TIRE INDUSTRY RESEARCH Global Tire Intelligence report

September 2020 edition: Dateline: 30 Sept 2020

Compiled by Shaw Information Services trading as
Tire Industry Research

For subscription enquiries
David@TireindustryResearch.com
+44 208 647 1185
www.TireIndustryResearch.com

Opinion & commentaries:

News and intelligence

About this publication

This document has been prepared in response to demands from the global tire community for insight into all aspects of the global tire industry value chain.

During conversations with many tire professionals, we identified a strong need for a source of information on the global tire industry that brings together many different, independent sources, with commentary, analysis and interpretation.

As the tire industry transforms, increasing numbers of people in the tire industry do not have a multi-decade history in this business. This report is for them, and for the more experienced.

About the author. This report is compiled by David Shaw. Mr Shaw publishes widely on his own blog and LinkedIn about the tire industry. He has a 30-year track record reporting on the global tire industry at the highest levels. He publishes market research reports; offers a weekly news service and manages conferences globally.

For more information see http://TireIndustryResearch.com

 TIRE INDUSTRY RESEARCH

Contents

"SAP" for materials data

Building a comprehensive materials database

In the eighth webinar run by Eduardo Minardi and David Shaw, we talked about building a comprehensive database of materials properties. That means really comprehensive. The different datasets might including tire test data; processing data and predictive modelling data in addition to the standard materials characterisation data. Very often, different people within the organisation hold that data in a series of discrete spreadsheets, and one researcher may not even be aware that tests were carried out by colleagues in a different department.

Bringing all the data together into one platform offers a number of benefits. First is that it makes it easier for materials scientists to lay their hands on the right data; and link the materials characterisation data to tire test properties, for example. Evidence shows that researchers spend up to 80% of their time looking for specific datasets and cleaning them, leaving less than 20% of their time to analyse and interpret the data. That process can be repeated many times over with each spreadsheet, resulting in huge inefficiencies.

Using a suitable platform makes materials scientists more effective; gives them more visibility on different data sets and permits them to see how their materials and compounds behave in the mixer; in the extruder and finally how they add value to tires.

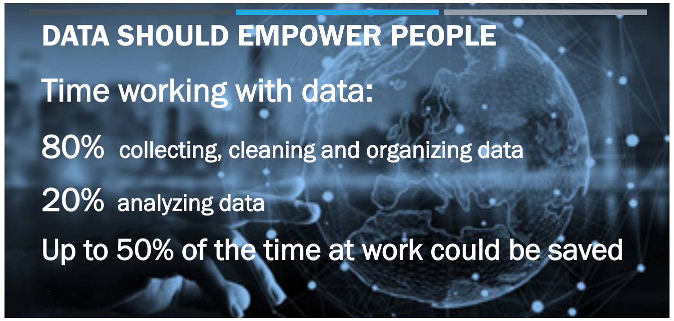
There are other benefits, such as the possibility to apply artificial intelligence rules to the full data sets and the option to support less experienced researchers with the accumulated knowledge of more senior experts.

Comparison with ERP

In the old days, teams of keen young business analysts would track the performance of a business and present the results on spreadsheets to management teams. In the 1980s and 1990s, the task of collecting and analysing data from manufacturing and purchasing and sales departments was replaced by Enterprise Resource Planning (ERP) systems such as SAP.

Those systems integrated different sources of information such as cost of goods; costs of energy and maintenance, sales records and suchlike. Once office staff had re-trained and converted their separate and customised systems into a more standardised format, the flow of high-quality information began, and has never stopped since.

That brought all the relevant data to the finger-tips of the right people, and offered tools to permit easy visualisation and analysis of the data contained in the business.



Imagine doing the same for all the data associated with materials performance and behaviour.

In many organisations, the materials testing team store all their data in a LIMS type system – except for that maverick brilliant scientist who keeps all the data on his own customised and highly automated spreadsheets. The production teams run ERP, but only identify each compound with a code and don't collate information on why specific compounds run better than others. They just complain when compound 234XY is running, because it always needs three or four passes through the mixer and then seems to wear out the extruder dies too quickly. Meanwhile, the tire modelling team uses sets of two-dimensional performance characteristics, and compares modelling data with actual behaviour. Finally, the tire test people look at the whole tire and do not identify whether the silica loading in the undertread for example is different from product A to product B.

Not only is the data stored in different formats and different locations, but in many cases, one group of engineers or scientists is not aware that the other datasets exist, nor how to integrate all the available information and data.

Uncountable offers a data integration platform

In this webinar, Will Tashman, co-founder of a California-based start-up called Uncountable, explained that these issues are a major pain point for almost all rubber companies and especially tire makers.

Bringing all the data together does a number of things.

First, it makes it easy for scientists to locate all the materials characterisation and test data associated with any given ingredient or compound. This is a huge advantage. If scientists spend 80% of their time locating and cleaning data, it means they can multiply their effectiveness by three or four times.

Second, the core of any experimental lab is the Taguchi method for design of experiments. Tire compounds might have 20-30 ingredients or even more. Then there is the time in the mixer and the sequence of events in the mixer, from filling with dry ingredients to adding the active cure package; rotor speeds and power and other factors.

If an experimenter wants to find the best combination of all the ingredients and the mix cycle, there might be hundreds of thousands of different options. Design of experiments aims to use statistical analysis to reduce that number to just a few hundred key combinations. Once these are carried out, the full performance envelope is available and scientists can identify the maxima and minima of the various target characteristics.

With a comprehensive platform, when those combinations are tested, the platform starts building the performance envelope and dynamically re-calculates the ideal set of key data points. This is known as adaptive experimental design. As more data comes in, it can select different datapoints, and re-design the experiment, reducing the overall number of experimental conditions by around 30% and in some cases up to 50%.

Third, as more data is added, the system can start to use that data to build artificial intelligence rules and begin to suggest specific compound improvements that traditional compound engineers might not have thought of.

You might think of the task of creating a new compound to be a bit like playing with a mixed-up Rubik cube. Each time you try to improve one face of the cube, the other faces become more muddled. The Uncountable platform helps speed up the process of solving that puzzle, said Tashman.

It helps speed up the development time for new materials and compounds by bringing all the data into play and then using computer power to make best use of all that data.

Tashman said, "You are capturing the expertise of your scientists. There are a lot of scientists with a great deal of experience in this space, but many of them are closer to retirement than they are to the start of their career. You want to make that information readily available and accessible to the younger scientists who will remain behind so that they do not have to do more research to establish things that are already known and understood."

Management of change.

The benefits are real. Uncountable numbers Cooper Standard and Zeon Chemicals among its clients. Mike Recchio, President and CEO of Zeon said, "With the Uncountable platform, analysis and reporting that used to take hours or days now takes minutes."

Chris Couch, Chief Innovation Officer at Cooper Standard said, ""Uncountable identified novel compounds that were outside of our normal box of experimenting."

"SAP" for materials data

While the benefits are real, they can be challenging to realise.

First, is that brilliant, but maverick scientist who insists on keeping his own customised spreadsheets. That data has to be fed into the system in a systematic way; not kept on a private database with customised Macros.

The system can accept that customised analysis, but it has to be done within the system; not on a private computer.

Essentially, like much in the tire industry today, it means changing the way people work, in order to deliver faster and better results.

Tashman said, "You have a change management issue on your hands. Your scientists have built up ways of working over the last few decades, and they like using their current systems and current spreadsheets. There are a lot of ingrained habits here that need to be addressed and managed over time.

He said that when Uncountable works with companies, "We definitely follow a kind of crawl-walk-run kind of mentality. You start small; you create quick wins to demonstrate the turn-around and the payback, and those wins are typically in the three month to six month range."

He said everyone who has worked in the materials development world knows that finding the right bit of data is a major pain point. "If you can take all that data and rationalise it and coordinate it so that the scientists can just click a couple of buttons and pull up the data that they need, then all of a sudden, you have made them much more effective and efficient."

Those scientists need to see the benefits of the system, so that they are motivated to feed new data into the system.

Tashman said that Uncountable usually takes on the role of assembling historic data and converting it for use in the system.

He said if you think of the time and money that was spent creating all that data, it is incredibly valuable, so it needs to be put into the platform. He added that the materials team already has enough to do, without cleaning and re-formatting old spreadsheets, so that burden tends to fall on the uncountable team.

Yakov Kutsovsky , former CTO and CSO at Cabot Corp now runs a consultancy called MateriaX that is advising Uncountable. Asked if this kind of system de-skills a highly skilled role in the organisation, he said that there might be a few pure scientists who think that way, but the deeper you get into the search for new compounds, the more you realise that finding the results of an experiment that someone in the organisation carried out three or four years ago is a huge issue. Hunting for the right information occupies so much time and effort that researchers cannot be effective for more than a day or two each week.

He said, "The tire industry produces a lot of data. You cannot calculate the performance of a tire, so you have to test it and that generates data. All of that data exists in different places – some in different silos within the organisation and some in databases of suppliers or external agencies.

He said, "The particular challenge in this industry is that the data is spread across the value chain. So when you are thinking about really deep insights into material characterisation, or the processing capabilities of specific pieces of equipment, or the processing window of a particular additive;" you might have to approach a series of different groups both within the organisation and outside, to find that data."

He added, "People have realised that this is an important problem and a lot of tire companies have announced digital transformation efforts and they are trying to navigate through this space."

He said, "My experience in Cabot tells me that this is really a very high value problem, and one that people are working on every day."

Yakov said, "It has been shown over and over again that 80% of the time is spent collecting and cleaning the data and only 20% is spent on analysing that data."

He said that the Uncountable platform, and others like it can reduce the amount of time spent hunting for data down to 10% or 20%. That boosts time available for doing real work by a factor of three or even four. "There are very few places in an organisation today where you can identify up to 50% inefficiencies."

Tashman said that the data is not limited to materials characterisation data – the system expects to see images (for dispersion, for example); cure curves; simulation results and other types of data that might not normally be codified.

Q&A

Q: Is there enough structure in historical data to generate meaningful insights?

Yakov Kutsovsky: The answer is usually yes if it is put in the right format. If you think about the cost of generating this historic data in terms of man hours; it was huge. So if you can properly organise this data there are some untapped insights that you can extract from it.

Q: How can your system work with the complex interactions between tire makers and materials suppliers?

Will Tashman: You are absolutely right that raw materials do impact tire manufacture. The point of a system like this is to be able to say that if you get a certificates of assessment from a supplier; how do you incorporate that into experimental retroactive analysis and how do you incorporate that from a retroactive analysis standpoint?

Yakov Kutsovsky: the thing about raw materials is that the suppliers have their own proxy relationship compounds. Most of them will do very deep characterization of tire performance based on their own materials.

Q: how can data related to tire wear properties which has a lot of variables and noise, be scoped into this system?

Yakov Kutsovsky: from my experience, when you look at such complex phenomena that are determined by many different variables; it is almost impossible to predict the behaviour using simple linear predictive tools.

This is where machine learning models that capture multiple factors and non-linearities can have a shot at it.

Assuming you have all of the information that the model needs, then this kind of model is more suited than human experience or human knowledge.

I would say there is a pretty good chance it can be predicted, but it needs to be based on the right data.

It's not just getting lots of data; the data has to go deep. There is no point in doing lots of tests in the dry when in fact you are looking at wear on wet roads. In the same way you need to look at all the different ingredients and processing conditions as well as the moulding and curing functions. Any one of these things or a combination can have an impact. So unless you have put all of that data into your machine learning model you would not know whether these things might have an impact or not. The point is

"SAP" for materials data

that you have to bring all of this data together.

Scientists tend to think about measurement data. But there is also modelling data that is being generated – density function calculations; molecular modelling and so on. All of these models can also produce data that can be part of the same database.

Q: Tire companies have many concerns about entering this field. One of them is the cost and the time consumed to develop a project like this.

How quickly can companies see results from a project like yours?

Will Tashman: part of it is what do you mean by results? When we talk about the practical implementation and what we focus on when putting in a system like this, we tend not to go straight for an artificial intelligence-driven compounding system. That might be the ultimate goal but it is not something that can be done quickly.

When we start out with clients we try to focus on some very basic things that can be done quite quickly. Things like generic searches and access to data. Then we progress to something where you can analyse the data and see some trends that were not obvious before. And then you can progress to compound optimisation. Then maybe you can start to cross-fertilise technologies between the North American truck tire compounds and the Asian aircraft tire activities for example.

Q: when we talk about tire development it typically takes one to two years to develop a new tire. If companies were to use your system and it were to be fully implemented how much can that be reduced?

Will Tashman: Any claims we make are based off of compound development type systems. How do you get from a goal that you bring into the laboratory and a compound that appears to achieve those goals in the lab. That is where that 25% improvement in efficiency can come.

When you have a compound that performs well in the laboratory, you need to scale it up to put it into a factory and onto a real tire. We are not at the stage where we have done that completely with a client yet, but our goal is when we are integrated into that compound development activity, we would expect to accelerate that part by 25% or better.

Yakov Kutsovsky: I think that product development schedule you mentioned is a little optimistic. We normally see three to five years for product development. The first time through, you might not see much benefit; but once you have created the foundations – if you want to adapt and iterate on that and proliferate the product with a series of customizations it might accelerate quite a bit faster.

Q: someone here is asking if you can give them a budgetary range. How much is it going to cost?

Will Tashman: I can't really answer that question right now. There will be costs from an information technology resources perspective. But the total cost is going to depend heavily on what type of solution you select.

If you try to develop your own internal solution; you would have to hire a team of software developers; and hire a team of data scientists; and a team of machine learning engineers. And those are three different skills. So you will need three different teams or three different people.

If you want to work with a consultant who build you a system, then you will pay them a one-off consulting fee but there will also be some ongoing commitments to keep the system up and running and effective.

If you work with other vendors such as ourselves, you will probably end up with some kind of subscription cost model.

If you go down that third route with someone like us then the costs are first of all the information technology initiation. Those can be fairly limited because there are standardised ways of creating APIs between different systems. There would be a training an on-boarding period. That varies from place to place and time to time. Then there is a fair amount of data cleaning and ingesting and structuring that can be shared between the provider and internal resources.

Our typical deal sizes will be in the low 6 figures to low 7 figures. If you are a smaller company with maybe one or 200 scientists you will be in the USD500,000 type of range; if you are a global company with 2000 scientists around the world I would expect that to be somewhere above USD1mn per year.

Those are our numbers. I do not comment on what other companies might charge.

Q: What about data security – you are collecting data from different sources and that data is extremely sensitive.

Will Tashman: Obviously we recognise that materials and compounding data are the 'Crown Jewels' of many of our clients. First and foremost you have to have a security type of culture within an organisation. If you ask them what they do with their own data compared to customer data; the answer will give you an indication of how much they care about that. Similar to other new providers, our systems are based in the cloud.

We implement very strict permissioning and audit controls. This system is different from a sharepoint.

If I have a sharepoint access to North America; I can plug in a USB drive and download all of the information to the USB and walk out of the door.

But with this system we have controls over exporting data – and those can also be driven by rules and artificial intelligence so that if someone who has never downloaded a compound before tries to download 400 compounds on a Friday afternoon, that kind of activity can be blocked.

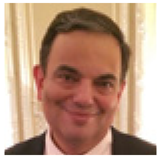
Data from customer one is kept completely separate from customer 2 for example.

Q: What about the skill-sets? Do you recommend developing appropriate skills internally? How do you train people to operate this kind of cultural shift?

Will Tashman: If a large company approaches us, it's not as if we plan on rolling it out to the whole company within a few months. The ideal is to be set up very well within two years rather than spending six years to claw back a bunch of old information.

If you can take that Data Lake and rationalise it and coordinate it so that they can just click a couple of buttons and pull up the data that they need, then all of a sudden you have made them much more effective and efficient.

We try to be very flexible in terms of what we take on, so that the data cleaning efforts are not primarily on the customer.



Yakov Kutsovsky: if you go back to the time when companies were introducing six Sigma; over time, the company became good at using statistical tools. This is like the next generation where you want people to really start using data and getting better decisions and not wasting time cleaning and processing data.

The main goal today is really about efficiency and speed. And if you are to get the maximum benefit from that you need to apply it to the maximum number of people.

You might get one technical breakthrough if you put a very smart data scientist in front of this system.

But to get 100 or 1000 incremental improvements you need to spread it in front of 100 or 1000 chemists and scientists.