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INTERWOOLLABS Report on Round Trials Completed in 2004

By

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SUMMARY

This report summarises the INTERWOOLLABS International Harmonisation (IH) Round Tests completed in 2004. The programs covered by this report include:

- Mean Fibre Length (as Hauteur) measured by the Almeter Method (IWTO-17)
- Mean Fibre Diameter measured by the Projection Microscope Method (IWTO-8)
- Mean Fibre Diameter measured by the Airflow Method (IWTO-6)
- Mean Fibre Diameter measured by the OFDA Method (IWTO-47)
- Mean Fibre Diameter measured by the Laserscan Method (IWTO-12)

The results are presented in graphical form and show the ranges in measured results that can be expected for each of the above methods. In general, the between-laboratories differences increase as the value of the measured characteristic increases.

INTRODUCTION

Since 1998, INTERWOOLLABS has continued to provide reports to IWTO ^(1,2,3,4,5,6) on the Round Trials, relevant to IWTO Test Methods, that it manages.

The presentation that follows summarises the results for the round tests conducted in 2004. It represents the combination of trial data from two separate round tests, conducted approximately six months apart, known as the IH Round Test 2004/1 and IH Round Test 2004/2. INTERWOOLLABS provides feedback to the participating laboratories in the form of detail reports that maintain the anonymity of the participants on a regular basis. The objective of this report is to summarise that information for a wider audience.

MATERIAL AND METHODS

INTERWOOLLABS maintains a stock of tops for running the twice-yearly round tests. The tops cover a wide range of mean fibre diameter and mean fibre length. After a rigorous testing program some of the tops are selected by the Management Committee to become Calibration Tops. Members of INTERWOOLLABS can elect to participate in any one or more of the following official programs:

- Mean Fibre Length measured by the Almeter Method (IWTO-17)
- Mean Fibre Diameter measured by the Projection Microscope Method (IWTO-8)
- Mean Fibre Diameter measured by the Airflow Method (IWTO-6)
- Mean Fibre Diameter measured by the OFDA Method (IWTO-47)
- Mean Fibre Diameter measured by the Laserscan Method (IWTO-12)

In the case of the first two programs 4 different tops are tested each six months, whereas for the other three programs 8 different tops are tested each six months. A statistical analysis is performed and reviewed at six monthly intervals by the Management Committee and the Administrative Council of INTERWOOLLABS prior to its distribution to the participating members of each program. The statistical analysis identifies any outlying results, which are subsequently excluded from the calculation of round test statistics. They are also excluded from the analyses presented in this Report

INTERWOOLLABS has set limits of acceptability for each parameter for each round test. The limits are included in the figures that summarise the round tests and are indicated as the IH Limit. Any laboratory exceeding the limits more than the number defined by INTERWOOLLABS in any program is required to undertake a full retest for that program.

RESULTS AND DISCUSSION

• INTERWOOLLABS Limits of Acceptance

The number of times laboratories exceeded the INTERWOOLLABS Limits of Acceptance are presented in Table 1 for Mean Fibre Length and in Table 2 for Mean Fibre Diameter. The results are summarised as the percentage of laboratories that had "0, 1, 2 or more than 2" results that exceeded the INTERWOOLLABS Limits of Acceptance.

For the trials being reported, laboratories that have 0 or 1 result outside the Limits are considered acceptable at the first attempt. Those laboratories that have 2 or more results outside the Limits have to undertake a mandatory retest on new samples.

Table 1: Summary of Performance as measured against INTERWOOLLABS Limits of Acceptance for Mean Fibre Length.

PROGRAM	Trial	Number of Participants	Percentage of laboratories where no tops, one top or more than one top are outside the IH Acceptance Limits		
			No Top Outside	One Top Outside	More Than One Top Outside
Almeter	IH 2004/1	84	88.1	7.1	4.8
	IH 2004/2	82	86.6	8.5	4.9

Table 2: Summary of Performance as measured against INTERWOOLLABS Limits of Acceptance for Mean Fibre Diameter.

Program	Trial	Number of Participants	Percentage of laboratories where no tops, one top or more than one top are outside the IH Acceptance Limits		
			No Top Outside	One Top Outside	More Than One Top Outside
Projection Microscope	IH 2004/1	29	93.3	0.0	6.7
	IH 2004/2	29	100.0	0.0	0.0
Airflow	IH 2004/1	80	87.5	7.5	5.0
	IH 2004/2	75	85.3	13.3	1.4
OFDA	IH 2004/1	43	88.4	9.3	2.3
	IH 2004/2	40	82.5	12.5	5.0
Laserscan	IH 2004/1	30	93.3	6.7	0.0
	IH 2004/2	30	100.0	0.0	0.0

• **Percentage of Members that Met INTERWOOLLABS Acceptance Criteria on the First Attempt**

Table 3 shows the number of members participating in each program that satisfied INTERWOOLLABS Acceptance Criteria at the first attempt over the last seven years.

Table 3: Percentage of Members that Met INTERWOOLLABS Acceptance Criteria on the First Attempt.

Year	Almeter (IWTO-17)		Projection Microscope (IWTO-8)		Airflow (IWTO-6)		OFDA (IWTO-47)		LASERSCAN (IWTO-12)	
	Trial 1	Trial 2	Trial 1	Trial 2	Trial 1	Trial 2	Trial 1	Trial 2	Trial 1	Trial 2
1998	94.4	94.5	97.5	90.0	93.3	95.1	100.0	100.0	100.0	100.0
1999	91.8	94.3	97.3	97.4	98.0	96.8	96.9	100.0	100.0	100.0
2000	88.4	95.3	92.1	97.4	98.9	94.7	100.0	100.0	100.0	100.0
2001	95.3	95.1	94.7	90.9	92.3	94.0	92.5	97.3	100.0	100.0
2002	94.0	95.1	87.1	91.2	94.1	94.0	97.6	97.4	100.0	100.0
2003	93.9	93.0	100.0	100.0	93.7	98.8	100.0	97.6	96.6	100.0
2004	95.2	95.1	93.3	100.	95.0	98.6	97.7	95.0	100.0	100.0

Note: In 2001 INTERWOOLLABS tightened its acceptance criteria for Airflow, OFDA and LASERSCAN to be the same as for used for both Almeter and Projection Microscope (ie more than one result outside the limits is unacceptable – prior to 2001 more than two results, out of the potential of eight, outside the limits was considered unacceptable for these measurement technologies.)

When comparing across the different methods, it is important to remember that the Acceptance Limits are the same for Airflow, OFDA and Laserscan but are wider for Projection Microscope. For this reason a comparison of the “between-laboratories” standard deviation is presented later in the report.

- **Between-Laboratories Performance for Each Top**

The round test performance is presented graphically in Figures 1 to 7. For the purposes of the graphical presentation, statistical outliers have been excluded from the data used to generate the figures.

Figures 1 to 5 show the between-laboratories range for each trial. The numbers in brackets indicate the number of laboratories that exceeded the “INTERWOOLLABS Limits” for the given sample.

Figures 6 and 7 show the between-laboratories standard deviation of Mean Fibre Diameter for the four different IWTO Test Methods.

A characteristic common to all the figures is that an increase in the characteristic being measured leads to an increase in the range of results between laboratories. This is a common occurrence in wool metrology and supports the use of confidence limits in IWTO Standard Test Methods that vary with the value of the characteristic being measured.

The range is a measure of variability that can be influenced by the number of results if the number is small. The number of participants in each program varied from 29 up to 84.

The “between-laboratories” standard deviation for each top in each round test completed in 2004 was graphed against the round test average (see Figure 6). These results confirmed the results from earlier round trials ^(1,2,3,4,5,6).

The relationship between precision (between-laboratories standard deviation) and the Mean Fibre Diameter can be seen more clearly in Figure 7 where the data from the 1998, 1999, 2000, 2001, 2002, 2003 and 2004 have been combined and the trend line for each Test Method presented.

- **Uptake of the New Diameter Measuring Technologies by INTERWOOLLABS Members**

Table 4 shows the number of members participating in each program over the last seven years.

Table 4: Summary of the Member Laboratories Participating in Each Program.

Year	Almeter (IWTO-17)		Projection Microscope (IWTO-8)		Airflow (IWTO-6)		OFDA (IWTO-47)		LASERSCAN (IWTO-12)	
	<i>Trial 1</i>	<i>Trial 2</i>	<i>Trial 1</i>	<i>Trial 2</i>	<i>Trial 1</i>	<i>Trial 2</i>	<i>Trial 1</i>	<i>Trial 2</i>	<i>Trial 1</i>	<i>Trial 2</i>
1998	89	91	40	40	105	103	30	32	20	19
1999	86	88	37	38	98	94	32	33	20	20
2000	86	84	38	39	94	94	34	38	20	22
2001	86	82	38	37	92	89	40	41	25	27
2002	84	82	34	31	85	84	43	39	30	32
2003	81	85	30	30	79	83	40	41	29	31
2004	84	82	29	29	80	75	43	40	30	30

CONCLUSIONS

The performance of participating laboratories in Round Tests run by INTERWOOLLABS has been presented. In general laboratory performance in all Round Tests is considered to be acceptable with from 93% to 100% of the member laboratories in 2004, depending on the specific program, passing on the first attempt.

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