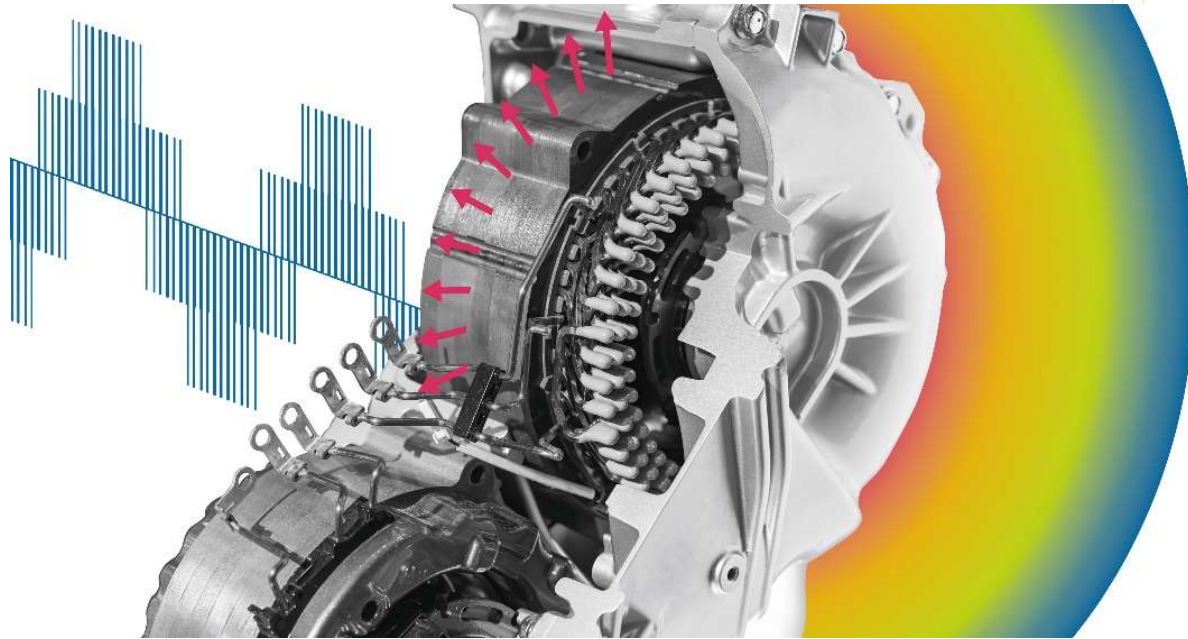# EOMYS ENGINEERING

Software solutions for electrical machines design / e-NVH consulting & training services

EOMYS mobilizes a team of multidisciplinary R&D Engineers...

- **Innovative company** created in 2013 in Lille (1 hour from Paris, France)

- **Development of Manatee CAE software** dedicated to the assessment and control of magnetic noise & vibrations at all design stages of electric drives

- **Engineering consultancy & technical trainings** complementary to Manatee software services ("e-NVH support")

- ~15 full time employees (electrical, mechanical, NVH engineers and software developers)

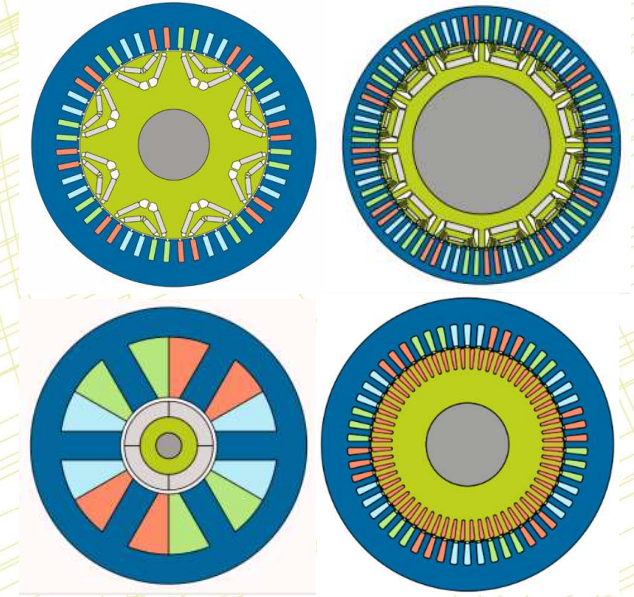 **+200 consulting projects** since 2013

  +150 customers since 2013

With a large experience of e-NVH issues…

- e-NVH analysis of **+250 electrical machines** over 10 years

- Large experience of topologies:
  induction & PM machines, AC/DC, inner/outer rotor, axial/radial flux

- **Up to 40 dB reduction** obtained after e-machine redesign

- **Wide range of magnetic, control & structural solutions:**
  skewing, notching, magnet shaping, current shaping, PWM, slot opening, Harmonic Current Injection, stiffening…

In all application fields involving electrical systems...

Automotive

STELLANTIS

Aerospace

LILIUM

Railway

ALSTOM

Marine

alconza
Irizar Group

Industry

Nidec

Energy

ENVISION

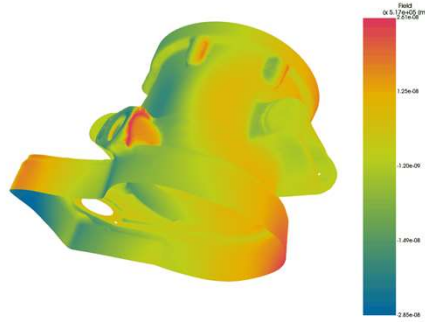## Home appliances

somfy

Medical

ELECTROMAG
ULTRA-QUIET HIGH-SPEED MOTORS

EOMYS 4

Offering advanced consulting & training services...
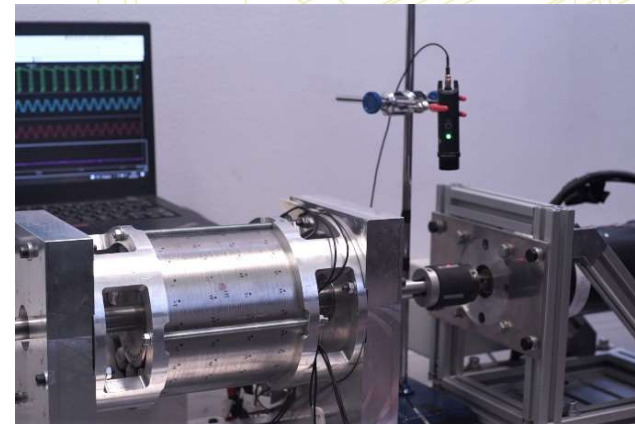

e-NVH **design** of electrical machines & drives using Manatee
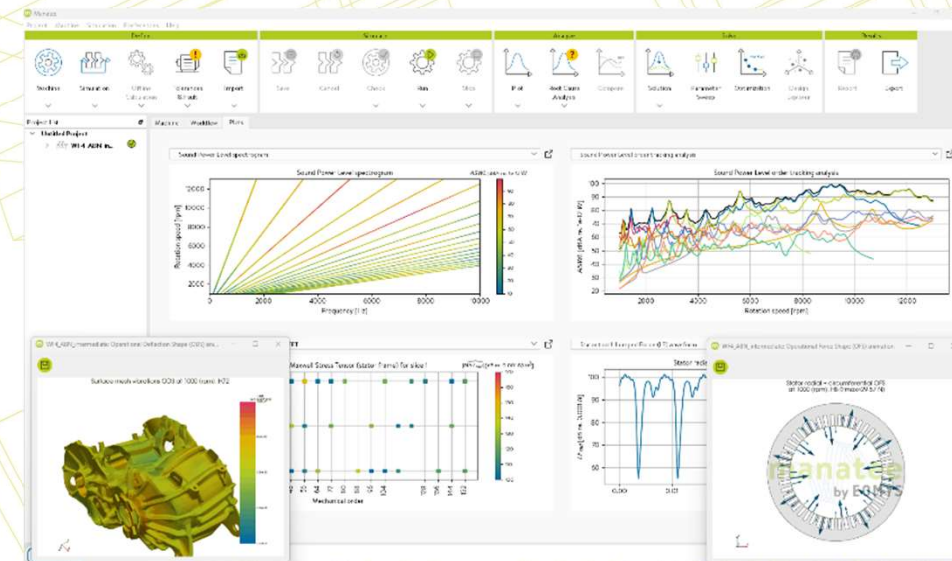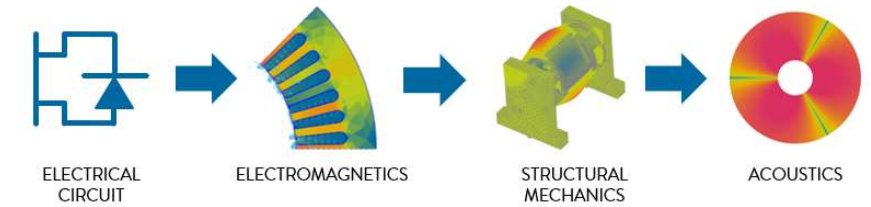
e-NVH **problem solving** using Manatee

e-NVH **technical trainings** based on Manatee

Powered by Manatee pioneering technology...

- Collaborative CAE platform for the assessment and control of **electromagnetic noise and vibrations**

- **Reduced development time** of electrical systems (faster simulation set-up, calculations, post-processing)

- e-NVH assessment at **all design stages** within a GUI made for electrical, mechanical and NVH test engineers

- Multiphysic magnetic, structural, acoustic calculations including **manufacturing tolerances**

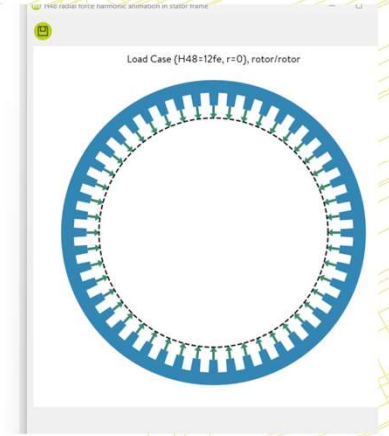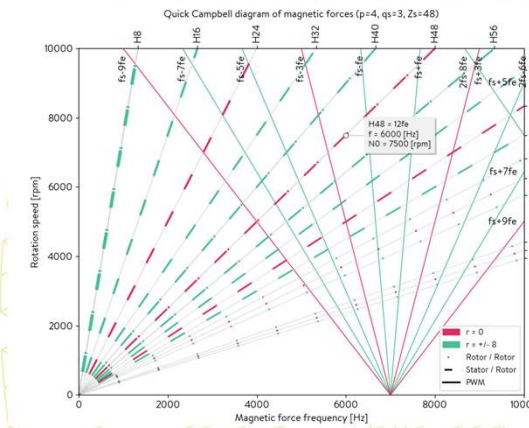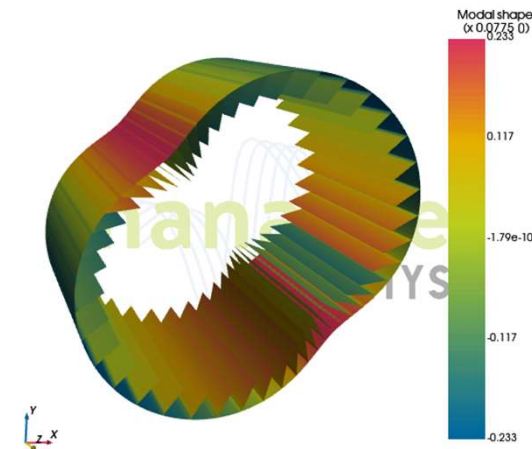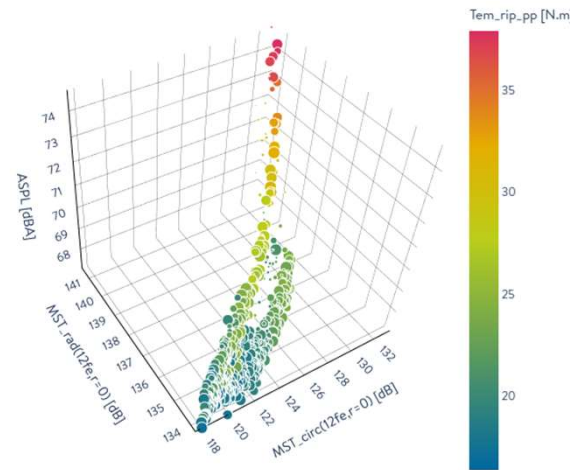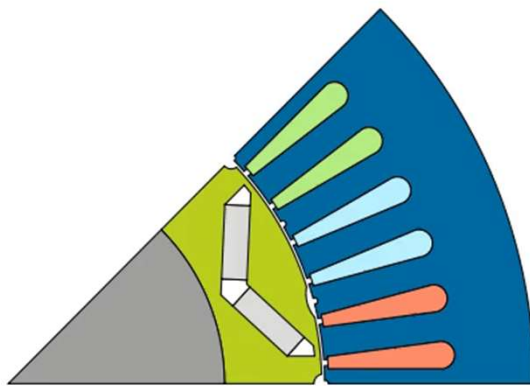- Advanced **root cause analysis** and **noise mitigation tools**

From electric machine level conceptual design phase...

- **e-NVH risk assessment** using Magnetic Frequency Signature Analysis

- **Quick ranking of e-NVH performances** of different electrical machines using fast NVH models of the stator stack

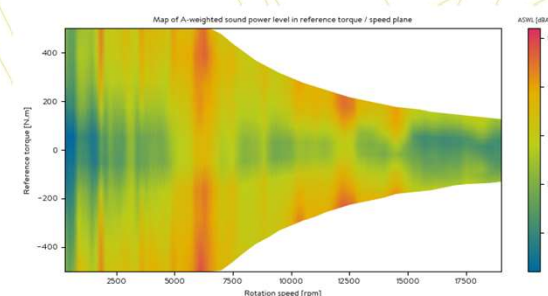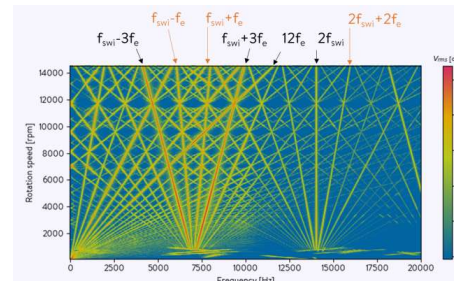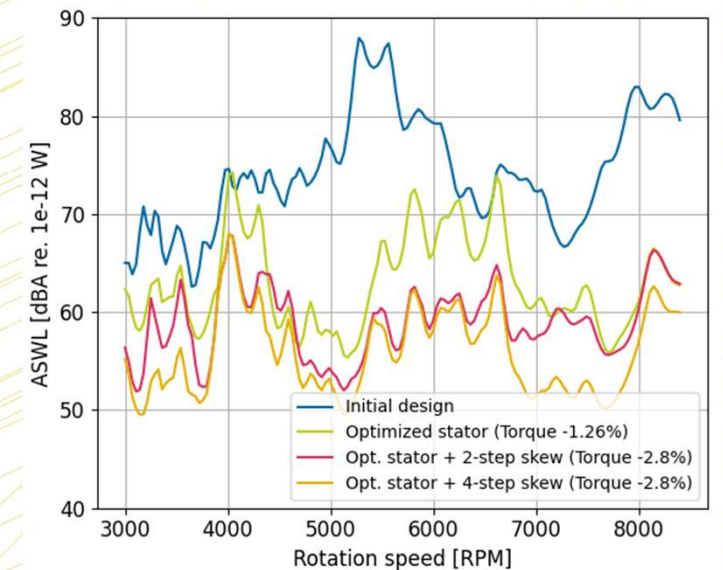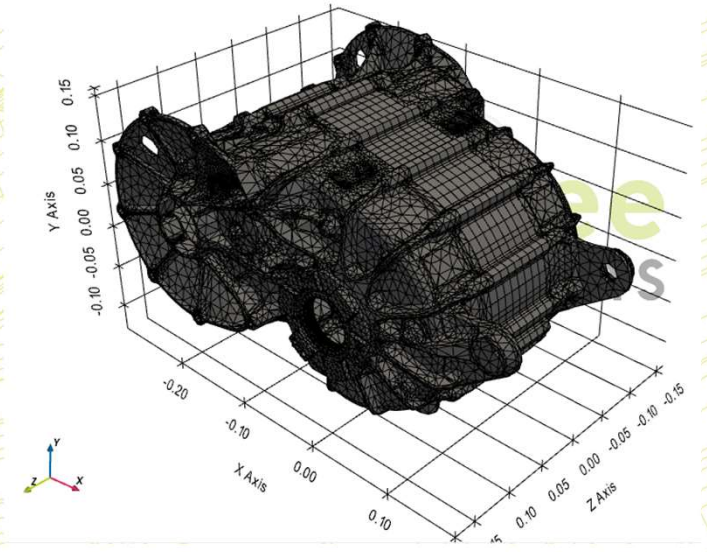- **Parameter sweeps** & constrained **multi-objective design optimization** of magnetic circuit dimensions

Mode 1 (2,0) at fnat = 775 (Hz)

To system-level detailed design phase…

- Refinement of e-NVH calculation using 3D FEA modal basis of full electric drive

- **Root cause** analysis and implementation of specialized **noise control** techniques (skew optimization, harmonic current injection, notching…)

- Impact of faults and **manufacturing tolerances** (e.g. eccentricities, uneven airgap, uneven magnetization, parasitic current harmonics)

- Extension of calculations with **PWM** or in the **torque/speed plane**

- Sound level and **sound quality** assessment including non-magnetic noise sources (e.g. gear whine)

And a unique training on e-NVH for all engineers.

- Manatee-based **technical training** on magnetic noise & vibrations **manatee** by EOMYS

- Designed for electrical, mechanical, NVH & test engineers involved in the development of e-drives

- Covers e-NVH **physics, simulation & test** :

  (S0. Offline: basic principle noise & vibrations & electrical machines)

  S1. Generation of flux and torque in AC electrical machines
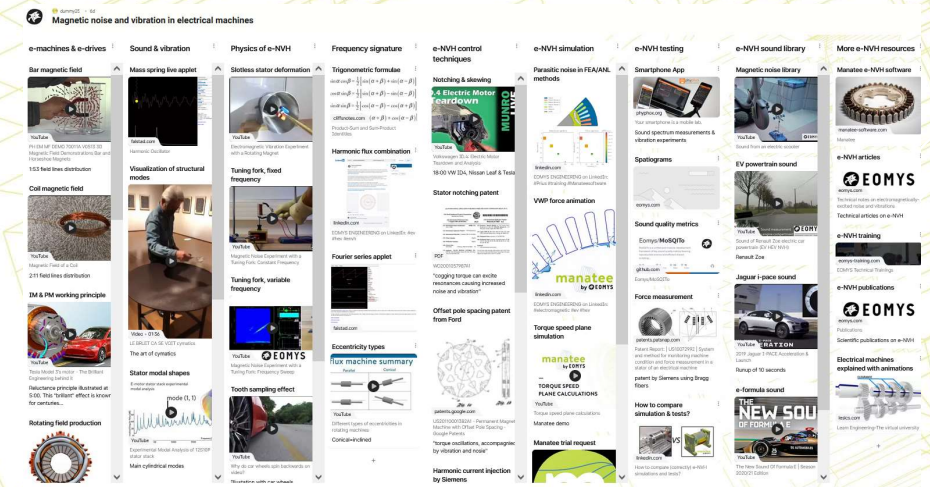 *S2. Generation of electromagnetic excitation forces*
  S3. Generation of electromagnetic vibrations and acoustic noise
  S4. Simulation and test correlation of magnetic noise & vibrations
  S5. Magnetic noise and vibration mitigation techniques
  S6. Virtual prototyping of electric drives including NVH requirements

- **Standard trainings** organized at EOMYS office (Lille, North of France) at www.training.eomys.com

- **Customized e-NVH workshops** organized online or in-person

Conclusions

- Manatee software solutions provides combined **e-NVH software, consulting & training services** throughout the development lifecycle of electrical systems

- EOMYS **reliable partner for noise and vibration** studies at design stage or after manufacturing of electrical systems