



- CUSTOMER SUCCESS STORY -

Interview: Dr. Tobias Wagner, Head of Quality Control Laboratory, H&R Group, Hamburg

Anton Paar instruments at the heart of mineral oil specialty manufactures

The H&R Group, based in Hamburg, Germany, is a leading manufacturer of mineral oil specialties like white oils, petroleum jellies, paraffin waxes, lubricants, motor oils, base oils, process oils, cable filling compounds, ozone protection waxes, plasticizers, and cosmetic and pharmaceutical raw materials. The group uses a series of Anton Paar instruments for quality control to deliver high-quality products to customers.

We spoke to H&R Group Quality Control Laboratory Head Dr. Tobias Wagner about bitumen testing, outsourcing vs. insourcing, and which Anton Paar instruments do what in the H&R production line.



All the samples from the refinery are tested in the quality control lab

Q: What's your role at H&R? What originally brought you to the company?

A: I am the laboratory head of the quality control laboratory in Hamburg, and I'm also responsible for all analytical methods across the whole company. So I also attend DIN or CEN meetings and working groups to develop and improve standards. H&R Hamburg has a sister refinery at Salzbergen, and I do it for both sites.

Q: What did you do before joining H&R?

A: I studied chemistry in Clausthal-Zellerfeld, a small town in the Harz mountains. I did my PhD there and in 2005 I started at the H&R site in Salzbergen at the refinery and did a kind of internship and it went on from there.

Q: What kind of petrochemical products do you produce? What share does bitumen account for? What importance does it hold in the overall H&R product line?

A: Our feedstock is so-called "ATRES," atmospheric residue, what's left over when you strip diesel or jet fuel away from crude oil. We perform distillation in a vacuum, and so we do all the more heavy products like base oil, all kinds of waxes, medical white oils. We have extender oils, and of course, ultimately, bitumen. When you look at it across the whole production spectrum, it counts for a minor but still relevant volume. We divide our products into main products and by-products. Bitumen is a kind of by-product, the revenue you get when you sell it isn't that big, but out of the by-product range, it comprises about 40 % – so a lot.



Left: Bitumen sample at room temperature; Right: DMA 4200 M measuring bitumen

Q: So it's the leader among by-products?

A: Yes, definitely.

Q: What kind of activities are carried out in your lab?

A: We are the quality control lab, so all the samples of the refinery come to us. Of course, everything is organized via a LIMS system. We try to connect most of the analyzers directly to the system so you don't have to write down the results and then type them into the LIMS system again. It's of course better if the results go directly into the system. That's what we're trying to improve constantly.

Q: So the number of samples analyzed per day with the density meter or viscometer is not so high that you can't manage it manually ...

A: I think for every sample for which we measure viscosity, we also measure density (40/d). Measurements are finished quickly, and our laboratory technicians do them one right after another. We thought of a kind of automation there but for that you first have to fill the samples into the small cups, e.g. for the density meter, then you put them in the sampler of the machine and press start. This would take longer than measuring it directly. In other words, we didn't see the advantage of automation there and didn't do it. The major effort is related to sample preparation and keeping the sample liquid.



Liquified bitumen sample

Q: Bitumen measurement for the density meter is really a manual measurement and maybe the sample throughput is simply not as high as for your main product, like white oil for e.g.?

A: Correct, it's not that many samples ... When we bought the density meter for bitumen, we still had to manage the issue of keeping the sample liquid, because when it cools down in the syringe that is used to fill the heated bitumen into the density meter, it quickly gets solid again. At that time, we had the syringe and injected a sample, and could only do one measurement before it was solid again. So we talked to Anton Paar and said we weren't quite happy with it and that was very good because Anton Paar then sent us product specialists to our site in Hamburg. They took a look at our work flow when measuring the density of bitumen with their instrument. After only six weeks, two months, around that, they installed a heater (Syringe Heating Attachment) for the machine – I think it was a kind of prototype – and I think that's why you can now buy a heater with the density meter, because of us. It's very good to see that Anton Paar listens to the needs of its customers.

Q: Yes, because they know about their challenges and problems so that's the best source of information ...

A: Yes, that was a good experience, to see that there's a reaction, that you want to help us.

Q: Is the responsiveness of the Anton Paar support team a key consideration in using Anton Paar instruments?

A: Yes, that and of course the instruments are reliable and precise, and that's much appreciated. I think with density meters you're the world leader, we like the density meters very much. The Stabinger viscosity meter is very good, reliable, precise, and fast for checking if we're filling the right oil into the right tank truck.

Q: Before you started using the Anton Paar density meter, did you work with pycnometers?

A: No, we didn't. We had a construction materials laboratory which analyzes street bitumen and things like that. They measured the density for us, with a pycnometer.

Q: So it was outsourced?

A: Yes, but it was on our site. The laboratory was directly on the opposite side of the street and was on our factory grounds. They paid a rent for the laboratory.

Q: What was the point at which you decided: we really need this kind of density meter from Anton Paar?

The sample numbers were rising, and a lot of the samples needed to be analyzed on the weekend – which is when the ships were loaded – but the construction materials laboratory was closed. Our shift laboratory, though, also works on Saturdays and Sundays and of course the technicians are used to the density meters of Anton Paar. So it was very clear that they would be able to operate a density meter for bitumen and then we did a simple calculation: The samples that we analyzed externally and the extra cost it's caused over the weekend when these external labs were closed but they opened up especially for us. All of this made the density measurement very expensive, and it also took very long because it was measured by a pycnometer. So all those facts led to the decision: We have to invest in a DMA from Anton Paar.



Syringe heating accessory for DMA 4200 M



Various bitumen samples

Q: So the common use case is you receive a delivery of heavy ends of vacuum residues with marine cargo ships, and you then measure the density for volume-to-mass conversion?

A: We need the density meters, the other ones we have, for this kind of analysis, to calculate volume-to-mass conversion for the ATRES, not vacuum residue. But when we sell our products, we send some of them off with a ship, also bitumen and we do the volume-to-mass conversion with the bitumen density meter there. The vacuum residue is left in our distillation when we distill the oil, so we don't have to buy it. We have the PDA, the propane de-asphalt unit in Hamburg, since 2010 I think. Before that, we didn't have bitumen here, we sold the vacuum residue for burning. But that's not the kind of business H&R want to do. We say: Mineral oil is too valuable to burn. So the PDA unit was built, and since then we get from the vacuum residue the bitumen and the de-asphalted oil to make bright stock out of it.

Q: So your business model is a sustainable one, and you really make sure not to leave any waste after production ...

A: Yes

Q: How important is the Anton Paar density meter to your bitumen analysis?

A: For bitumen, I don't think there's any other kind of machine in the market. Some of the manufacturers sometimes forget about the heavy parts of the oil. You also have the problem that it's not easy to get a machine to measure the viscosity of bitumen. Sometimes it's very hard to find machines for the heavy parts of the oil, so it was good to see that Anton Paar has the density meter, because I don't think it would be an alternative for us to measure the density with the pycnometer.

Q: What other Anton Paar instruments do you use?

A: We have a Herschel Emulsifier, we have a Pensky-Martens flash point tester, we have a Stabinger viscosity meter, and we have some density meters for bitumen. And we have a further three devices, one for density at 15 °C, one for 70 °C, and one for 85 °C. And we have a penetrometer – one for bitumen and one for waxes.

Q: And what kind of other samples do you use them for?

A: Nearly everything in our portfolio, from base oil, to waxes, to extender oils, and also the raw distillates

At the heart of the H&R Group's values are a combination of quality and a proactive approach to environmental protection, sustainability and conservation of resources – a forward-looking vision to which Anton Paar instruments will continue to contribute.

Infobox:

INSTRUMENTS: DMA 4200 M

SAMPLES: asphalt and bitumen, base oil, waxes, extender oils, raw distillates

MEASUREMENT PRINCIPLE: Pulsed Excitation Method - After reaching a stable oscillation, the excitation is switched off, and the oscillation fades out freely. This sequence of excitation and fade-out is repeated continuously, creating a pulsing oscillation pattern. By allowing the natural oscillation of the U-tube, and evaluating this oscillation pattern (determination of the "Quality Factor"), the instrument gains three times more information than with the conventional Forced Oscillation Method.

MEASURED PARAMETERS: Density, specific gravity