

Expanding personalized fitting opportunities with Oticon Intent

Oticon Optimal Fitting Series - 2024 updates

ABSTRACT

Our world is getting more and more personalized. Personalized items, apps, working schedules - basically all aspects of our lives are getting increasingly custom-made. In hearing care, it is progressively important to offer a personalized approach to meet the needs of individual users, as each person's hearing ability is unique. With the latest premium hearing aid, Oticon Intent™, we are introducing the world's first user-intent sensors. It is a unique technology that allows Oticon Intent to recognize when the user's listening needs change and adapt accordingly, by utilizing the 4D Sensor technology paradigm and an updated Deep Neural Network (DNN) 2.0. In 2024, we are not only introducing hearing aids, but also new ways to further personalize your hearing aid fitting. This white paper will go into details with how the new offerings from Oticon offer the most personalized fitting opportunities to date. Firstly, we focus on the fitting of the updated MoreSound Intelligence™ 3.0, including the new interface in Genie 2. Next, this paper will bring forward the benefits of the new miniFit Detect speaker unit, including self-calibration and higher MPO. Finally, details about fitting opportunities in the low frequencies will be described, suggesting the many benefits of more bass.

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EDITOR OF ISSUE



Pernille Aaby Gade
*Clinical Research Audiologist
Centre for Applied Audiology
Research, Oticon A/S*

MoreSound Intelligence 3.0 - for personalized help in noise

Background

Did you know that hearing in noise remains the number one complaint of people with hearing aids (Jorgensen & Novak, 2020; Manchaiah et al., 2021)? That MoreSound Intelligence 3.0 (MSI 3.0) is the go-to place for adjusting how Oticon's hearing aids respond to speech in noise? That MSI 3.0 is the next step beyond fine-tuning, and has a redesigned interface?

At Oticon, we are continuously working to improve how to best support you in addressing your users' needs. By analyzing over 2 million data points related to how the MSI feature is used in terms of adjustments, the goal became to optimize Oticon Genie 2 to better suit the audiologist's actual day-to-day use. To then gain further insights on the clinical experience of Genie 2, we conducted a survey with over 80 hearing care professionals. The results show that they primarily want simple interfaces and an intuitive understanding of features. When asking how the future fitting software should look, 92% answered that a visualization of features is "important" or "very important". Based on these insights, we have redesigned the MSI 3.0 interface in Oticon Genie 2 with simplicity and user-friendliness in mind, to better help you employ a person-centered approach. With this upgraded toolbox, you can easily adjust the advanced signal processing in Oticon Intent and onwards, ensuring the appropriate amount of help is provided for your patient in all listening environments. The following sections will describe how.

The link to Audible Contrast Threshold™

In 2024, we take an important step towards addressing the number one complaint of people with hearing aids. With the introduction of the new diagnostic test, Audible Contrast Threshold™ (ACT), we now have an objective and evidence-based method for prescribing aided help in noise. When an ACT value is entered in Genie 2, MSI 3.0 will automatically be prescribed to cater for your patient's needs (see Løve, Wang, & Ghamkhar, 2024, for more fitting details on ACT).

Measuring ACT is an excellent opportunity to have a fast and reliable method to assess a patient's real-life speech-in-noise ability (Santurette & Laugesen, 2023). However, if ACT is not yet available to you, the MSI 3.0 screen in Oticon Genie 2 can act as your main counseling and adjustment tool for helping patients perform their best in difficult listening environments. The following sections describe the main elements of MSI 3.0 in Genie 2 including the fitting pyramid, recommendations for the fitting flow, and how to use the different settings.

The MSI 3.0 fitting pyramid

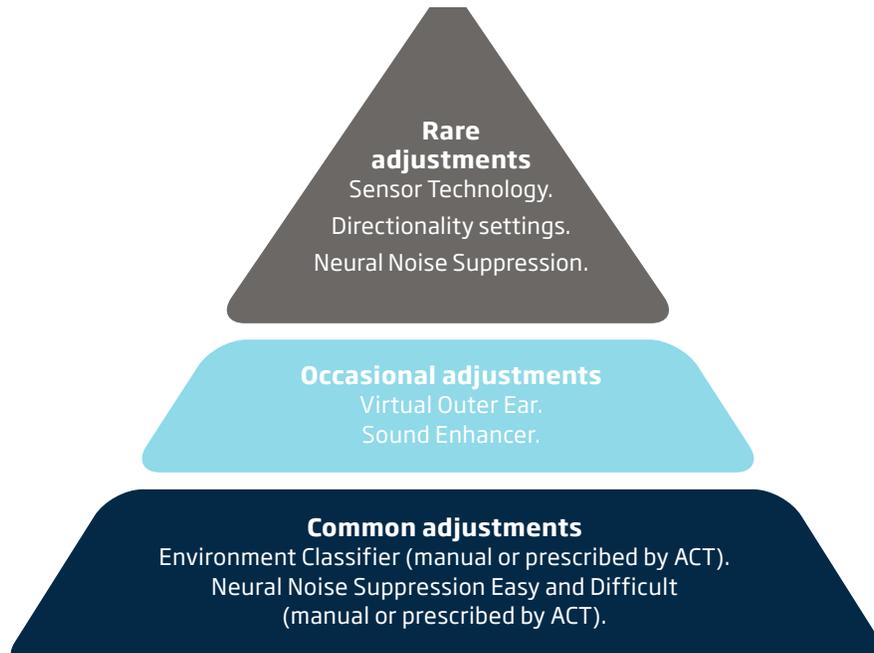


Figure 1. The fitting pyramid for advanced adjustments in MoreSound Intelligence 3.0.

The fitting pyramid

Fitting hearing aids requires pulling the right handles to meet the needs and preferences of each hearing aid user to make the hearing aid as personalized as possible. With advanced features like MSI 3.0, making the needed adjustments is not necessarily difficult, but knowing what to apply and when, may not always be intuitive. Furthermore, not all adjustments are equally useful for all patients. The fitting pyramid (Figure 1) above provides an overview to help illustrate which adjustments can be used at what time.

1. The base of the fitting pyramid contains the **common adjustments** that should be considered in all fittings. These settings can be adjusted manually but are also automatically prescribed when the ACT value is logged in Genie 2.
2. The middle contains adjustments that can be made more **occasionally**, or at a follow-up visit.
3. The top of the fitting pyramid shows settings which should **rarely** be adjusted. As an example, it is recommended to keep the **Directionality setting** as the default in **Neural Automatics**, as this is the only setting that utilizes the adaptability of MSI 3.0 and 4D Sensor technology in the signal processing.

Fitting flow recommendations for MoreSound Intelligence 3.0

The fitting pyramid categorization provides a solid foundation for a recommended fitting flow, as envisioned in Figure 2 below. The flow starts with whether an ACT value is obtained, as referred to above, and then continues into potential subsequent visits. Navigating the different MSI 3.0 settings within the fitting flow is central to gain a personalized hearing aid fitting, and the following sections will go into details with how to adjust each of them.

Navigating MoreSound Intelligence 3.0

Hearing aid fitting - adjustments to the common settings

How to use the Environment Classifier interactive tool

The MSI 3.0 interface has been specifically designed with simple visuals and the interactive **Environment Classifier** tool. This is meant to spark a conversation between you and your patient about their communication needs in different real-life situations. A suggestion for starting that conversation is given here:



Turn your screen so your patient can see it.



Start by asking the simple question: *Which situations are Easy or Difficult for you?*



Now, together with your patient, complete the exercise of moving the boxes (representing different environments) into the **Easy** and the **Difficult** category. Choose a way to systematically go through the environments, e.g., from **Very simple** to **Very complex**, and ask your patient how they perceive it. If they say that a sound environment is particularly easy or difficult, use the arrows to move the box into the appropriate category.

Tip: Hover your mouse over each box to see examples of specific environments.

Tip: Click on **Set to default** to start over.



Once you have classified the environments, Oticon Intent is set up to provide unique, personalized help based on your patient's needs.

MSI 3.0 fitting flow recommendations

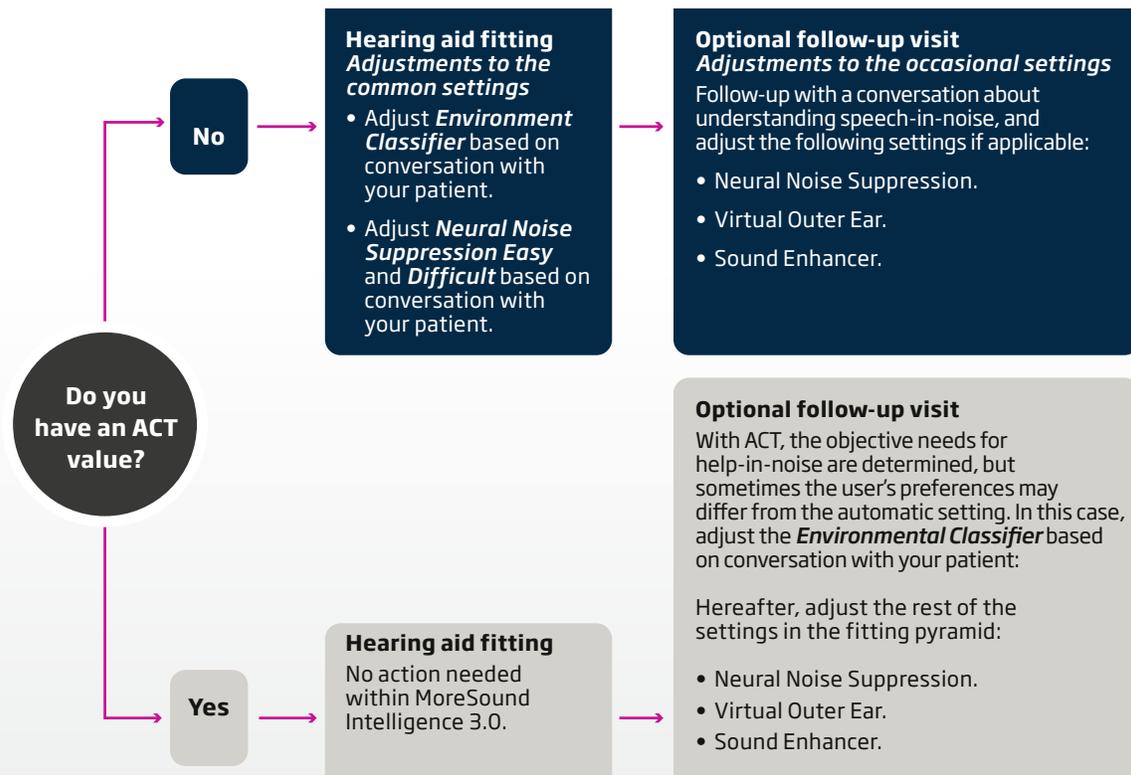


Figure 2: The fitting pyramid categorization is a great foundation for a recommended fitting flow, which includes a visit for hearing aid fitting and an optional follow-up visit.

How to use Neural Noise Suppression Easy and Difficult

Once you are finished categorizing the environments, move on to personalizing **Neural Noise Suppression**. This allows you to adjust the strength of the support provided by the DNN 2.0, for both Easy and Difficult listening situations. You will see a default recommendation (e.g., prescribed based on the ACT value or as a standard default based on age and audiogram), but your patient may need additional support. You can adjust noise suppression ranging from 0 to 6 dB for environments that you have classified as **Easy**. For environments classified as **Difficult**, noise suppression options range from 6 to 12 dB. Please note that different performance levels have different ranges.

Optional follow-up visit - adjustments to the occasional settings

How to use Virtual Outer Ear & Sound Enhancer

When the patient returns for a follow-up visit, it may be necessary to make further adjustments to their help in noise settings based on their experiences. In **Sound Configuration**, you will find **Virtual Outer Ear** and **Sound Enhancer**.

For adjustments targeting **Easy** situations, consider adjusting **Virtual Outer Ear**, which helps spatial sensation in easy situations. Ask your patient these simple questions: *"Do you want to focus a bit more on someone in front of you, in quieter situations?"* - if yes, choose **Focused**. *"Do you want to be very aware of all sounds around you in quieter situations?"* - if yes, choose **Aware**.

For adjustments targeting **Difficult** listening situations, consider adjusting **Sound Enhancer**. This feature works dynamically. It activates in noisy situations to preserve and enhance speech details when noise suppression is actively working. Ask your patient these simple questions: *"In difficult listening situations, are you sometimes overwhelmed?"* - if yes, choose **Comfort**. *"When listening to speech in difficult situations, do you prefer more speech details?"* - if yes, choose **Detail**.

How to adjust the rare adjustments

Sensor technology (4D Sensor technology) is active by default in Oticon Genie 2 for adults and is only available in the General and Speech in Noise programs. It is deactivated by default for children. We recommend using your best clinical judgement about this feature's suitability for your patient: for example, if your patient has atypical

head or body movements. **Directionality settings**, in the majority of cases, should not need adjustment. But the option is there, should you need it.

Further information

For a person-centered approach to fitting hearing aids for users with hearing needs that do not require additional fitting steps, we recommend using "Oticon Fitting Guide - Comprehensive". For a more detailed explanation of the technology in Oticon Intent and outcome levels shown by technical measurements, see Brændgaard/Zapata-Rodríguez et al. (2024).

The new miniFit Detect speaker unit The world's first self-calibrating speaker unit

Did you know that when a conventional speaker unit is produced, industry standards tolerate a gain variation of +/- 3 dB from target? This means that in the worst-case scenario, a binaural hearing aid user can be fitted with an up to 6 dB gain difference between the right and left hearing aids!

When practicing audiology, we all strive to make a good hearing aid fitting. All hearing care professionals know that the number one rule in audiology is to provide the right gain for each hearing aid user. Speaker units play a key role in ensuring precise and accurate gain over time. At Oticon, we want to ensure that the gain you prescribe, is the gain the user receives. That is why we are introducing the new miniFit Detect speaker unit, compatible with Oticon Intent.

With the miniFit Detect speaker unit, users are guaranteed gain accuracy within 1 dB, thanks to automatic self-calibration. When a miniFit Detect speaker unit is produced, it is measured, and its data is saved in the new 8-pin connector. Any deviation from target speaker unit gain is automatically corrected in 24 frequency channels, which ensures up to 57% more precise gain compared to our previous speaker unit. Effectively, this makes speaker unit inaccuracy a thing of the past.

Furthermore, the self-calibration happens each time the hearing aid is turned on, so there's no need to connect them to Oticon Genie 2. This self-calibration guarantees that the hearing aid user receives the exact gain they need, every day.

New retention wire

Due to the different shapes of each patient’s individual ear canal, some will experience movement of the speaker unit while speaking, eating, or yawning. Having to push the speaker unit in place can be a daily annoyance to many and a sign of poor retention of the speaker unit. With miniFit Detect, a new wire bend design is introduced that is optimized for the natural shape of the ear canal and ear opening. The bend is designed with comfort, retention, and deep placement in mind. It’s notably different from previous Oticon speaker units.

Five new information parameters for reassurance and confidence

The connector of the miniFit Detect speaker unit now contains a memory chip loaded with details about the speaker unit when Oticon Intent is connected to Genie 2: serial number, right/left, fitting power level, and wire length. Furthermore, a status indicator enables you to see if the speaker unit corresponds to the selected one in Genie 2, or if it is missing, faulty, or incompatible. This provides a clear benefit in terms of clinical efficiency.

Some hearing care professionals may also worry that they, or a colleague, didn’t add the right speaker unit on a patient’s hearing aids. This doesn’t have to be a worry

anymore, as the LED in Oticon Intent will flash orange if there’s a mismatch between the attached miniFit Detect and what’s set in Genie 2.

Adding more fitting room with higher MPO

Maximum Power Output (MPO) refers to the highest output level a hearing aid can deliver and is important because some patients require a high level of gain. However, amplification near or above MPO causes distortion in the signal. To account for this possibility, it is desirable to have a large amount of headroom in the hearing aid. One way to achieve this is by using a larger speaker unit, i.e., a higher power fitting level. However, a large speaker unit may not fit all ears.

It is clinically impactful to have a solution for this, and with the introduction of MoreSound Amplifier 3.0 we now also offer increased MPO for miniFit Detect speaker units fitting level 60 and 100 (see Figure 3). With a higher MPO in, especially, fitting level 60, we allow for a more comfortable fit of users with smaller ears that need more gain than the previous speaker units could provide. Increased headroom can also have a positive impact on sound quality when listening to music in the MyMusic program, which accounts for the recommendation of higher MPO in music programs, as described in Greasley, Crook, & Beeston

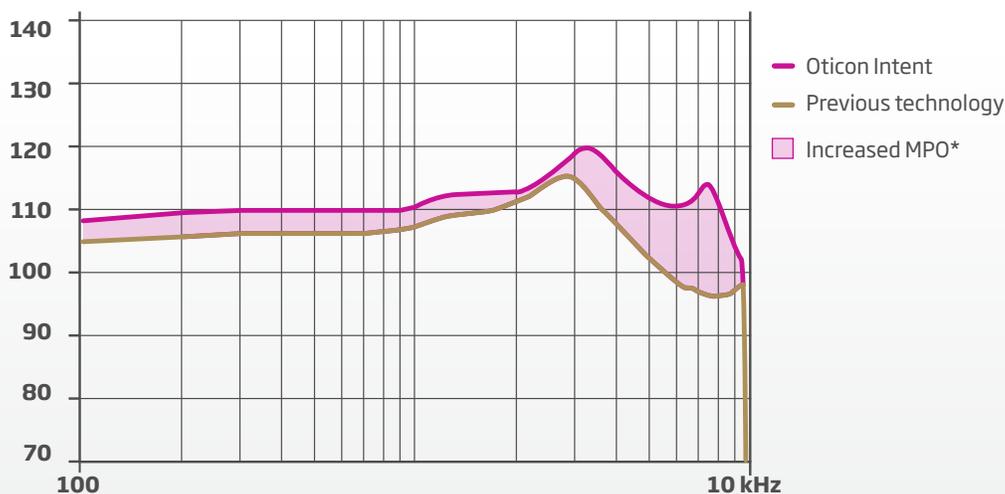


Figure 3. Increased MPO with fitting level 60 and 100 miniFit Detect speaker units.

(2019). Overall, the higher MPO in the miniFit Detect speaker units means more precision, more fitting confidence, and an improved overall listening experience for the user.

Giving bass back

Most people know the thrill of good bass, especially when listening to music. Music has even been shown to play a part in our feelings of identity and belonging, which are essential to our well-being (Laukka, 2006). More bass is not necessarily associated specifically with speech. However, applying the right amount of low frequency gain for speech is equally important as for music. Moore & Tan (2003) describe how different frequency cutoffs in hearing aids can impact the perceived naturalness of music and speech signals. They find that a low frequency cutoff between 55-123 Hz is desirable (Moore & Tan, 2003), suggesting that adding more bass to the hearing aid processing is beneficial.

Guide to adjusting Power Bass

1. Open Oticon Genie 2
2. Make sure that the acoustics in user's ears are the same as selected in Genie
3. Go to **End fitting**
4. Click on **Accessories**
5. Under **Phone, TV adapter/EduMic, ConnectClip**, select the level for **Power Bass**. We recommend keeping the default setting, but based on clinical observations the setting can easily be adjusted.

The next step in optimized bass when streaming

Speech and music signals are inevitably different. Music has a larger dynamic and frequency range than speech, and contains large, dramatic changes uncharacteristic to speech (Chasin and Russo 2004). Due to these acoustical differences and reported difficulty with musical enjoyment from hearing aid users, Oticon introduced Oticon MyMusic in 2021 (Man, Kjeldal, Sørup Yssing, Garnæs, & Løve, 2021). With the introduction of Oticon Intent, we have taken another step on the journey to a better music experience. With the upgrade of the Power Bass feature in the general programs, we are giving a gain boost to the low frequencies when streaming. The result? A much richer streamed sound, and not only when streaming music, Power Bass also works hard to optimize the experience of podcasts, live content, movies etc. both on Android™ and Apple devices.

The reason behind

Multiple insights lay behind this upgrade. Firstly, one of the drawbacks of open fittings is the loss of low frequency energy, as it leaks out of the vent. This is especially an issue when a user is streaming, and sound quality can, as a result, be perceived to be thin and bass deprived. Secondly, data on the use of Oticon hearing aids show that the majority of users have only one program - the General speech program - available. This program will as a result be multipurpose and used for both listening or streaming. Finally, to gain users' perception of the development of Power Bass, we ran a study on people with mild to moderate hearing loss using OpenBass dome and Bass dome double. The purpose was to test which one of two potential versions of the Power Bass feature they perceived as giving the best sound quality when streaming, compared to the previous Power Bass version in Oticon Real. The version they preferred was then implemented in the hearing aids.

With the upgraded Power Bass, more amplification of low frequencies is applied when streaming, without compromising the advantages of open fittings, providing a richer sound. The feature has three customizable settings (**Low, Medium, and High**) and is automatically prescribed based on the vent size (see Table 1 for default settings based on acoustics).

Expanded access to low frequencies for all listening inputs

At Oticon, we work hard to give users the input that they need to make sense of the world around them. This includes giving access to all relevant sounds. When it comes to low frequencies, previous generations of Oticon hearing aids have always provided users with access. However, to make the information available even more plentiful, the lower cutoff is now at 80 Hz* with a roll-off of ~10 dB/octave.

By opening up for more sounds, the energy going through the hearing aid to the user is increased. Thus, MoreSound Amplifier™ 3.0 has a unique starting point for amplifying the whole range of sounds based on the needs of each individual hearing aid user, ranging from 80 Hz all the way up to 10,000 Hz. The perception is a richer representation of the environment incl. speech and music, and is dependent on acoustics, hearing loss, and how the hearing loss is compensated for. Especially patients with more closed acoustics will hear a difference compared to previous premium hearing aids from Oticon. However, the expanded bandwidth is now a core functionality in Oticon's hearing aids and applies to all price points, all fitting rationales, and all programs.

**80 Hz is the -3 dB cutoff frequency for the high-pass filter.*

Conclusion

In 2024, we are not only introducing hearing aids, but also new ways to fit them with a special focus on personalization. The fitting pyramid maps the settings of MSI 3.0, and is a good foundation for the recommended fitting flow to ensure a personalized fitting. Furthermore, the greatest benefit of the new miniFit Detect speaker unit is its ability to self-calibrate, providing personalized gain appliance every day. Finally, expanding the fitting offerings in the low frequencies suggests the many benefits of more bass for all sounds, including streaming.

Acoustics	Default Power Bass setting and low frequency gain appliance
OpenBass dome	High
Bass dome double	Medium
MicroShell, MicroMold, and LiteTip	From Off to High depending on vent size: Vent ≤ 0.8 mm gives Off . Vent from 0.8 to 1.8 mm gives Low Vent from 1.8 to 3.0 mm gives Medium Vent > 3.0 gives High
GripTip Open	High
GripTip Closed	Power Bass is Off
Power dome	Power Bass is Off

Table 1. The more open acoustics, the more low frequency gain is applied by Power Bass

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