

Special Articles: Wheelchairs

Important information about wheelchair improvement is frequently not available in the current scientific and engineering literature. In this issue of the *Journal*, we are initiating an effort to provide such information by publishing two articles which report on recent design improvements and research. In "Automatic Transmission for Electric Wheelchairs," **James B. Reswick, Sc.D.**, presents a new design which may promise to be a significant advance in wheelchair electromechanical efficiency. **James J. Kauzlarich, Ph.D.**, discusses "Wheelchair Tire Rolling Resistance and Fatigue"—a subject of high interest to both user and prescriber. Finally, portions of an interview with an expert on wheelchair standards and evaluation are presented below. Text of the complete interview will be featured in the April 1986 issue of the *Journal*.

We encourage readers involved in projects designed to improve the functions of wheelchairs to submit articles describing their work for consideration in forthcoming issues.

Colin A. McLaurin, D.Sc., Director of the Rehabilitation Engineering Center at the University of Virginia in Charlottesville, was interviewed by the editors of the *Journal* to gain an insight into the state of the art in wheelchair design, evaluation, and the development of standards for testing wheelchairs. Dr. McLaurin is well known in the rehabilitation field for his concentrated effort to establish wheelchair standards and also for his excellent wheelchair research and engineering program at the University of Virginia. He is Chairman of the Technical Advisory Group (TAG) of the American National Standards Institute (ANSI), a private group representing the United States at the International Organization for Standards (ISO), which is responsible for developing wheelchair standards.

These are some highlights of the interview:

Editors: "What are your thoughts about an automatic transmission system for electric wheelchairs as described by James B. Reswick, Sc.D., in his paper entitled "Automatic Transmission for Electric Wheelchairs."

McLaurin: "The design will increase the range of powered chairs, cut down the amount of amperage needed, require a smaller motor with more efficient work output, and allow easier hill climbing."

Editors: "Are there any other engineering approaches to automatic transmissions that differ from Dr. Reswick's design?"

McLaurin: "Perhaps. Series wound motors are possible and are efficient."

[The complete dialogue on other engineering approaches to automatic transmissions will appear in the April 1986 issue]

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Editors: "Why do we need standards for compliance testing of wheelchairs?"

McLaurin: "A consumer/prescriber should be able to buy a wheelchair with some confidence in what he [or she] is buying. Something about the chair's strength, durability, performance characteristics, and safety record should be known."

Editors: "Will standards impair creative innovations in future research and development?"

McLaurin: "No. The standards relate to performance and performance measurement. The standards do not restrict the kind of 'nuts and bolts' used in wheelchair construction, and could help focus and stimulate research."

Editors: "What is the content of the standards? We would like to publish the standards along with supporting material in the *Journal of Rehabilitation Research and Development*."

McLaurin: "I think the *Journal* would be a very appropriate place for publication of standards. Final standards will not be completed for 18 months or so. However, I can tell you now that standards for electric and manual wheelchairs presently cover the following categories:"

1. Static Stability (Manual Wheelchairs)
2. Dynamic Stability (Electric Wheelchairs)
3. Efficiency of Brakes
4. Energy Consumption
5. Overall Dimensions, Mass, and Turning Space
6. Determination of Maximum Speed, Acceleration, Retardation, and Jerk
7. Determination of Seating Dimensions
8. Static, Impact, and Fatigue Strength for Manual Wheelchairs
9. Climatic Tests
10. Obstacle Climbing Ability
11. Test Dummies
12. Determination of Tracking Characteristics of Manual Wheelchairs
13. Coefficient of Friction for Text Surfaces

The interview with Dr. McLaurin also addressed these issues:

- What are currently the most important areas of wheelchair research and development and what impact will this research have on future wheelchair users?
- What research and development is needed, beyond that which is underway at the University of Virginia Rehabilitation Engineering Center, and other such facilities?
- What are the present problems with commercially available wheelchairs?
- How much progress has been made over the past 10 years in the improvement of wheelchair performance? For example, have problems such as these been solved or improved: reduction of width, downhill steering, caster insufficiency, caster shimmy, and one-hand drive, as discussed at the Mobility Workshop sponsored by the National Academy of Sciences, Committee for Prosthetics Research and Development, 1976?

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