APEX Version 2019 V1 - Release Notes

APEX 2019 V1 Release Notes: new and enhanced features and resolved issues. For late-breaking release note changes, see the text file in the installation folder.

Engine Date: 12/20/2018.

New Sources - LEDs

Manufacturer	BRO Name
Cree (J Series)	J2835_4K_70CRI J2835_4K_80CRI J2835_3500K
Osram (SYNIOS P2720)	KY_DMKN31_FY
Osram (PointLED Series)	LY_P47F_AMBER LY_P47F_RED LY_P47F_S_RED LY_P47F_YELLOW
Seoul Semiconductor (3030 Series)	STW8C2PB_COOL STW8C2PB_NEUT STW8C2PB_WARM
Seoul Semiconductor (SZ8 Series)	SZ8_W0_C7 SZ8_W0_C8 SZ8_W0_C9 SZ8_WN_C7 SZ8_WN_C8 SZ8_WN_C9 SZ8_WW_C7 SZ8_WW_C8 SZ8_WW_C9

New and Enhanced Features

Software Quality Work Certificates	Description
	APEX now utilizes a parallelized computational kernel.

Known Issues

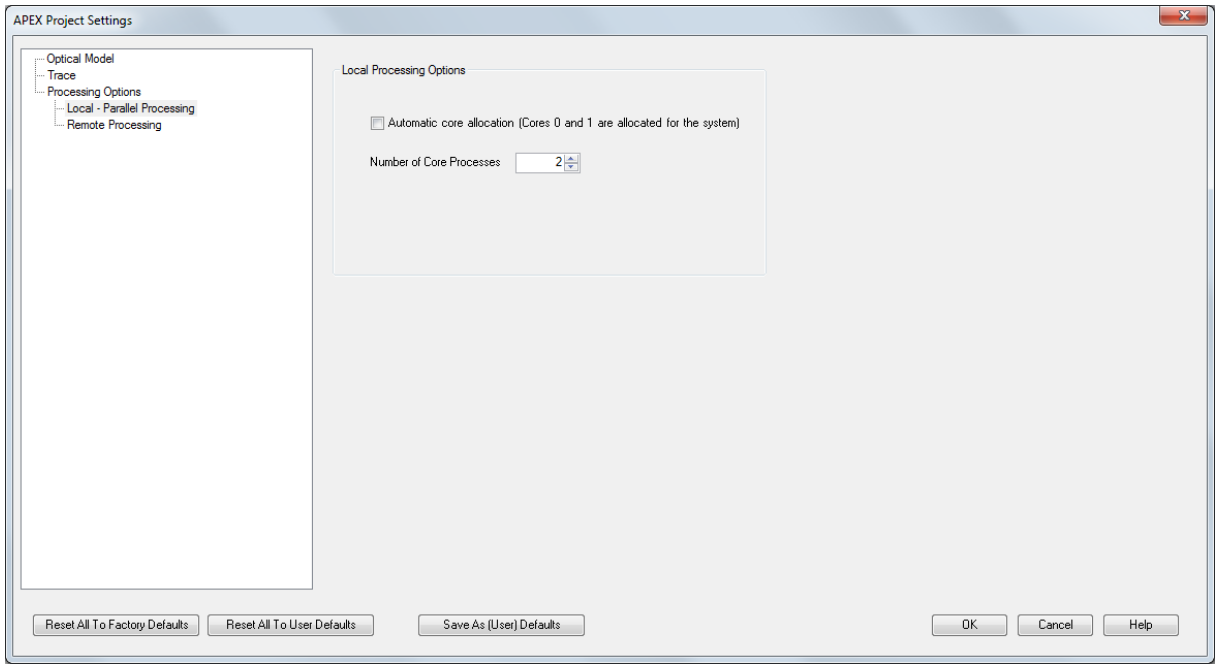
Software Quality Work Certificates	Description
06PRD00004819	Uniform Color Space calculations (CIE) can be performed only on the most recent photometric analysis results. To do Uniform Color Space analysis on previous results, you can use Copy and Paste of the previous analysis to create new data.
06PRD00004823	Luminous Intensity (angle space) can “hang” SOLIDWORKS if the selected surfaces have no energy.
06PRD00004889	APEX will not operate correctly if run using Remote Desktop when APEX is installed in a directory other than “Program Files”.

APEX Multicore Notes

Parallel Processing

APEX now includes parallel processing for improved ray tracing speed and efficiency. APEX uses the same computational kernel as ASAP NextGen and therefore its CoreMax technology to automatically run parallel processes on all cores on a local PC. In addition, you can control the number of cores accessed on each machine.

You can allocate the number of cores per process through the APEX Project Settings. You can also indicate automatic core allocation for all available cores on your machine.



Parallelization or multi-core support is implemented in APEX through the Message Passing Interface or MPI. MPI has been actively developed since early 1990's for parallel super computers and now is widely used for solving significant scientific and engineering problems on parallel computers with thousands of CPUs. MPI is considered the standard technology for parallel-distributed computing.

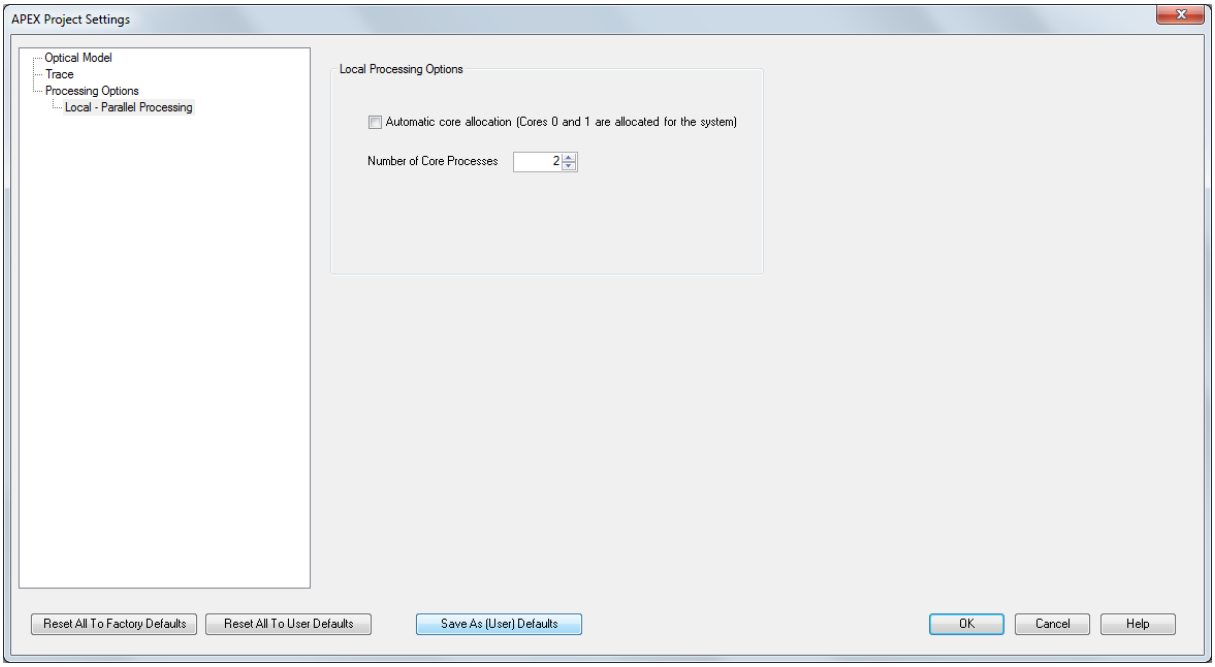
MPI achieves parallelization in the process level instead of the thread level used in multi-threading technology. It is important to note that Hyper or Multi-Threading is no substitute for physical cores and true parallel processing since a multi-threaded core must share processing duties and cannot be allocated to a single task.

Restrictions/Enhancing Performance

- Cores 0 and 1 are reserved for operating system and APEX on host machine
- Incoherent ray traces and calculations in APEX are parallelized and can be simulated on multiple cores.
- There must be at least one ray defined in every core to keep the parallelization synchronized during a ray trace. APEX will tell you to switch to a single core when you attempt to trace only one ray while using parallel processing.

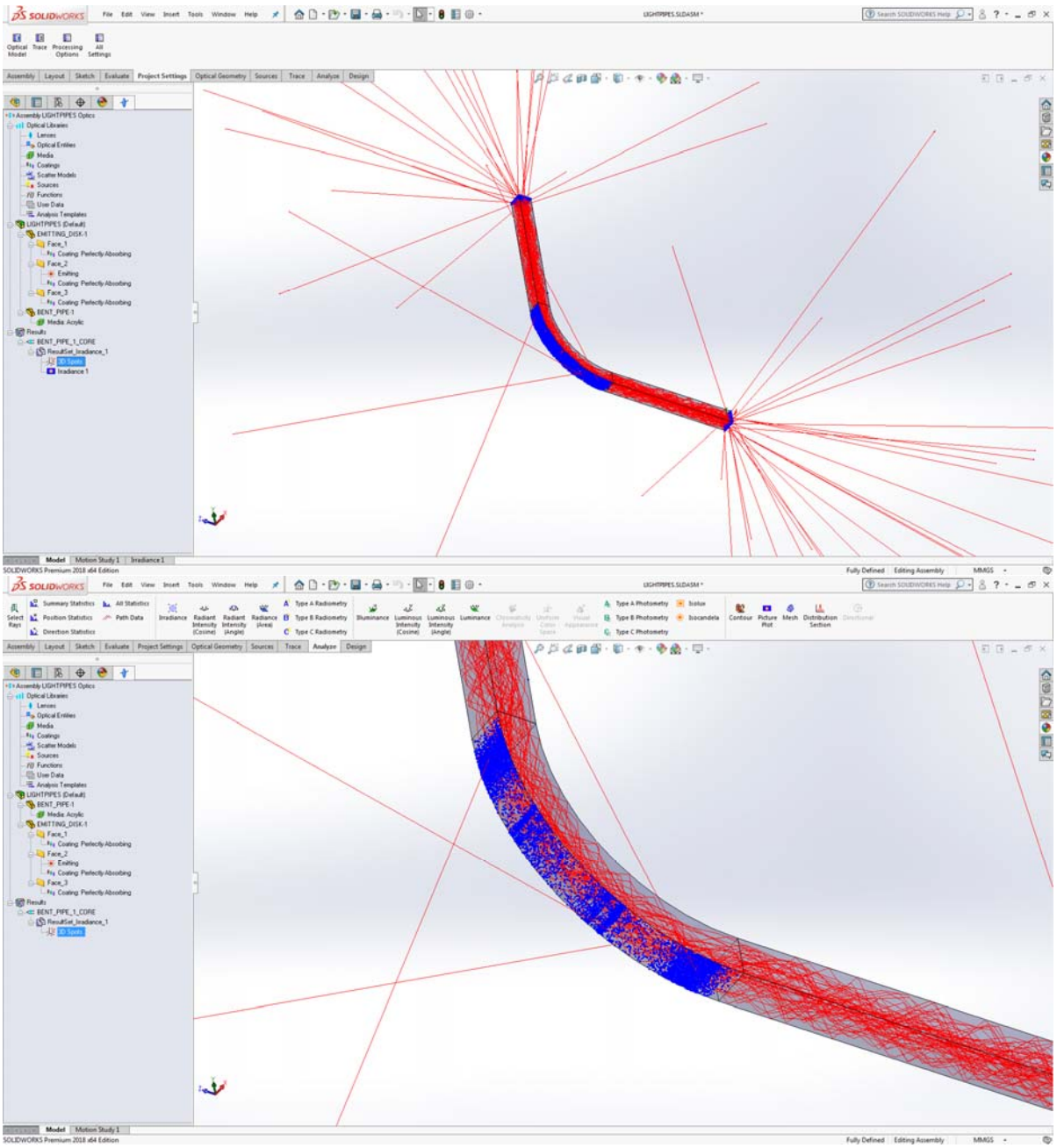
- Do not change the number of cores during the same APEX simulation. For example, do not simulate your system using 1 core and then switch to 2 cores.

- Restart SolidWorks/APEX after changing the number of cores. Be sure to save the Number of Core Processes under Processing Options in APEX Project Settings using the Save As (User) Defaults or at least check the number of cores before proceeding to make sure you have the desired number of cores.

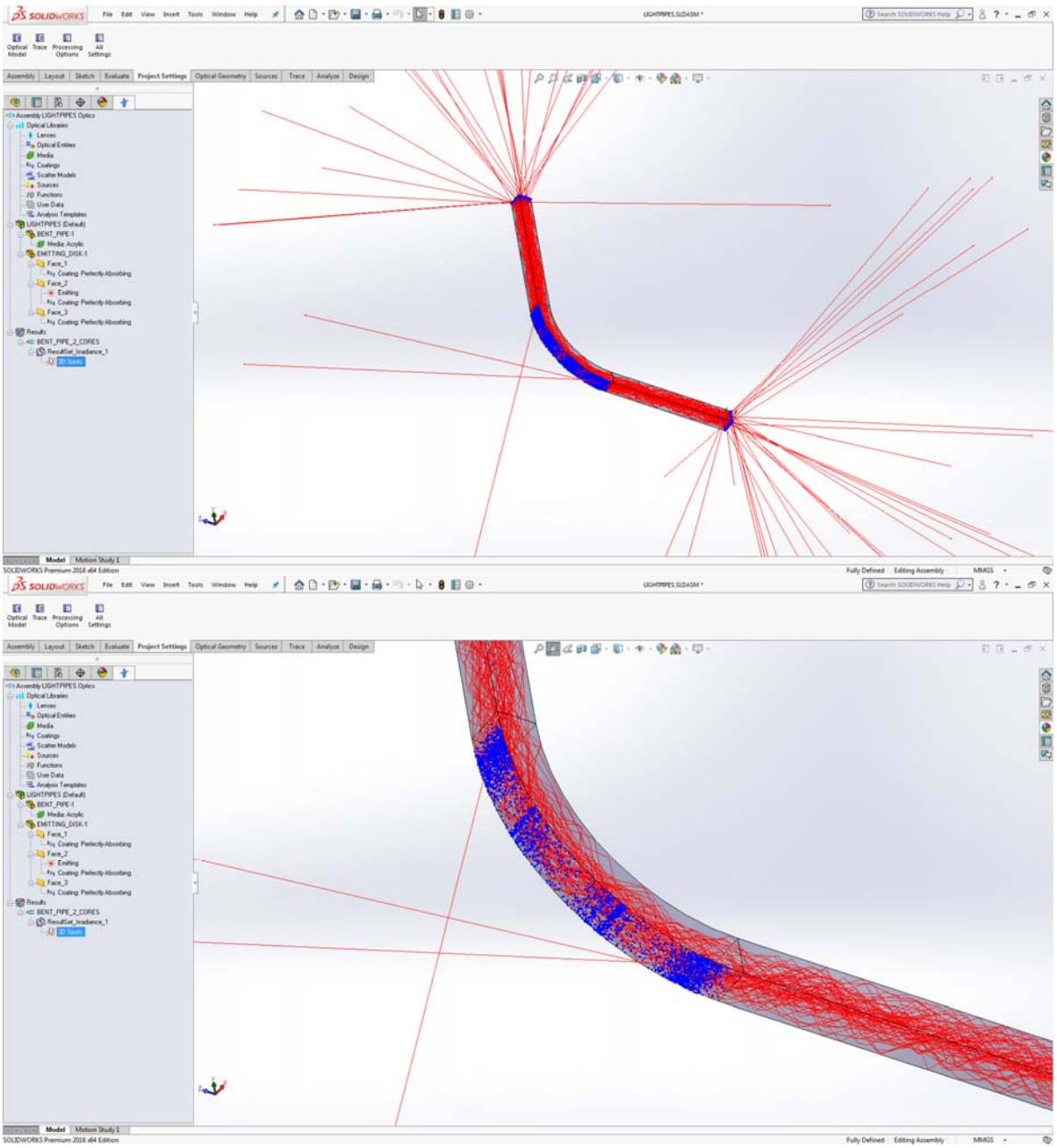


- Do not mix ray traces and analyses from a different number of cores in the same simulation. APEX creates working directories for all requested cores. All ray traces and analysis are saved even if temporarily in APEX and in these various working directories. Switching from 1 core to 2 cores, for example, will cause a confliction of the data between the ray traces from different cores.
    - If you wish to perform the same analysis using a different number of cores then put them in separate, unique and different directories.
- Ray trace and spot diagrams will typically only show the results from the parent node if more than 1 core is used in the simulation. The other rays are traced, and their contributions are automatically accounted for in the simulation, but you will only see the ray trace results of the master node. This can be somewhat confusing when compared to the results from a single core because it will appear that rays and spots are missing from the trace. However, all data from all cores is combined for numerical and graphical calculations.

- The results of an incoherent ray trace plot that is parallel processed over multiple cores will show only the ray trace results of the master node. The other rays are traced, and their contributions are automatically accounted for in the simulation, but you will only see the ray trace results of the master node.

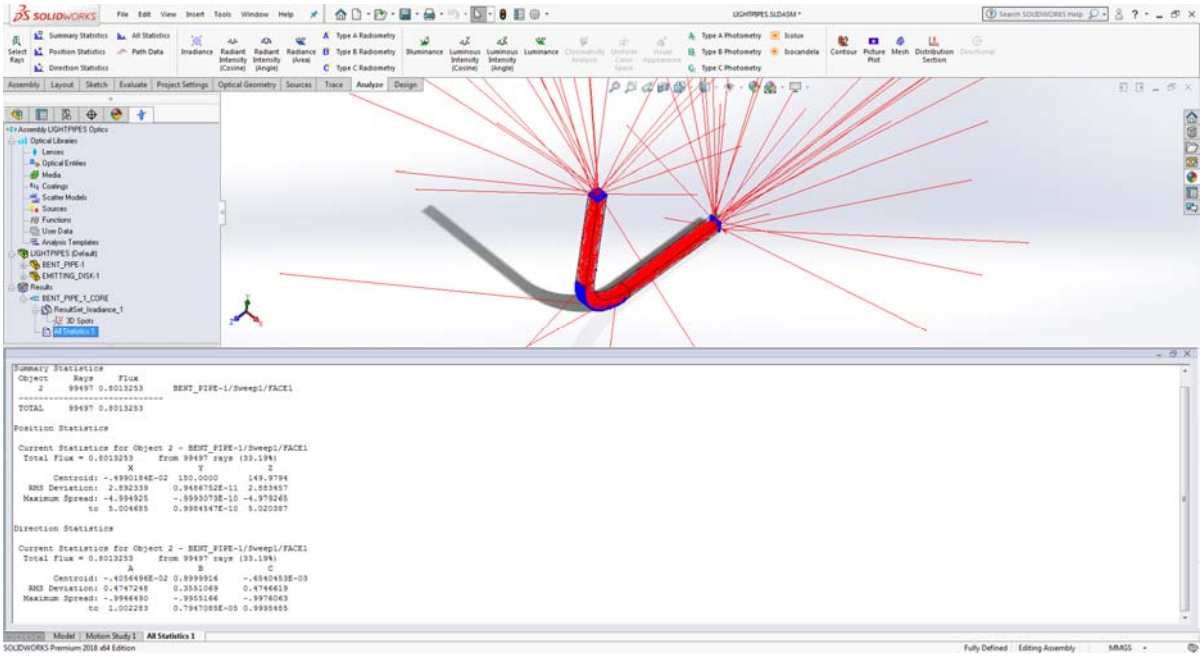

SOLIDWORKS
LIGHTPIPES.SLDASM *
Assembly
Layout
Sketch
Evaluate
Project Settings
Optical Geometry
Sources
Trace
Analyze
Design
Model
Motion Study 1
Irradiance 1
SOLIDWORKS Premium 2018 x64 Edition
Fully Defined
Editing Assembly
MMGS

Single Core



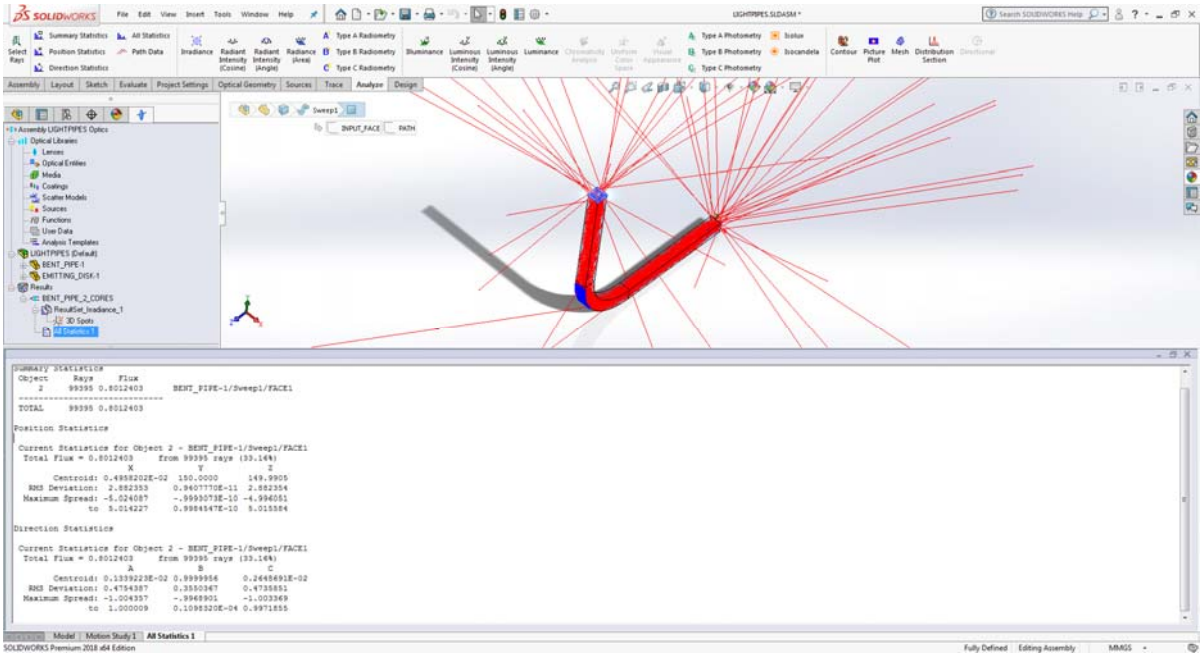
Two Cores

- Numerical (statistical) and graphical results will vary slightly depending upon the number of cores used in the simulation. This is due to the deliberate use of different random seed numbers on each core that produce different ray distributions to support a more robust Monte Carlo simulation.



```
Summary Statistics
 Object      Rays      Flux
      2     99497 0.8013253       BENT_PIPE-1/Sweep1/FACE1
 ----------------------------
 TOTAL      99497 0.8013253

Position Statistics

 Current Statistics for Object 2 - BENT_PIPE-1/Sweep1/FACE1
  Total Flux = 0.8013253     from 99497 rays (33.19%)
                          X              Y              Z
        Centroid: -.4990184E-02  150.0000      149.9794
   RMS Deviation:  2.892339     0.9486752E-11  2.883457
  Maximum Spread: -4.994925     -.9993073E-10 -4.979265
               to  5.004685     0.9984547E-10  5.020387

Direction Statistics

 Current Statistics for Object 2 - BENT_PIPE-1/Sweep1/FACE1
  Total Flux = 0.8013253     from 99497 rays (33.19%)
                          A              B              C
        Centroid: -.4056496E-02 0.9999916      -.6540453E-03
   RMS Deviation: 0.4747248     0.3551069      0.4746619
  Maximum Spread: -.9946490     -.9955166      -.9976063
               to  1.002283     0.7947085E-05 0.9995485
```

One Core



```
Summary Statistics
 Object      Rays      Flux
      2     99395 0.8012403      BENT_PIPE-1/Sweep1/FACE1
 ----------------------------
 TOTAL      99395 0.8012403

Position Statistics

 Current Statistics for Object 2 - BENT_PIPE-1/Sweep1/FACE1
  Total Flux = 0.8012403     from 99395 rays (33.16%)
                          X              Y              Z
        Centroid: 0.4958202E-02  150.0000      149.9905
   RMS Deviation:  2.882353     0.9407770E-11  2.882354
  Maximum Spread: -5.024087     -.9993073E-10 -4.996051
                to  5.014227     0.9984547E-10  5.015584

Direction Statistics

 Current Statistics for Object 2 - BENT_PIPE-1/Sweep1/FACE1
  Total Flux = 0.8012403     from 99395 rays (33.16%)
                          A              B              C
        Centroid: 0.1339223E-02 0.9999956     0.2648691E-02
   RMS Deviation: 0.4754387     0.3550367     0.4735851
  Maximum Spread: -1.004357     -.9968901     -1.003369
                to  1.000009     0.1098320E-04 0.9971855
```

Two Cores