State of the Art
UIC-Project „Technology of Composite Brake Blocks“

UIC / DB Systemtechnik

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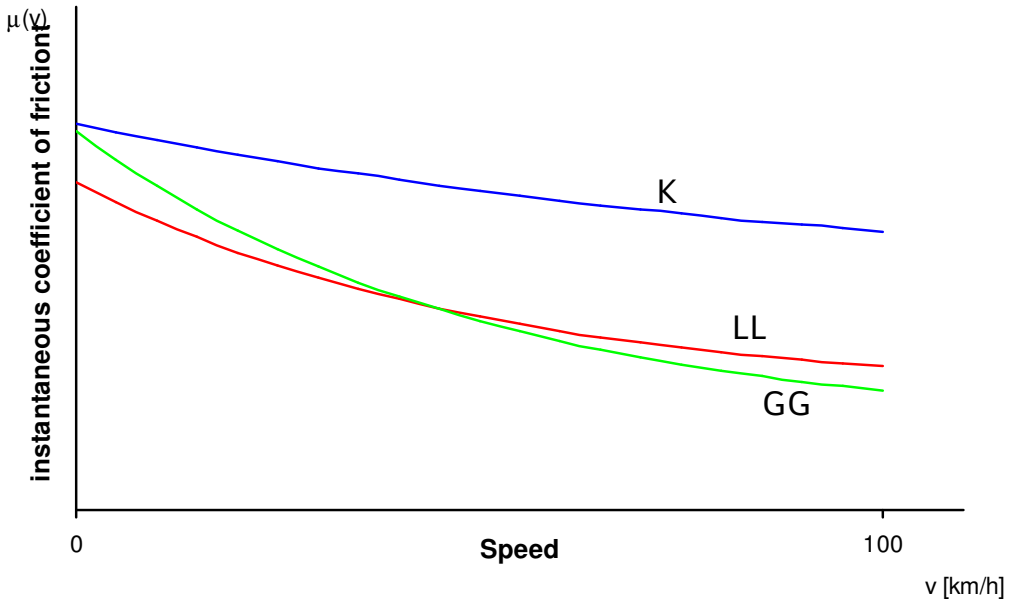
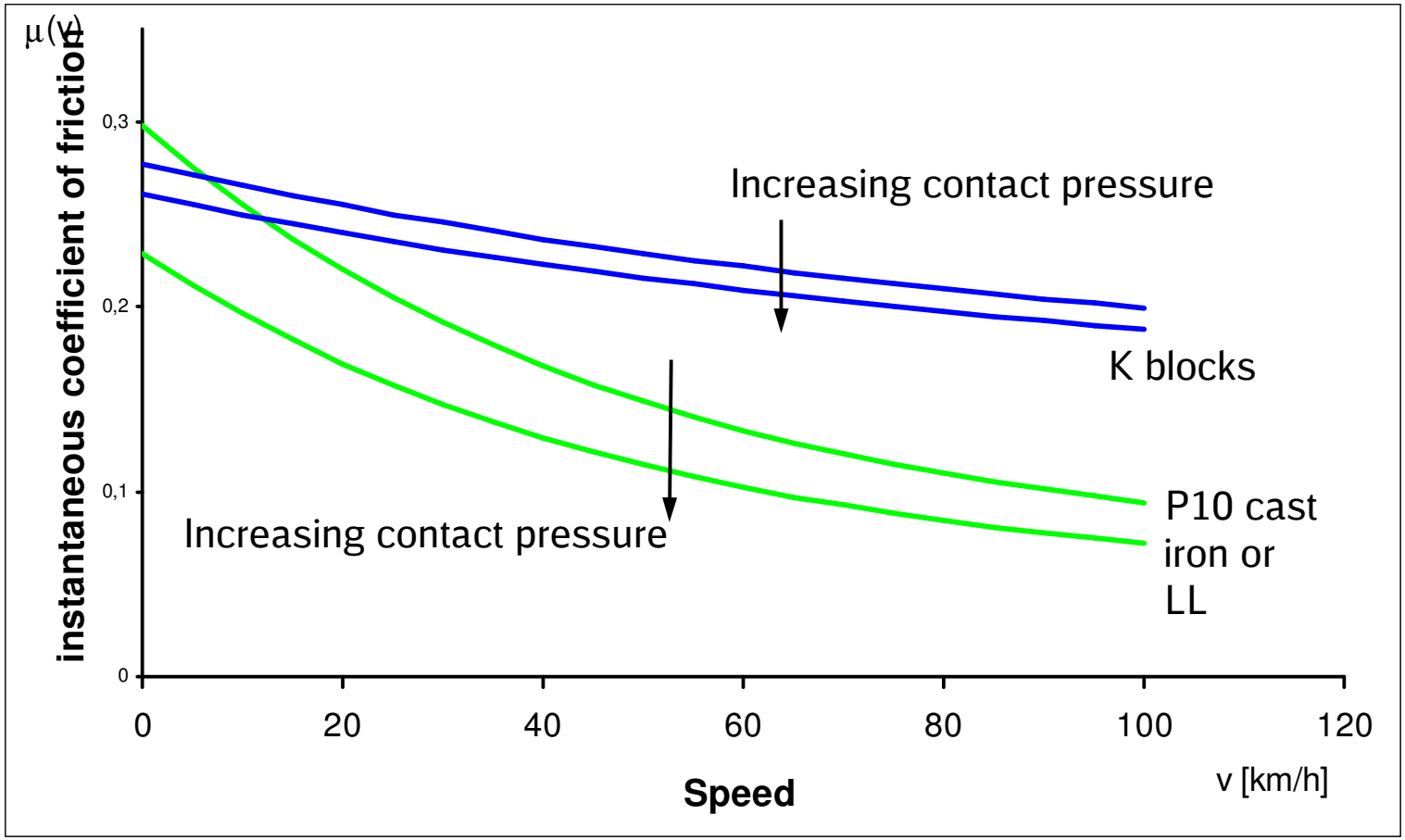
Introduction I/II

Two separate composite block systems have been and are still being developed:

- **K blocks**:
  Higher coefficient of friction (by a factor of approx. 2.5) than that of cast iron blocks
  (Vehicle's brake equipment requires modification)
- **LL blocks**:
  Coefficient of friction similar to that of cast iron blocks
  Aim: enable cast iron blocks on **existing** vehicles
  to be replaced with LL blocks without modification of the vehicle in as far as this is possible



Introduction II/II



The characteristic coefficient of friction of **cast iron blocks** (at very low friction levels) is heavily conditioned by:

- Friction velocity
- Contact pressure

These characteristics of the friction material must also be included in **LL blocks**.

The **K blocks** on the other hand meet the normal product development goals

Current situation concerning LL-blocks

The good news

- LL brake blocks are proving to be a promising noise-reducing measure for existing freight wagons.
- **At least 2 LL brake block types (IB 116* and Jurid 777), can in principle be safely used under all different European conditions of use.**

Weaknesses

- LL brake blocks still require further improvement and can not currently be used directly on a large scale in Europe.
- **Further well documented field tests on a larger scale with various usage profiles are necessary in order to better estimate the LCC of the system**

Challenge - The last major problem

It has been observed in the last months of the in-service tests that both LL brake blocks have been showing an anomalous increase of the Equivalent conicity.

Summary of synthesis report LL – test results I/II

Material / Specification Point	C 952-1	Jurid 777	IB 116*	System
▪ Brakeperformance				
➢ **Bench test**	(✓)	(✓)	(✓)	(✓)1)
➢ **Slip test**	✓	✓	✓	✓2)
➢ **Winter test**	✓	(✓)3)	✓	✓
➢ **Steep gradients test**	✓	✓	✓	✓
➢ **Long trains**	✓	✓	✓	✓
➢ **Hand brake force**	(✓)	(✓)	(✓)	(✓)4)
▪ Brake Failure Test	✓	✓	✓	✓

1) None of the available LL-blocks fulfils all test bench requirements
2) Spread in brake percentage with LL-blocks greater than with GG-blocks
3) Predecessor of J777 winter tested, winter tests of J777 to be clarified
4) Requirements of current TSI cannot be fulfilled (same as for K blocks) ➔ TSI to be adapted

Summary of synthesis report LL – test results II/II

Specification Point \ Material	C 952-1	Jurid 777	IB 116*	System
▪ Shuntage	✓	✓	✓	✓
▪ In-service test ➢ **General usability**	(✓) 1)	✓	✓	✓
➢ **Tendency to block**	(✓) 1)	✓	✓	✓
▪ Wheel wear / equiv. conicity	↯	↯	↯	↯
▪ Economics / LCC	↯	↯	↯	↯ 2)
▪ Noise reduction	✓	✓	✓	✓

1) Availability of test results is not yet sufficient
2) Cost effectiveness dependent on LL-block type, further work necessary on topic conicity/maintenance

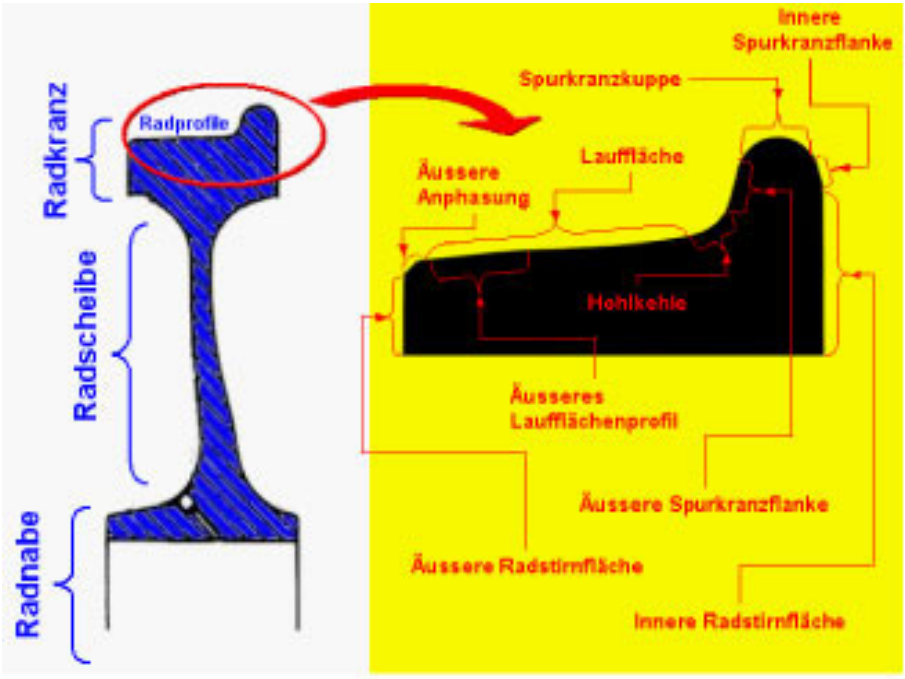
Summary of synthesis report LL – conclusions

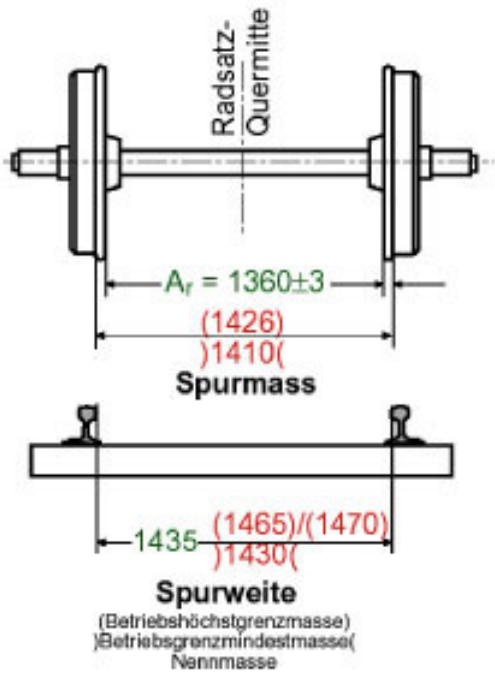
- Overall, LL brake blocks are **proving to be a promising noise-reducing measure for existing freight wagons, but one that can not currently be used directly on a large scale in Europe**. It is clear that the LL brake blocks still require further development.
- It is recommended that the **homologation of block types IB116* and J777 is prolonged for the following 3 years**, under the following conditions:
  - For each combination of wagon and block type, slip tests are performed to confirm the braking performance;
  - Equivalent conicity is monitored in practice;
  - The requirements of “Application Directive V-BKS (LL)” are adhered to;
  - All test data with respect to safety, cost-effectiveness and general performance are provided to UIC.
- Within this period of three years, the existing LL-blocks can be developed further and new LL-blocks can be designed/developed.

Further progress within UIC

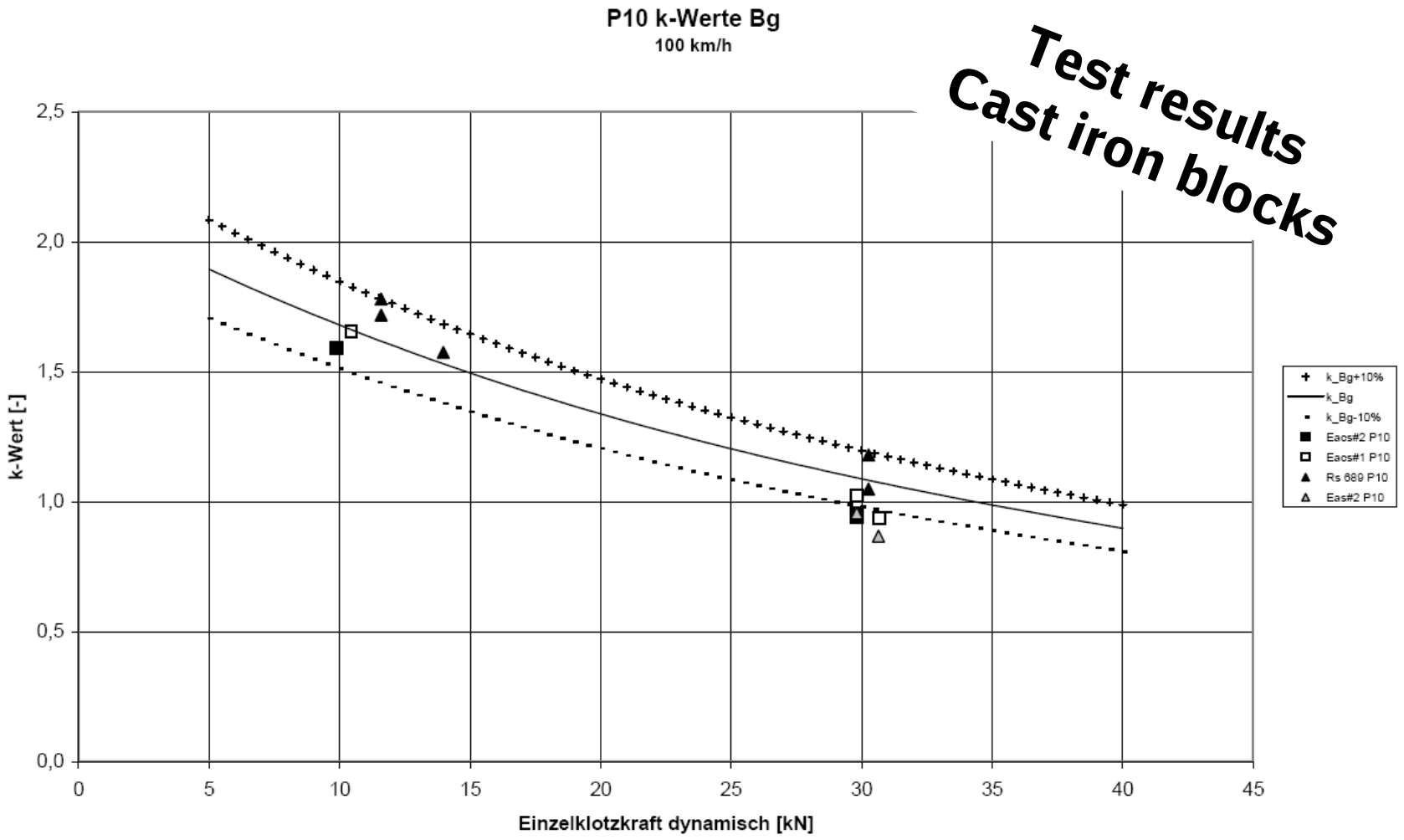
Two projects to be set off immediately by UIC

- Project #1: Influence of the brake block contour
- Project #2: Equivalent conicity – limit values / operational rules

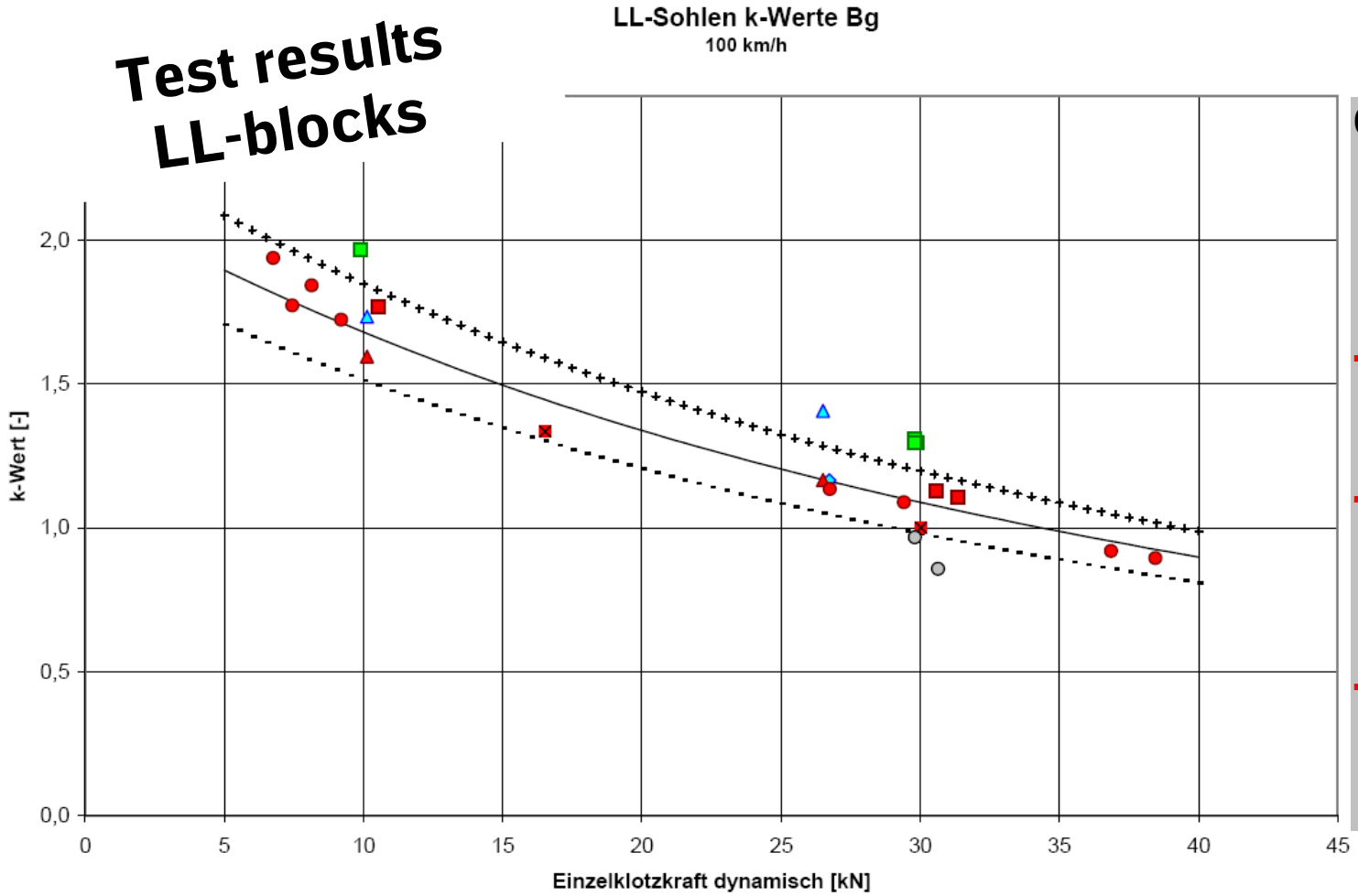




One technical example –
K-factor – calculated from slip tests results I/II



One technical example –
K-factor – calculated from slip test results II/II



Observed variations in slip tests with LL-blocks seem to be bigger than with cast iron blocks.

- ➔ At the moment still little resullts, especially with cast iron blocks!
- ➔ This leads to difficulties in interpretation of the test results of LL-blocks.
- ➔ New approach needed with modern statistical tools.

Last but not least: status K-blocks

Currently approved blocks

- **CoFren C 810** and **Jurid 816 M** [1)]
  [1)] the configuration 2xBg has no final approval at SNCF
- Both types of blocks mentioned as fully approved in official ERA list from June, 30th, 2009

Other types are in various phases of the approval process

- **Frenoplast FR513**
- **Becorit K40**
- **ICE9 909**
- **……**

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