

## RESEARCH & DEVELOPMENT ACTIVITIES

As a policy matter, the aim for NITRA's research and development activities is to help the industry. So, at NITRA, ideas for most of the R & D projects are conceived only after interaction with the industry. Need based projects are earmarked for carrying out research and special emphasis is given to those projects which have industry acceptance as well as commercial viability.

In the year 2019-20, NITRA worked on ten projects. Out of which four have been successfully completed during the period whilst work is in progress for the six projects.

Work done in the area of R&D during the year 2019-2020 is categorized as below:

### 1. GOVERNMENT SPONSORED PROJECTS

#### 1.1 Completed projects

- (i) **Project title** : Development of protective work wear for cement porters (Sponsored by Ministry of Textiles, Govt. of India)
- Objectives** :
- To determine the magnitude of occupational health hazards among cement porters
  - To design and standardize dustproof and comfortable material such as gloves, socks and workwear for cement porters which can suit the climatic and working conditions
  - To evaluate effectiveness of the developed material in actual practice and standardization of test methods
- Research Outcome** :
- Fabric samples were developed after intensive survey of cement user/ manufacturers
  - Fabric dust proof property analyzer has been fabricated and a patent has been filed
  - Cement work wear is developed and commercialized
  - Project is completed and technology has been transferred to M/s. Arvind Ltd., Ahmedabad.
  - Brief details of experimental work carried out are given here:

Under "Development of protective work wear for cement porters" project, four fabric samples coded as 'A', 'B', 'C', and 'D' were developed and tested for various properties including cement dust resistance property. The results of this study are shown in the Table-1. Out of four fabric samples, Sample C found to be better than others as it has low lower mass, higher tear and tensile strength, lower UV exposure effect, better water vapour permeability than others. Other properties like air permeability, acid and alkali resistant of all the samples were similar. The dust resistance property is shown in the Fig.-1. This test is

carried out on NITRA's developed Fabric dust resistance tester (Fig.2). It is explicit from the figure that dust resistance property of Sample-C is better than other three samples at different air jet pressure.

**Table 1 : Results of various properties**

<b>Property</b>	<b>Sample A</b>	<b>Sample B</b>	<b>Sample C</b>	<b>Sample D</b>
Mass, g/m <sup>2</sup>	185	182	135	182
Fabric Thickness (5 kPa), mm	0.40	0.44	0.38	0.32
Tear strength, Newton Warp wise Weft wise	52 48	56 49	63 53	19.5 18.5
Tensile Strength, Newton Warp wise Weft wise	428.9 527.8	431.8 551.2	653 478	563 435
Tensile strength after UV exposure-60 hrs, Newton Warp wise Weft wise	380.7 269.3	389.5 242.2	547 283	221 202
Water Vapour Permeability, mg/cm <sup>2</sup> /hour	5.16	4.58	5.74	5.53
Air Permeability, cc/sec/cm <sup>2</sup>	0	0	0	0
Taber Abrasion Resistance, Load: 250 grams, CS- 10, No. of cycles till the first thread breaks	100	300	≥1000	≥1000
Chemical resistance test i) NaOH (10% Con.) - Penetration, % - Repellency, % ii) H <sub>2</sub> SO <sub>4</sub> (30% Con.) - Penetration, % - Repellency, %	0 92.7 0 97.3	0 96.6 0 93.5	0 92 0 96	0 96

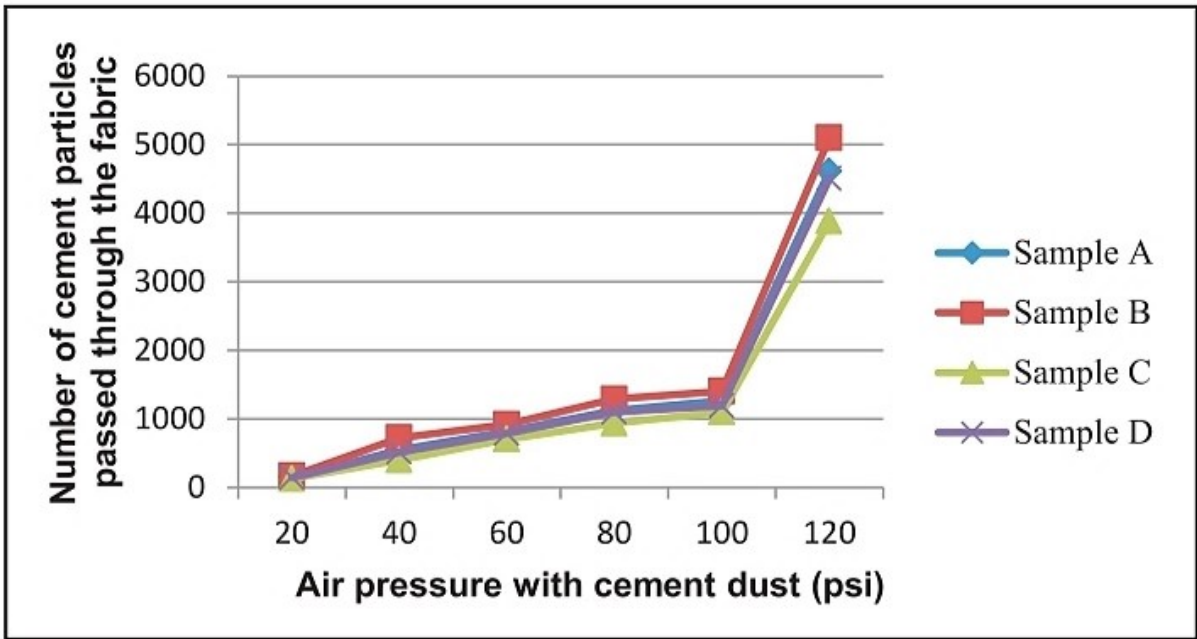


Fig. 1 : Dust resistance property of fabric samples



Fig.2: NITRA - Fabric dust resistance tester  
(Indian Patent application no. 201711002704)