

Innovation

in the fluid power industry

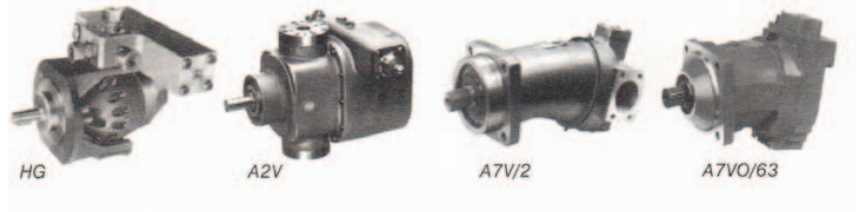


I N N A S

Peter Achten

9.IFK Aachen
March 25, 2014

Mister Chairman, ladies and gentleman, good afternoon. I was born in 1957, the same year in which the German Fluid Power Journal O+P was born. In 1997 the journal celebrated its 40th birthday. On this occasion, the Journal presented an overview of 40 years of progress in the hydraulic industry.



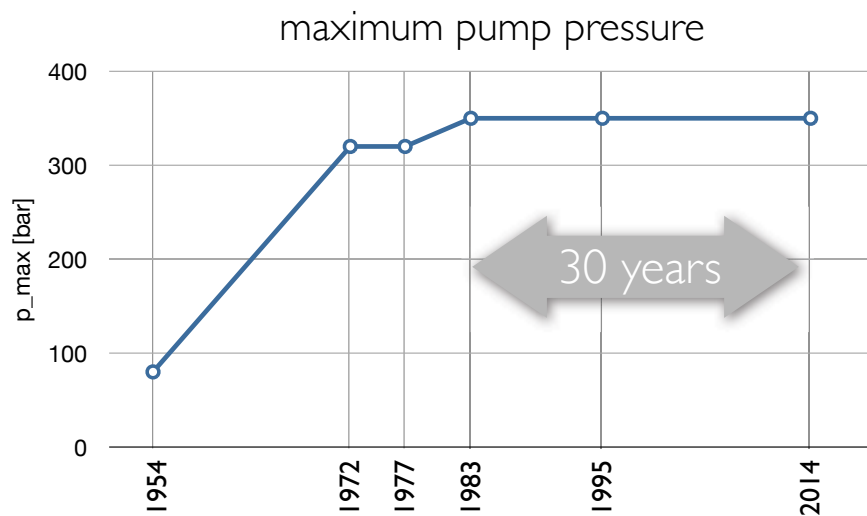
Year	1954	1972	1977	1983	1995	2014
maximum displacement [cc/rev]	107	107	107	107	107	107
maximum pressure [bar]	250	400	400	400	400	400
rated pressure [bar]	80	320	320	350	350	350
maximum rotational speed [rpm]	1450	2000	2000	2000	2150	2150
flow at maximum speed [L/min]	150	208	208	208	223	223
Power [kW]	20	114	114	125	134	134
Weight [kg]	110	100	53	49	49	49
power density [kW/kg]	0,2	1,14	2,15	2,55	2,73	2,73

This was one of the tables the journal presented. It shows 40 years of development of bent axis pumps.

I have taken the liberty to add another column, showing the present values.

A comparison of the values of 1995 and 2014 reveals something interesting: as you can see, the two columns are identical. Nothing has changed!

development 107 cc bent axis pump

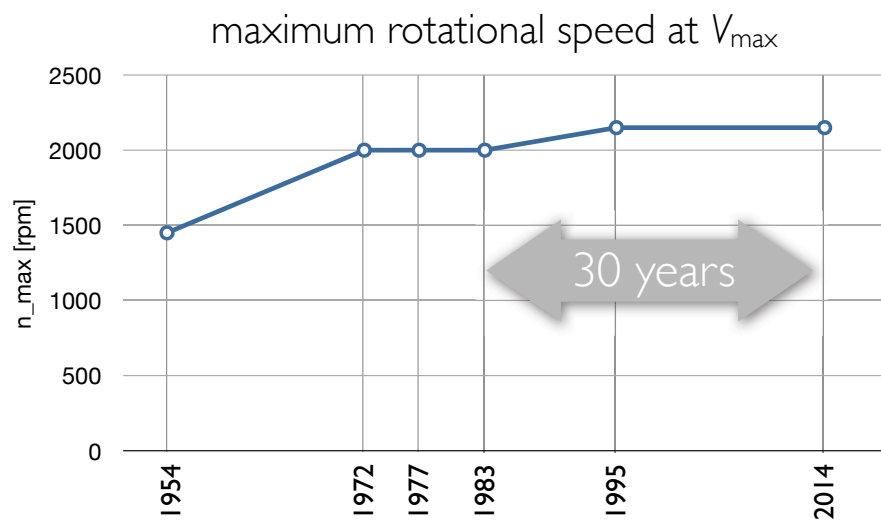


These are the same data, but now displayed in a diagram. The graph shows the maximum pump pressure as it has developed over the years. Between 1954 and 1972 there was an enormous progress. After that, the improvements became incremental.

I started my professional career in the fluid power industry thirty years ago. In this period nothing has changed. For which, of course, I offer you my sincere apologies.

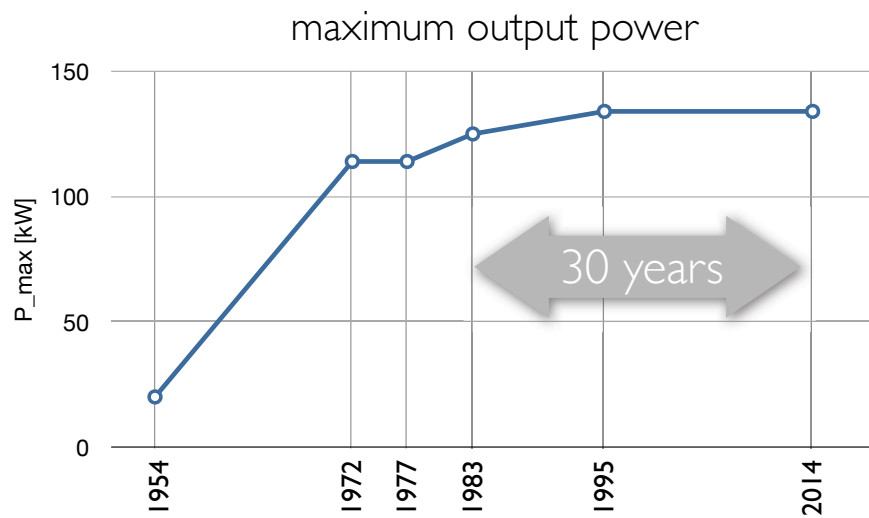
The same kind of diagrams can be made for the other parameters:

development 107 cc bent axis pump



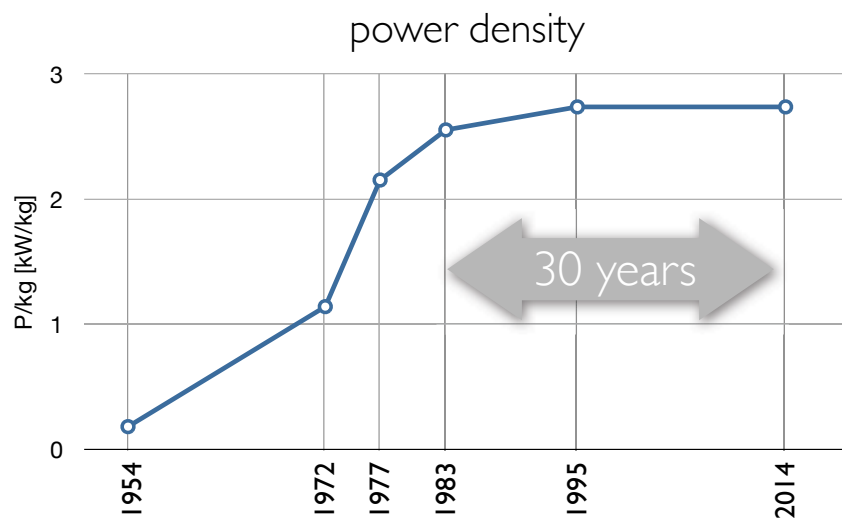
The maximum rotational speed...

development 107 cc bent axis pump

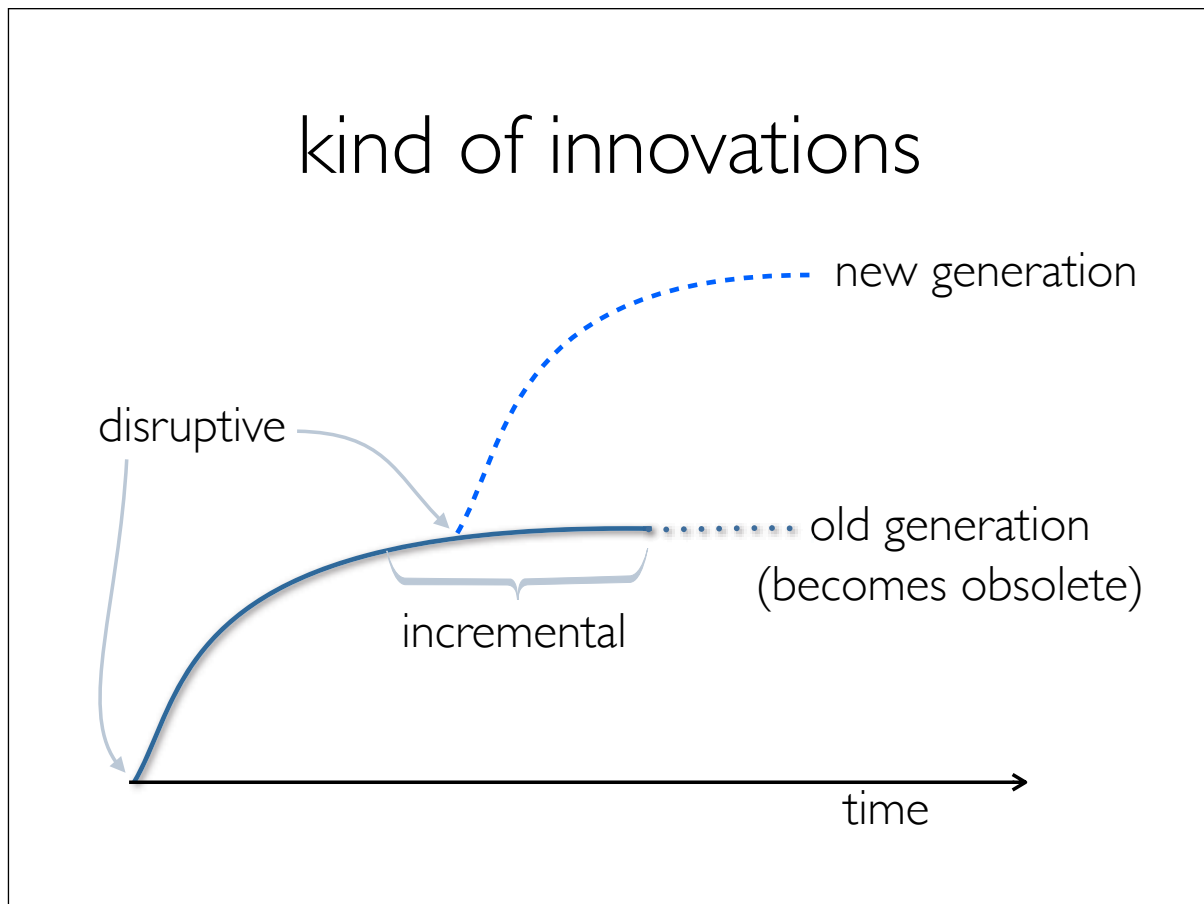


...the maximum output power...

development 107 cc bent axis pump



...and the power density.



All of these curves follow the same trend. Similar curves can be made for other components, or other parameters such as the efficiency.

After a few years of development, the technology becomes mature and the innovations become incremental.

Just to be clear: I have nothing against incremental innovations, as long as these innovations are not just window dressing. Some of the best innovations are simple. But they should never be ordinary, trivial, and –most and for all– not asked for by the market.

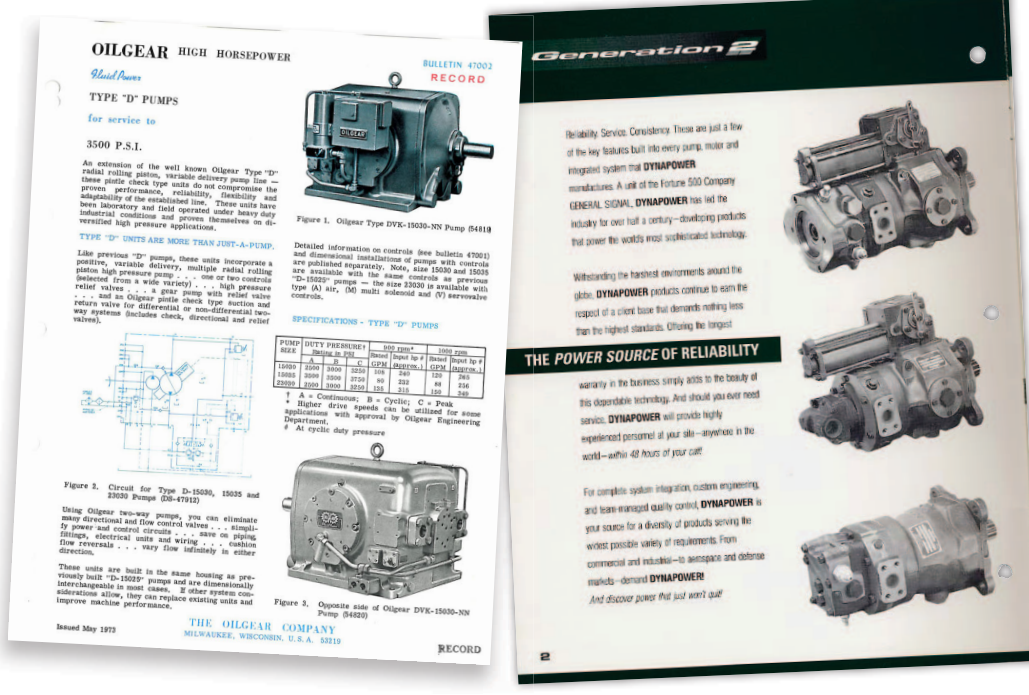
But my presentation of today is not about incremental innovations.

Today's presentation is about the birth of new generations, about disruptive innovations.

I know that the market is not always waiting for a new technology. But after 30 years of waiting, the market is ready for something new,... really new...

...and as soon as such a new disruptive technology appears in the market, the old generation becomes obsolete...

these are still sold



...and pumps like these disappear from the market.

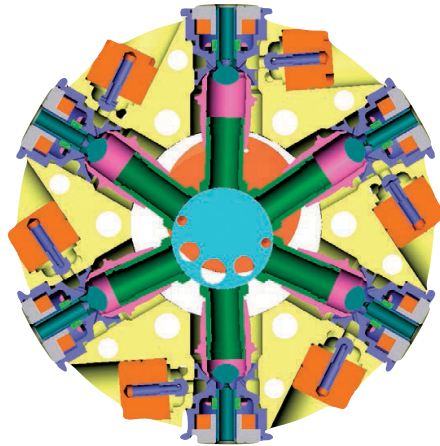
Mind you: These are still sold!

what is innovation ?
why run the risk ?
what if ?

Today, I will address three questions:

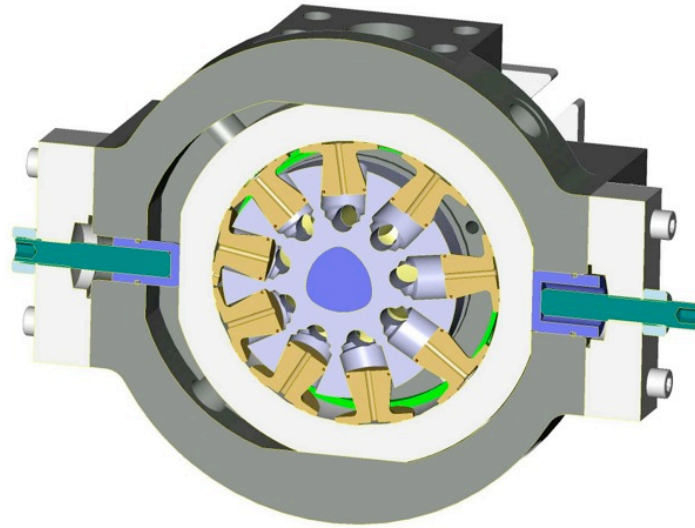
- ◆ what is innovation?
- ◆ why should you run the risk of switching to something new?
- ◆ and what happens if your largest competitor suddenly introduces a new, disruptive technology?

Technologies like?:



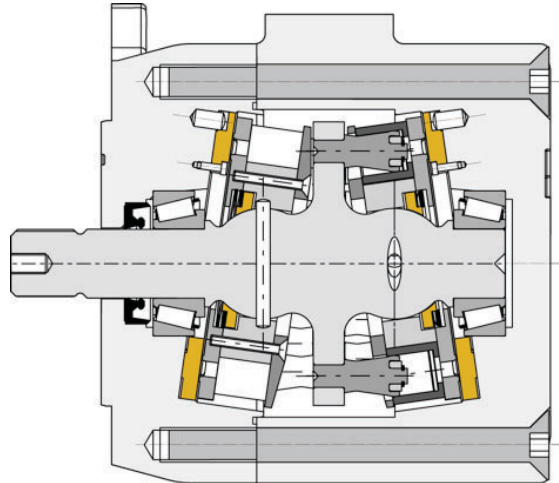
Digital Displacement Principle (2004)
Artemis IP/Mitsubishi

the digital displacement principle from Artemis...



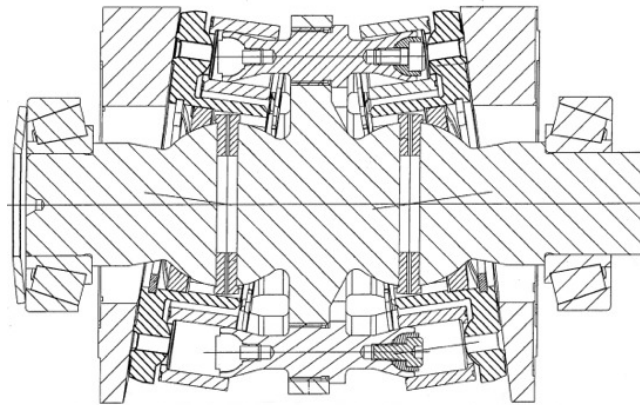
RAC Principle (2009)
Berbuer/IFAS

or the RAC-principle from Dr. Berbuer...



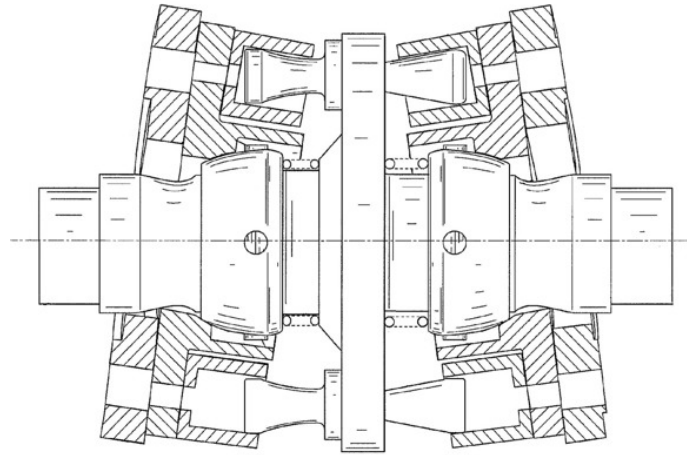
Floating Cup Principle (2002)
INNAS

or our floating cup principle...



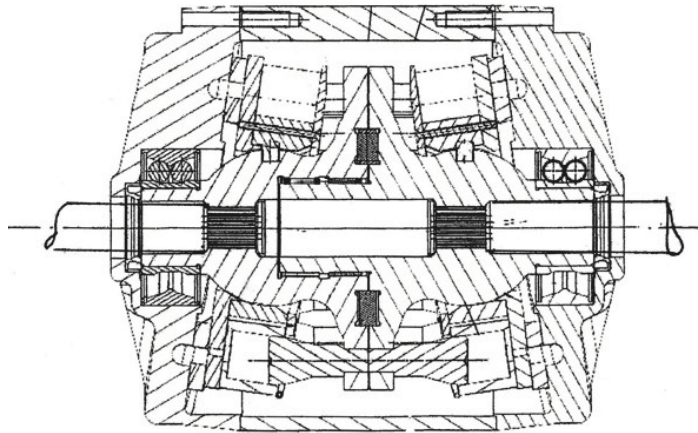
Doppelkugeltriebwerk (2007)
Bosch Rexroth

Or the double ball principle from Bosch Rexroth.



Floating Cup (2008)
Caterpillar

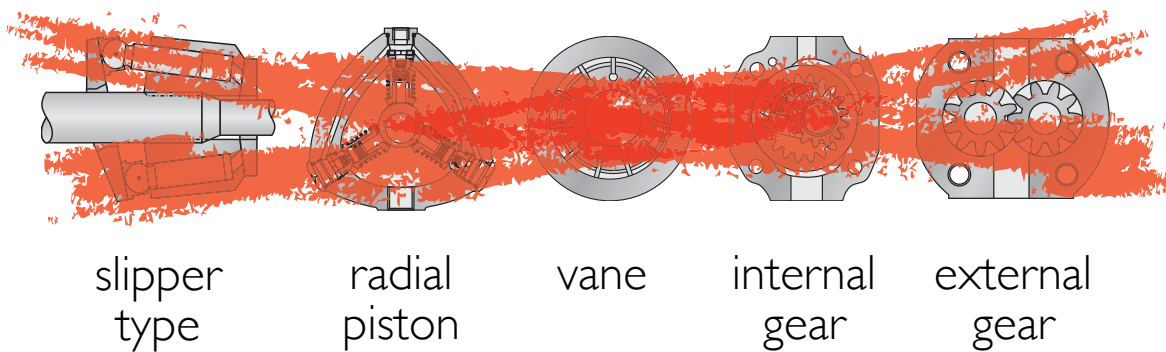
or the floating cup from Caterpillar...



Module Hydraulique Compact (2013)
Technoboost/Peugeot Citroen

...or from Peugeot-Citroen

disruptive pump & motor innovations



If one of these new concepts penetrates into the market, it will not just be another incremental step:
it will be a disruptive innovation; ♦ one that will replace most of the existing hydrostatic principles.

what is innovation?

Innovation starts with imagination: to imagine an ideal concept, without even knowing how this concept can be realised or materialised



This is the result of such an imagination. The iPhone is today's most prominent example of innovation. It is so well known, that it has become an icon. Many companies are copying the concept. Or at least they think, that they should do something similar, something with a lot of electronics and touch screens.

iPump 6

the absolute pressure device



Therefore, it is with great pride that I introduce to you...the iPump 6! It's a phone, an internet device and a pump. And of course you can make gorgeous pictures with it and post them directly on facebook and instagram. It is the absolute pressure device. We are so proud of it!

Of course, this is ridiculous



bells and whistles
'Schnickschnack'

But many companies believe innovation is about adding something, adding bells and whistles.
In Germany they have a beautiful word for this: 'Schnickschnack'.



But innovation is not about Schnickschnack. Innovation is about added value for the market



These are the specifications the market is asking for. Mind you, the market is not waiting for a concept which has just a through drive, or only a pump which can handle pressures up to 500 bar.

The market is waiting for a new concept, which can combine all of these demands into one single design. If such a concept would arrive on the market it would create an earthquake. That is what disruptive technologies do.



why run the risk?

Innovation is not without risk, nor is standing still. But why should you run the risk of adapting a new technology? I will give you three reasons.

1. to adapt to a changing world

The first reason is simple: companies sell products because the market needs and wants these products. If the world around us changes, then the market changes, and the industries have to adapt to it. They have to create new technologies and offer new products which address today's needs.

So, let's slow down for a moment and see how the world is changing, and how this affects the industry.



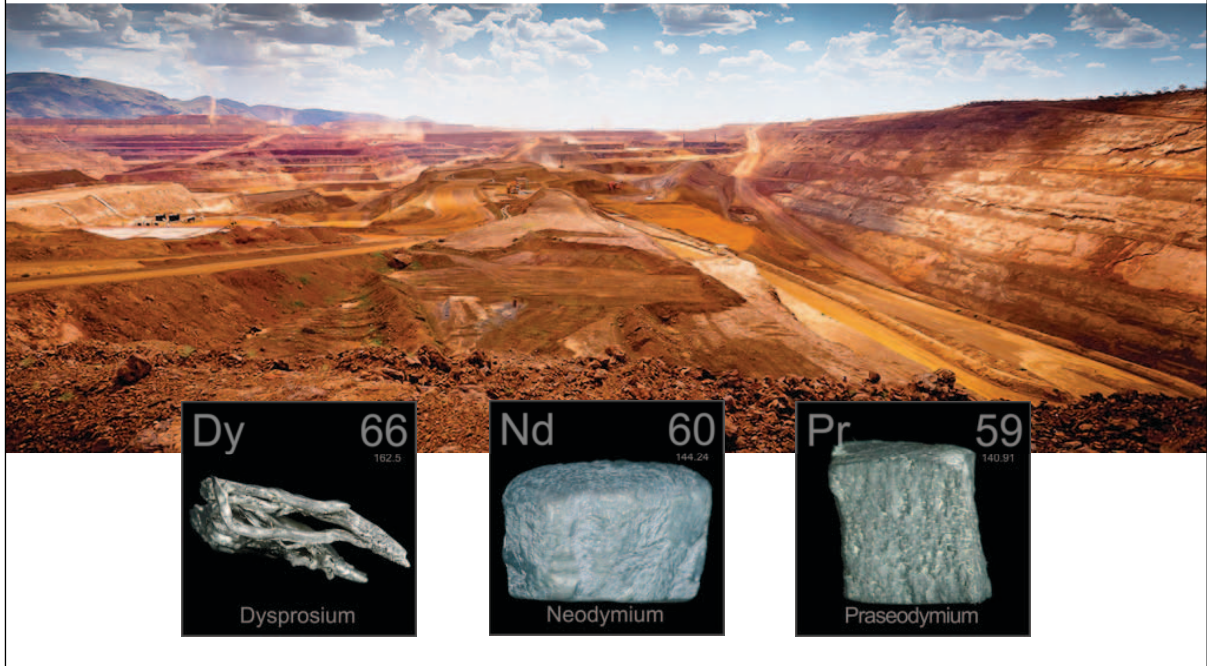
This is a photo of only a small part of Mexico City. The photo demonstrates two of the most important changes for the industry: population growth and urbanisation. People are leaving the countryside. Handwork in agriculture is more and more replaced by machines, in which fluid power can play a very important role. The work forces, which used to work on the fields, are now moving to the urban areas...

low labour cost



...creating an enormous reservoir for low cost labour. This is a threat for those European, American and Japanese industries which still have high labour cost. The pump industry belongs to this category. Having a labour cost percentage of over 30%, this production is already moving to China, Vietnam and other countries. The people you see on this picture have something in common: they want a better life. They also want to have a smartphone, ...and decent food, ...and a tv-set ...and a car

limited resources



As a consequence, the industry is demanding more and more resources. One thing is certain about these resources: they are limited, and some are more limited than others. This offers opportunities for the hydraulic industry:

Unlike the electric industry, the hydraulic industry is not so much dependent on materials like Dysprosium, Neodymium and Praseodymium. But we also face a thread:...

limited resources



...the oil price. Hydraulic systems and components are notorious for their poor efficiency. If we want to expand our market, we have to address this issue. We have to find better solutions.

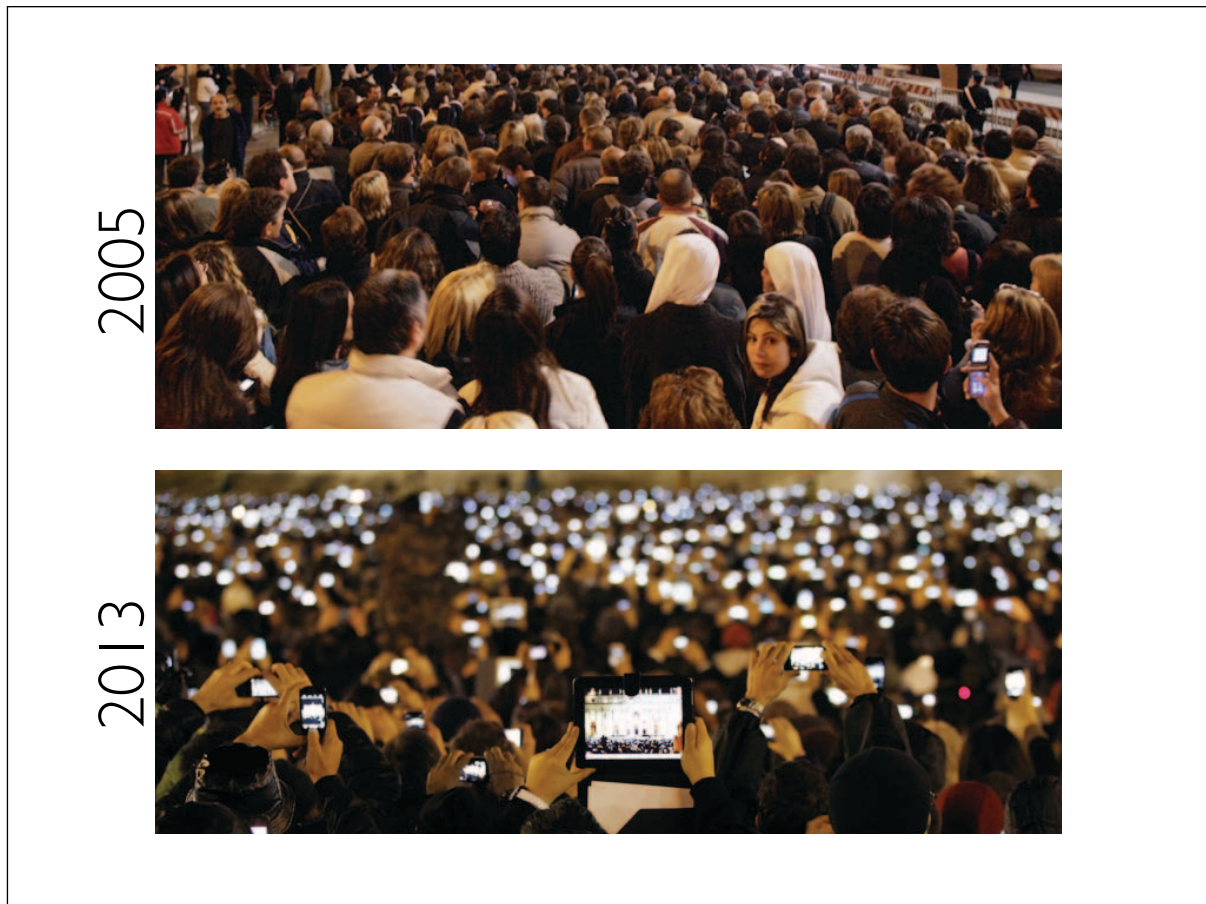
2. there is always a better solution

And there always is a better solution. This is the second reason why you should innovate. When your competitor starts selling a revolutionary new product, you should better be prepared for it.



This is what a better solution can do to a market. Seven years ago, this was hot. But then the smart phones arrived and they changed the complete landscape. Not only of the phone industry...but also of the camera industry.

To illustrate the effect:



This is St. Peter's Square in the Vatican in 2005...
...and –eight years later– in 2013.

Indeed an enormous change. And an enormous success. At least for some. But it also marks the downfall of big companies like Polaroid, Agfa and Kodak, Nokia and Blackberry, soon to be followed by the PC and book industry. These two photos show what disruptive technology can do.

Now, I hear you thinking: this only happens in the world of electronics. But then you are wrong.

cable-operated
excavators...

...were replaced by
hydraulic excavators



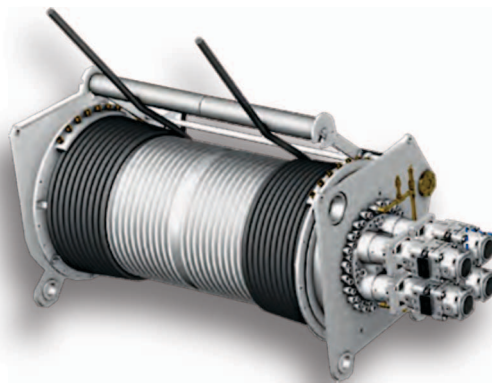
In the early fifties of last century, all excavators were cable actuated. Ten years later, most of them had been replaced by hydraulic excavators, and companies like Northwest, vanished. Hydraulic systems have been one of the clear examples of a disruptive technology.

3. the market demands it

Companies disappear, not only because of new technologies, but most and for all because they didn't see it coming. They did not see, feel or smell that the market was changing, or possibly they ignored these signals. Just to mention some signals that we have learned from the market:



no stick-slip,
no torque variations,
dynamic control

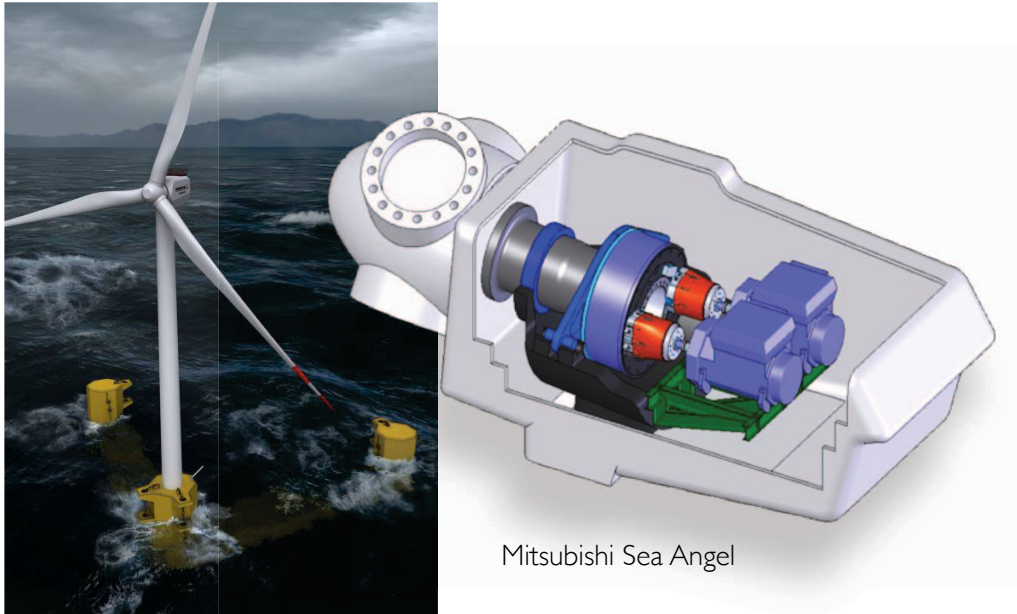


Liebherr winch drive

The market demands higher productivity, and for instance for cranes, this means:

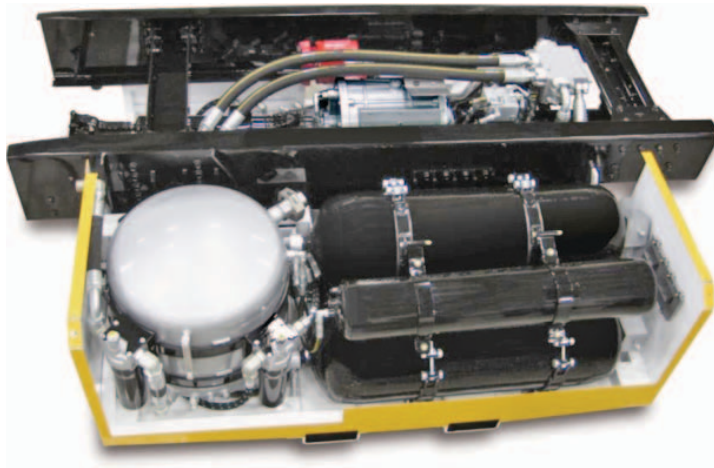
- no stick-slip,
- no torque variations
- and a dynamic control of the winches.

robustness, efficiency



The wind power industry needs efficient and extremely robust transmissions.

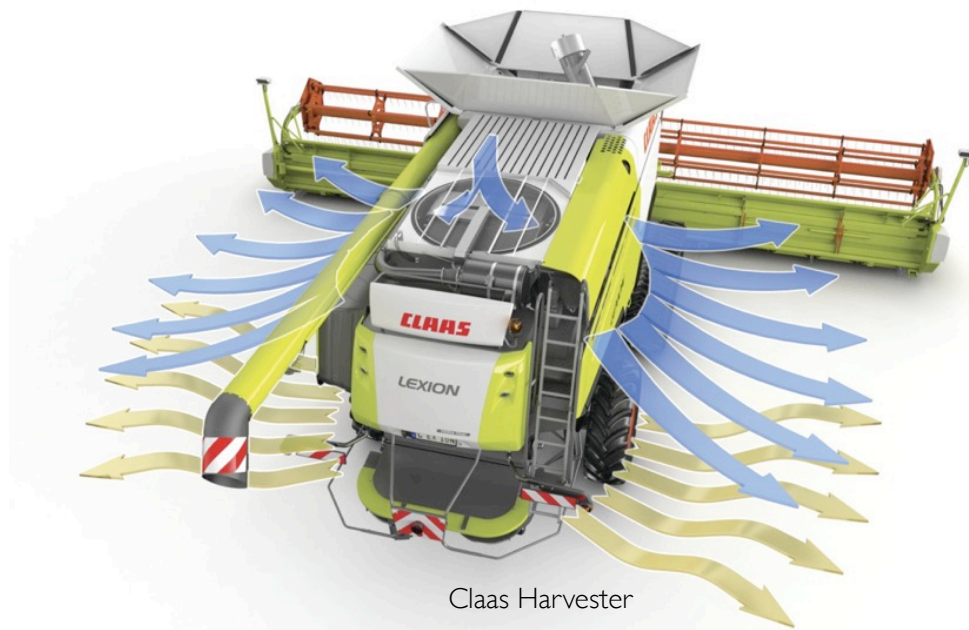
high cycle efficiency



Parker RunWise

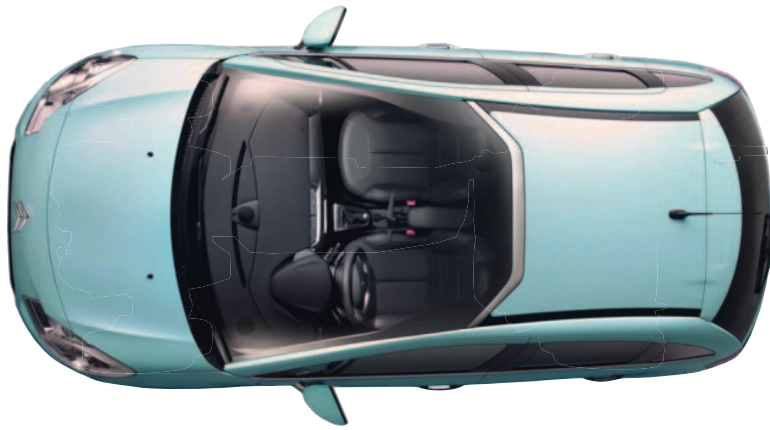
The market already knows the potential of hydraulic hybrid systems, but a higher cycle efficiency of the hydrostatic components is needed to create a breakthrough.

smaller coolers



Harvesters have a tremendous cooling requirement, for a considerable part because of the poor efficiency of the hydraulic system. The market demands a strong reduction of these losses.

low NVH, low cost



PSA Hybrid Air

And finally an example you have heard earlier today, in the presentation of Mr. Lalliard. Hydraulic transmissions could become an integral part of the drive train of tomorrow's passenger cars. Of course this requires a high efficiency. But it also demands a strong reduction of noise, vibrations, harshness and -most and for all- of costs.



what if ?

So what will happen if a groundbreaking new hydraulic pump and motor, is offered to the market?



increased productivity

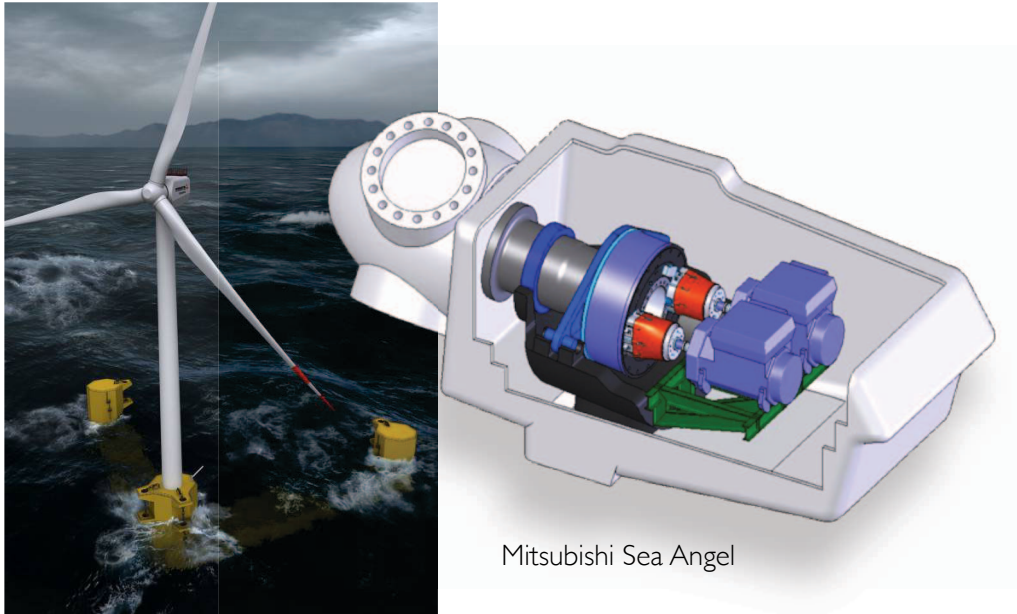


Liebherr winch drive

The image block contains two main visual elements. On the left is a photograph of a large white wind turbine tower with a red stripe, being constructed by a yellow crane against a clear blue sky. On the right is a 3D CAD rendering of a Liebherr winch drive, showing a cylindrical metal housing with a black cable spool and a complex hydraulic or electrical connection interface on the right side. The text 'increased productivity' is centered above the winch drive, and 'Liebherr winch drive' is centered below it.

Then our customers will be able to increase their productivity

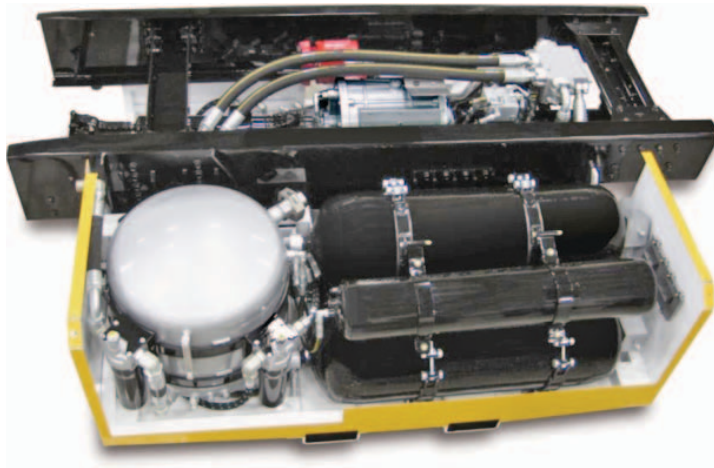
competitive wind energy



Mitsubishi Sea Angel

Wind energy will become competitive

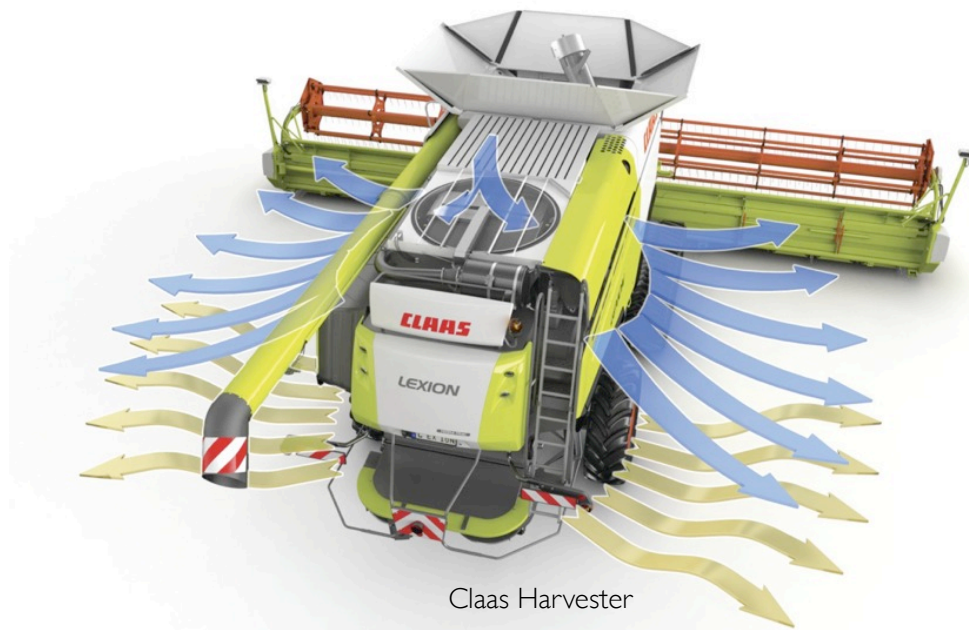
hydraulic hybrids 2.0



Parker RunWise

Hydraulic hybrid systems will finally get an update, which will create a real breakthrough for these systems in the market

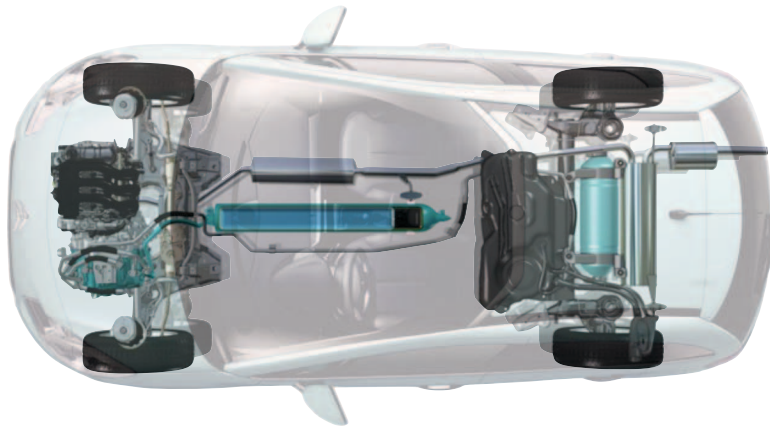
efficient & strong machines



Claas Harvester

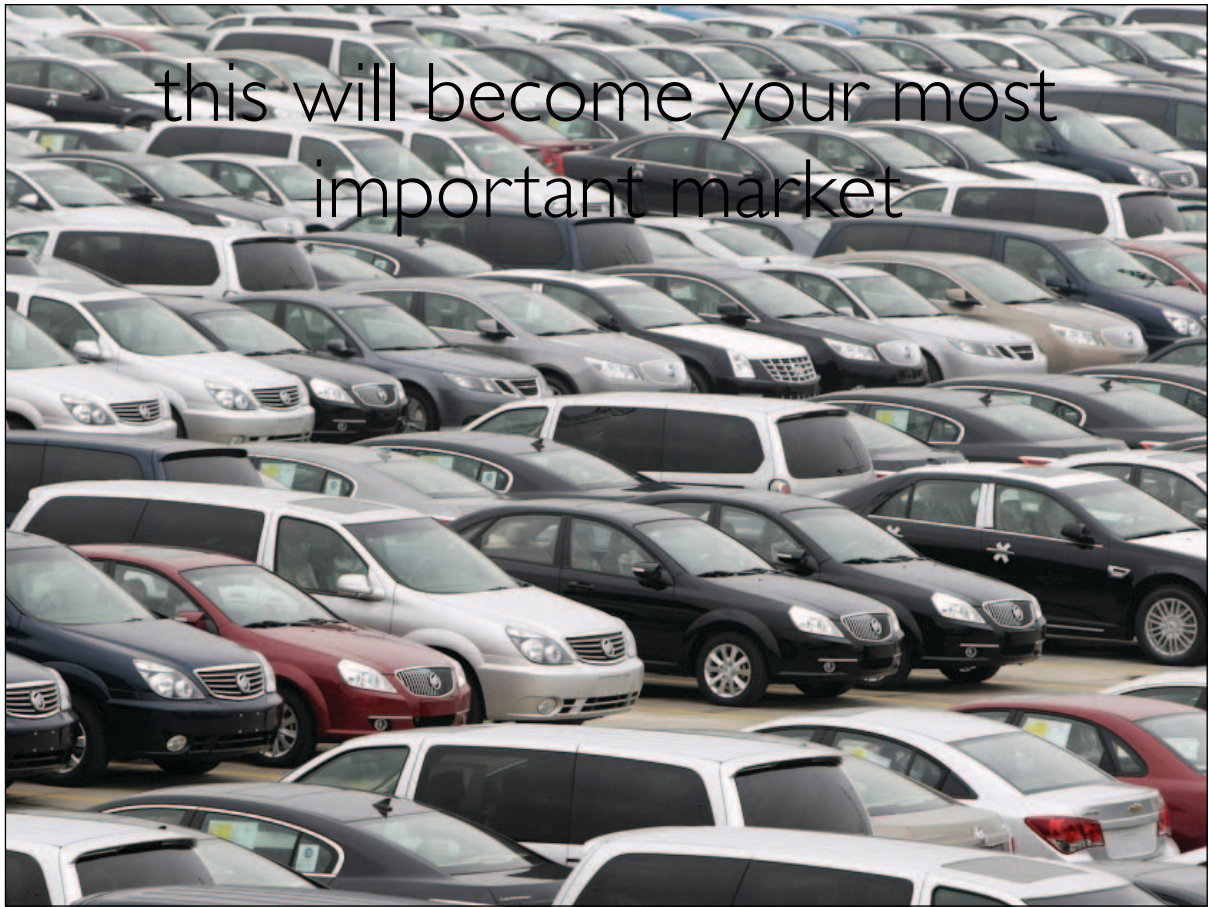
Machines will become much more efficient, and the power –which was earlier converted into heat– can now be used to make the machines even stronger

a new market for the hydraulic industry



PSA Hybrid Air

And the automotive market adopts hydraulic systems as a standard for their drive trains. I have said this before and I will say it again:

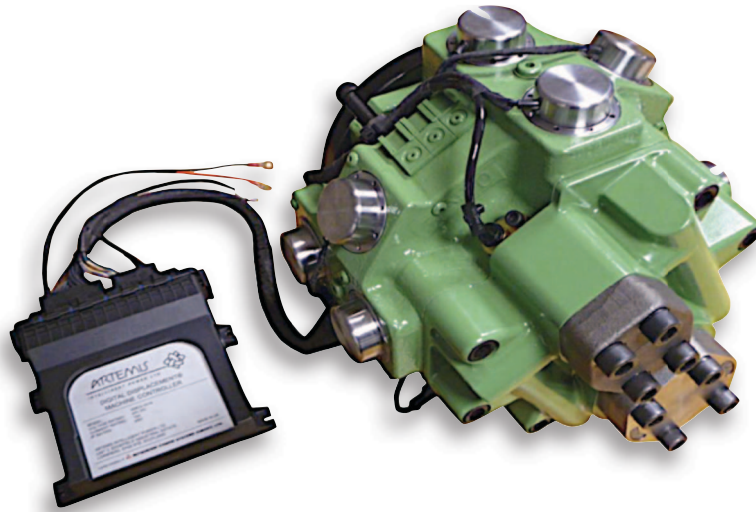


This will become your largest market!

Things to come

Now you might say, we did not have a new concept in the past sixty years. So why should things suddenly be different? The answer to that is simple: because we did not have a new concept in the past sixty years. For too long we have neglected that the world around us is changing. The market demands new solutions. And these are some of the things to come:

Artemis E-Dyn 96



Digital Displacement® Hydraulic Pump
96 cc/rev

Artemis will start the sales of the completely new E-dyn-series: a revolutionary new pump series with a digital control of the displacement. This is the 96 cc version that soon will be introduced to the market.

Floating Cup



first non-exclusive license agreement
has been signed in February 2014

And last month, INNAS signed a first non-exclusive license agreement, soon to be followed by other non-exclusive license agreements. Floating cup pumps and motors will arrive on the market



This will become reality!



convicted to innovation

Mister Chairman, ladies and gentleman: You are convicted to innovation, whether you like it or not. If you don't innovate...

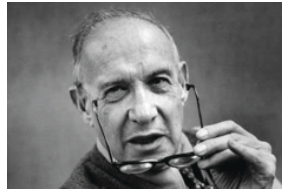
To adapt to a changing world
Because there is always a better solution
Because the market demands it

... then you have not noticed that we live in a different world than 30 years ago
... then you don't have an answer to the better solution of your competitor
... and then you have completely ignored that the market meanwhile demands something new



If you don't innovate, you'll be out of business, and end up like this picture.

"...Because its purpose is to create a customer,
business has two — and only two functions:
marketing and innovation.
Marketing and innovation produce results,
all the rest are costs."



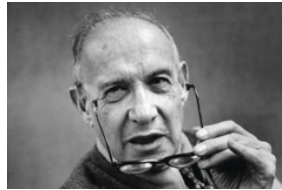
Peter F. Drucker

Peter Drucker, the famous writer, professor and marketing consultant, once said:
Because its purpose is to create a customer, business has two — and only two
functions: marketing and innovation.
Marketing and innovation produce results, all the rest are costs.

So before you leave this conference I would like you to remember this sentence: ...

business has two — and only two functions:
marketing and innovation.

all the rest are costs.



Peter F. Drucker

business has two — and only two functions:
marketing and innovation.

All the rest are costs.

What will be your innovation?

What will be your innovation?