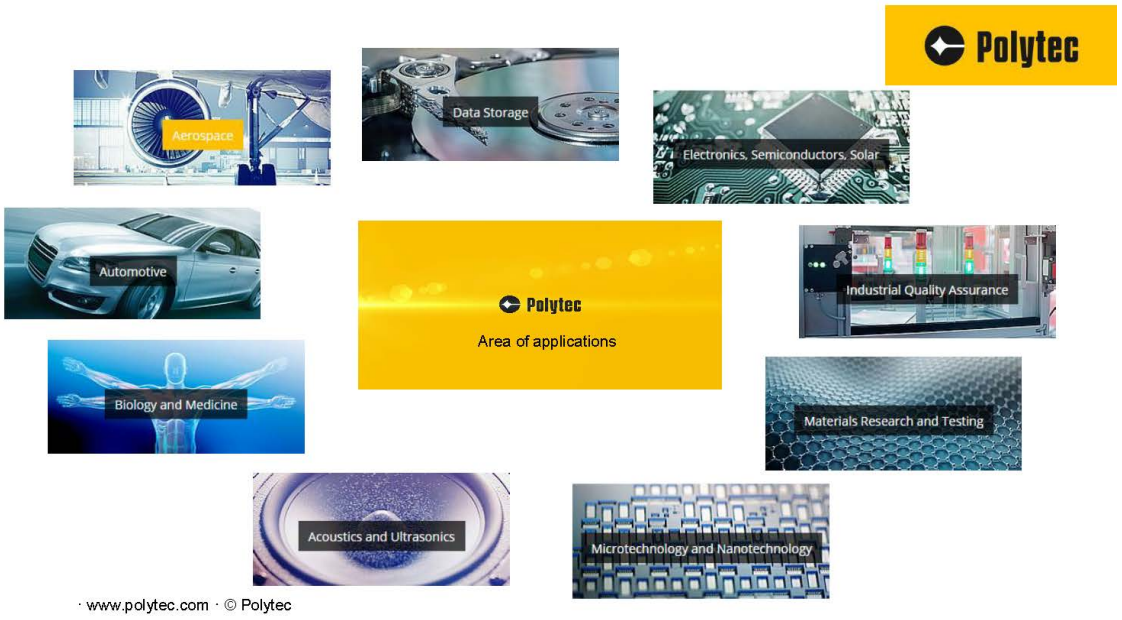
5b. Applications
(Please see the video clips)



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And what is your application?

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Thank you for your attention

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Thank you for your attention

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VI. PRODUCTS AND SERVICES FROM OUR MEMBERS

VI. ACOUSTICAL NEWS

VI.REPORT ON CONFERENCES

The Regional Conference on Acoustics and Vibration (RECAV) organised by the Society of Acoustics(Singapore) and the Association of Acoustics and Vibration Indonesia(AAVI) was successfully held in Bali,Indonesia from 27 to 28 Nov 2017. There were 110 presentations from 14 countries with 60% of them from Indonesia. There were also some 18 exhibition booths. This

reflected strong local participation and the international nature of the conference.

VII. BID FOR FUTURE INTERNATIONAL CONFERENCES

The Society of Acoustics(Singapore) will be hosting the ICSV28 in Singapore from 24 to 28 July 2022 at the Marina Bay Sands Hotel.

The Society of Acoustics(Singapore) will be bidding for hosting the ICA 2031 in Singapore in 2031.

The Society of Acoustics(Singapore) will be bidding for hosting the ISTU 2024 in Singapore in 2024.

Government Bodies

www.mom.gov.sg

www.nea.gov.sg

www.lta.gov.sg

Technical and Research Sites

Corporate Sites

www.metaultrasound.com

www.noisecontrols.com

(The Society welcomes interested parties to contribute relevant websites to the above e useful links. For more information, please contact us. Thank you.)

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President: Woon Siong Gan
E-Newsletter compiled by: Woon Siong Gan